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TECHNIQUES FOR ESTIMATING FLOOD DISCHARGES FOR UNREGULATED STREAMS IN NEW MEXICO

By Richard P. Thomas and Robert L. Gold

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CONVERSION FACTORS

The inch-pound units in this report can be converted to the metric system of units as follows:

Multiply inch-pound unit	By	To obtain metric unit
inch	25.40	millimeter
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
cubic foot per second	0.0283	cubic meter per second
foot per mile	0.1894	meter per kilometer

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

TECHNIQUES FOR ESTIMATING FLOOD DISCHARGES FOR UNREGULATED STREAMS IN NEW MEXICO

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ABSTRACT

Equations for estimating flood magnitudes at selected recurrence intervals from 2 to 500 years were developed using multiple-regression analyses. These equations relate flood magnitudes to basin characteristics, contributing drainage area, and site altitude, and only are applicable to unregulated streams in New Mexico that are relatively unaffected by urban runoff. Flood estimates at gaged sites are computed using a separate estimating equation. This equation adjusts discharges developed from the original regression equations using flood magnitude and frequency values at the gaged site.

INTRODUCTION

For the design of hydraulic structures, such as dams, bridges, culverts, levees, and channels, reliable estimates of flood magnitudes and frequencies are essential. Both underdesigned and overdesigned structures can waste time, money, and resources.

This report presents equations that can be used to estimate flood magnitudes at various recurrence intervals for unregulated streams in New Mexico that are relatively unaffected by urban runoff. The report also documents the procedures used to relate flood-magnitude and flood-frequency characteristics to basin characteristics. Basin characteristics found to be statistically significant in this study are contributing drainage area and site altitude.

The equations presented estimate flood magnitudes at the 2-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year recurrence intervals. Recurrence interval represents the average number of years within which a flood of a given magnitude will be exceeded. For example, the flood magnitude at a 100-year recurrence interval will be exceeded on the average of once every 100 years. The probability of exceedance in any given year, expressed as a percentage, is equal to the reciprocal of the recurrence interval times 100. There is a 50-percent probability that the 2-year flood will be exceeded in any given year and a 1-percent probability that a 100-year flood will be exceeded in any given year.

This report is a result of a 10-year project begun during 1969 to investigate the flood characteristics of small streams in New Mexico. The equations are for a wide range of drainage areas; the study used a data base of 277 stations with drainage areas ranging from 0.05 square mile to 15,300 square miles. Locations of the streamflow-gaging stations used in this report are shown in figure 1.

This report was prepared by the U.S. Geological Survey in cooperation with the New Mexico State Highway Department and the U.S. Department of Transportation, Federal Highway Administration. The contents of this report do not necessarily reflect the views or policies of the cooperating agencies.

PREVIOUS STUDIES

Techniques for estimating flood magnitude and frequency have been developed for New Mexico or parts of New Mexico in 11 previous studies made by the U.S. Geological Survey. These studies are summarized in table 1.

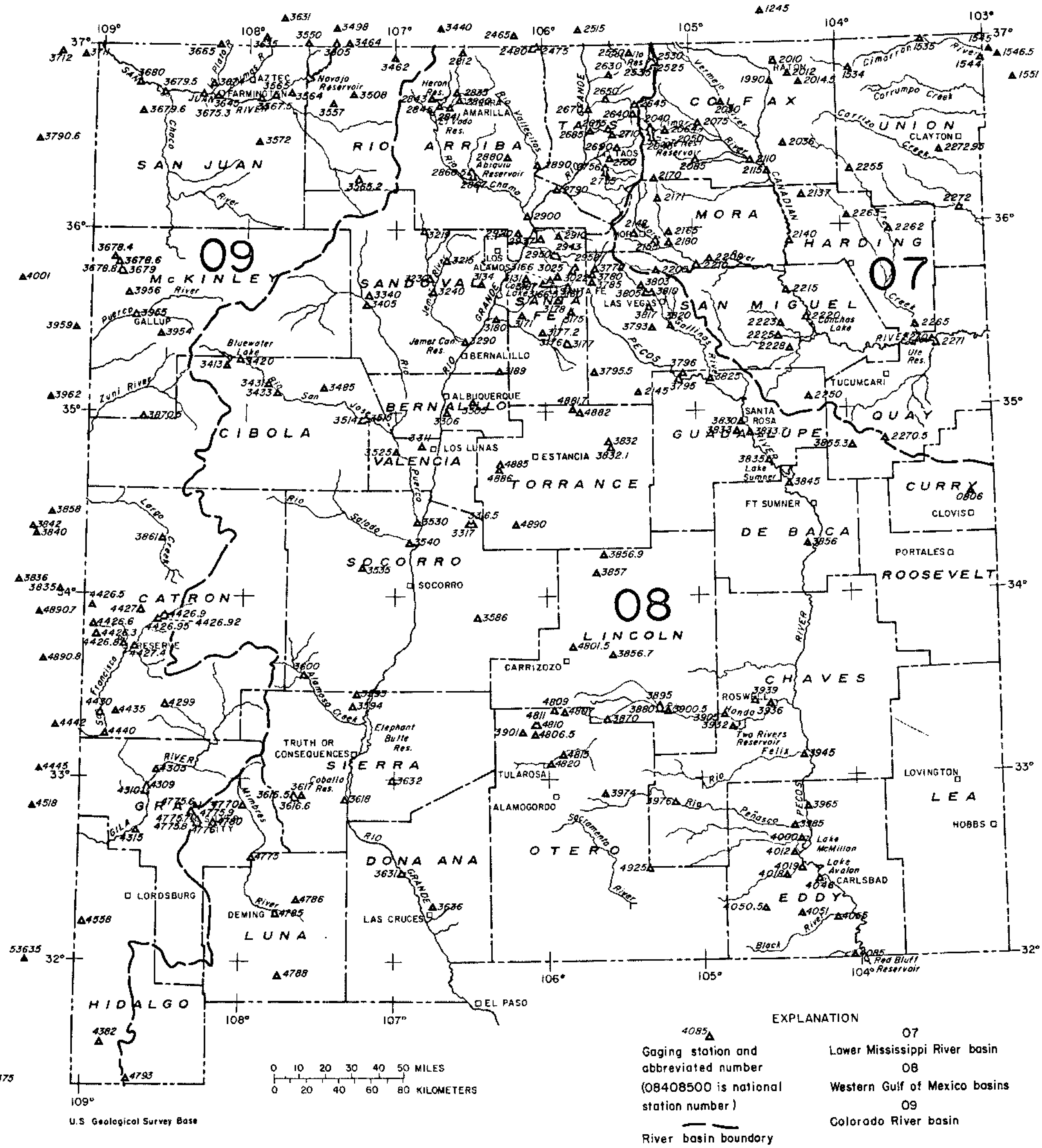

Figure 1.--Location of surface-water monitoring stations on unregulated streams in New Mexico.

Table 1. Studies by the U.S. Geological Survey relating to flood frequency

Study title	Date	Author	Type of study: Index flood	Type of study: Multiple regression	Part of New Mexico covered in study	Number of stations: Entire study	Number of stations: New Mexico only	Form of release
"The Rio Grande of New Mexico, magnitude and frequency of floods"	1952	H. H. Hudson	x		Main stem Rio Grande only	12	12	Unpublished data
"Floods in north-central New Mexico, frequency and magnitude"	1953	H. H. Hudson	x		North-central New Mexico	32	32	Unpublished data
"Magnitude and frequency of summer floods in western New Mexico and eastern Arizona"	1954	F. W. Kennon	x		Distinct areas in north-central and in southwest New Mexico	51	27	Unpublished data
"Floods in New Mexico, magnitude and frequency"	1962	L. A. Wiard	x		All of New Mexico	120	102	Circular 464
"Magnitude and frequency of floods in the United States, Part 7, Lower Mississippi River Basin."	1964	J. L. Patterson	x		Eastern New Mexico	393	17	Water-Supply Paper 1681
"Magnitude and frequency of floods in the United States, Part 8, Western Gulf of Mexico Basins."	1965	J. L. Patterson	x		Central New Mexico	298	79	Water-Supply Paper 1682
"Magnitude and frequency of floods in the United States, Part 9, Colorado River Basin."	1966	J. L. Patterson and W. P. Sommers	x		Western New Mexico	342	14	Water-Supply Paper 1683
"A proposed streamflow-data program for New Mexico."	1970	J. P. Borland		x	All of New Mexico	163	163	Open-file report
"Preliminary flood-frequency relations and summary of maximum discharges in New Mexico."	1971	A. G. Scott		x	All of New Mexico	163	163	Open-file report
"Flood discharges of streams in New Mexico as related to channel geometry"	1976	A. G. Scott and J. L. Kunkler		x	All of New Mexico	79	79	Open-File Report 76-414
"Small streams flood-frequency relations for the central Rio Grande Valley of New Mexico."	1980	R. P. Thomas and J. P. Borland		x	Central Rio Grande Valley	15	15	Unpublished data

Studies prior to 1966 used the "index-flood" method to estimate the flood magnitude at given frequencies using a ratio between the flood at the desired frequency and the mean annual flood. The areas studied generally were divided into regions where the developed ratios appeared to be homogeneous. The reports by Patterson (1964, 1965) and Patterson and Sommers (1966) used data from parts of New Mexico, but the relationships were developed using a data base that was mostly from outside New Mexico. Wiard (1962) developed index-flood ratios that were applicable for most of the State.

The reports by Borland (1970), Scott (1971), and Scott and Kunkler (1976) used multiple-regression analysis to develop equations that related flood magnitudes for several recurrence intervals to measurable channel geometry and basin characteristics. The reports by Borland (1970) and by Scott (1971) related flood magnitudes to basin characteristics that affect the size and shape of a flood peak for a particular basin. The basin characteristics are unique for each basin and include drainage area, basin shape, basin length, basin slope, altitude, temperature, and precipitation. The number of possible characteristics is very large, but the equations use only those that can be determined from topographic or climatic maps and that are statistically significant. The report by Scott and Kunkler (1976) related channel width and depth to flood magnitudes but found only width to be significant. Their method is considered to be an acceptable alternative to the equations presented in this report.

DATA BASE

The equations in this report were developed from a data base of annual peak flows and selected basin characteristics collected by the U.S. Geological Survey at streamflow-gaging stations in New Mexico and immediately adjacent areas of conterminous States. The stations selected for this data base were those that met the criterion of non-regulation of peak flows, a criterion defined for the purpose of this report as no regulation or regulation of an amount or type such that peak flows would be negligibly affected. In addition, the stations were to be relatively unaffected by urban runoff. The data base was selected to include stations in the bordering areas of adjacent States so as to insure some consistency of flood-frequency estimates across State boundaries. However, the equations presented herein are specifically intended to be applicable to streams in New Mexico.

The data base listing flood-magnitude values, the six most significant basin characteristics, and the years of record at each site used in this report can be found in tables 3-5. All basin characteristics determined for each site, in addition to peak flows and station flood characteristics, have been compiled previously in a report by Thomas and Dunne (1981).

ANALYSIS

Peak-flow data from each of the selected stations were analyzed using the log-Pearson Type III distribution according to techniques and procedures outlined by the U.S. Water Resources Council (WRC) Bulletin 17A (1977). The analyses were performed using computer program J407 (WATSTORE vol. 4, chap. 1, sec. c) on the U.S Geological Survey computer system in Reston, Virginia. Generalized coefficients of skew as selected from WRC Bulletin 17A were weighted, in accordance WRC guidelines, with the skew coefficients computed using the station record. The adjusted flood-frequency characteristics and statistics as well as the unadjusted characteristics and statistics for each station are summarized in Thomas and Dunne (1981).

One phase of this project used rainfall and runoff data collected at specific sites in an attempt to develop long-term, synthetic, flood-frequency curves at those sites. The relationship of storms to runoff quantities could not be established; therefore, the frequency curves were not available for use in this study.

The flood magnitudes at the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals were regressed against a number of basin characteristics with log transformation of the variables using the statistical program, "Statistical Package for the Social Sciences" (SPSS) (Nie and others, 1975). Using a forward (stepwise) inclusion of independent variables (basin characteristics) in a multiple-regression analysis, a large number of independent variables was reduced to the six significant variables listed in table 3: Contributing drainage area, main channel length, main channel slope, site altitude, mean annual precipitation, and mean minimum January temperature. Using the reduction of the standard error of estimate as a criterion, the number of variables was further reduced to include only contributing drainage area and site altitude. Contributing drainage area and main channel length were both highly significant but also were so correlated to each other that the length characteristic was not used.

In an attempt to improve equation accuracy, the data were divided into groups based on drainage-area size, physiographic region, and site altitude. Multiple-regression analyses were performed on each group of data, and the results were compared to an analysis of all the data to determine the relative worth of each specific division. Regression analyses performed on groups of data divided on the basis of drainage-area size resulted in no improvement of equation accuracy.

The State was divided into two different sets of physiographic divisions; one set is defined in Fenneman (1931), and the other set is defined by the National Oceanic and Atmospheric Administration (1981). These divisions were made based on geology, various basin characteristics, and climatic patterns. Regression analyses were made on the data in each of the divisions and then on many different groups of compatible divisions. The average standard error for the various divisions was similiar to the standard error for a single set of statewide equations.

Other State studies have defined regions based on residual trends from the regression analyses. The residuals (the difference between the estimated and measured peaks) of the New Mexico statewide equation were examined for patterns in two ways: (1) Through a statistical program that uses patterns of spatial variance (Skrivan and Karlinger, 1980); and (2) visual examination of a contour map of the residuals. Empirical-semivariogram estimation (Skrivan and Karlinger, 1980) displayed patterns similiar to variables that are random in nature, such as a series of annual rainfall quantities at a station. A contour map of the negative and positive residuals was generated by the computer. The map showed no large areas of similarity of the residuals that would lend themselves to statewide divisions. Thus, based on the analysis of the residuals, there is no apparent reason to divide the State into regions of homogeneous flood magnitude.

The inclusion of site altitude in the regression equations may be a cause of the random distribution of residuals. In other States and in a previous report about New Mexico (Scott, 1971), the distribution of residuals coincided fairly well with physiographic features because the mountains were in one division and the plains and lowlands were in another. The site altitude may have canceled any physiographically related residual distribution.

To further evaluate the effect of site altitude on equation development, the data were divided into about 20 overlapping groups based on site altitude; regression analyses in each of the groups showed no significant improvement in standard error in any altitude range.

As a means to evaluate whether a log-linear regression model was appropriate for the data collected, a series of graphic plots were made. The independent variables (contributing drainage area and site altitude) were plotted versus the residuals. The plots proved to be random and thus indicated that use of the regression model was suitable.

Using a random-selection process built into SPSS, a set of regression analyses was made on data bases representing 50, 60, 70, 80, and 90 percent of the original data base. Variable selection and equation development were similiar to the full data base equation at each of these percentages.

ESTIMATING TECHNIQUES

The techniques for estimating flood discharge described in this report apply only to streams that are unregulated and do not apply to streams draining basins where man has significantly changed the runoff characteristics. If the user is estimating flood magnitudes to develop a probability curve, each of the points on the curve needs to be estimated by the same method and the same set of variables.

Flood magnitude at sites on ungaged streams

Equations for estimating flood magnitudes

Flood magnitudes can be estimated at sites on ungaged streams through the use of the equations presented in this section. The general form of the equation to estimate flood magnitudes at ungaged sites is:

$$Q_t = kA^x \, (Sa/1{,}000)^y \qquad (1)$$

where

Q_t = flood magnitude (instantaneous peak discharge), in cubic feet per second, for the recurrence interval t;

k = regression constant (presented in scientific notation form);

A = contributing drainage area, in square miles;

Sa = site altitude, in feet above sea level;

x = regression exponent for A; and

y = regression exponent for Sa.

The equations for estimating flood magnitudes at the 2-, 5-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals are presented below:

$$Q_2 = 2.25 \times 10^3 \; A^{0.515} \; (Sa/1,000)^{-2.06} \qquad SE = +151, -60 \qquad (2)$$

$$Q_5 = 1.49 \times 10^4 \; A^{0.469} \; (Sa/1,000)^{-2.54} \qquad SE = +129, -56 \qquad (3)$$

$$Q_{10} = 3.88 \times 10^4 \; A^{0.444} \; (Sa/1,000)^{-2.78} \qquad SE = +124, -55 \qquad (4)$$

$$Q_{25} = 1.06 \times 10^5 \; A^{0.419} \; (Sa/1,000)^{-3.03} \qquad SE = +134, -57 \qquad (5)$$

$$Q_{50} = 2.01 \times 10^5 \; A^{0.403} \; (Sa/1,000)^{-3.18} \qquad SE = +140, -58 \qquad (6)$$

$$Q_{100} = 3.54 \times 10^5 \; A^{0.389} \; (Sa/1,000)^{-3.32} \qquad SE = +145, -59 \qquad (7)$$

$$Q_{200} = 5.91 \times 10^5 \; A^{0.376} \; (Sa/1,000)^{-3.45} \qquad SE = +157, -61 \qquad (8)$$

$$Q_{500} = 1.09 \times 10^6 \; A^{0.360} \; (Sa/1,000)^{-3.59} \qquad SE = +169, -63 \qquad (9)$$

The standard error (SE) shown is the standard error of estimate associated with each equation, expressed as percentages. The flood magnitude at these recurrence intervals can be computed using contributing drainage area (A) and site altitude (Sa).

Example for an ungaged site

The following steps are used to estimate the magnitude of the 100-year flood for Arroyo Jaspe at U.S. Highway 285 near Lamy, New Mexico (fig. 2):

1. Locate the site on the appropriate topographic map. Arroyo Jaspe at U.S. Highway 285 is located on the Wildhorse Mesa, New Mexico, 7.5-minute topographic quadrangle.

2. Determine the site altitude (the altitude of the streambed at Highway 285). From the topographic contours, the altitude of the site is about 6,300 feet.

3. Define the contributing drainage area by first delineating the drainage basin. Any part of the basin that will not contribute to the runoff needs to be excluded from the delineated area.

4. Compute the area of the contributing drainage within the defined area. One method would be to use a digitizer coupled to a computer; other methods are to use an integrating planimeter or simply to overlay the area with a transparent grid containing squares of a given area and to count the squares that are within the delineated basin. The contributing drainage area for Arroyo Jaspe is 6.76 square miles, determined with a digitizer.

5. Using the computed drainage area and site altitude, compute the amount of the 100-year flood peak by using equation 7 as follows:

$$Q_{100} = 3.54 \times 10^5 \quad A^{0.389} \quad (Sa/1{,}000)^{-3.32}$$

$$= 3.54 \times 10^5 \quad (6.76)^{0.389} \quad (6{,}300/1{,}000)^{-3.32}$$

$$= 1{,}700 \text{ cubic feet per second}$$

The estimated magnitude of the 100-year flood for Arroyo Jaspe at U.S. Highway 285 is 1,700 cubic feet per second.

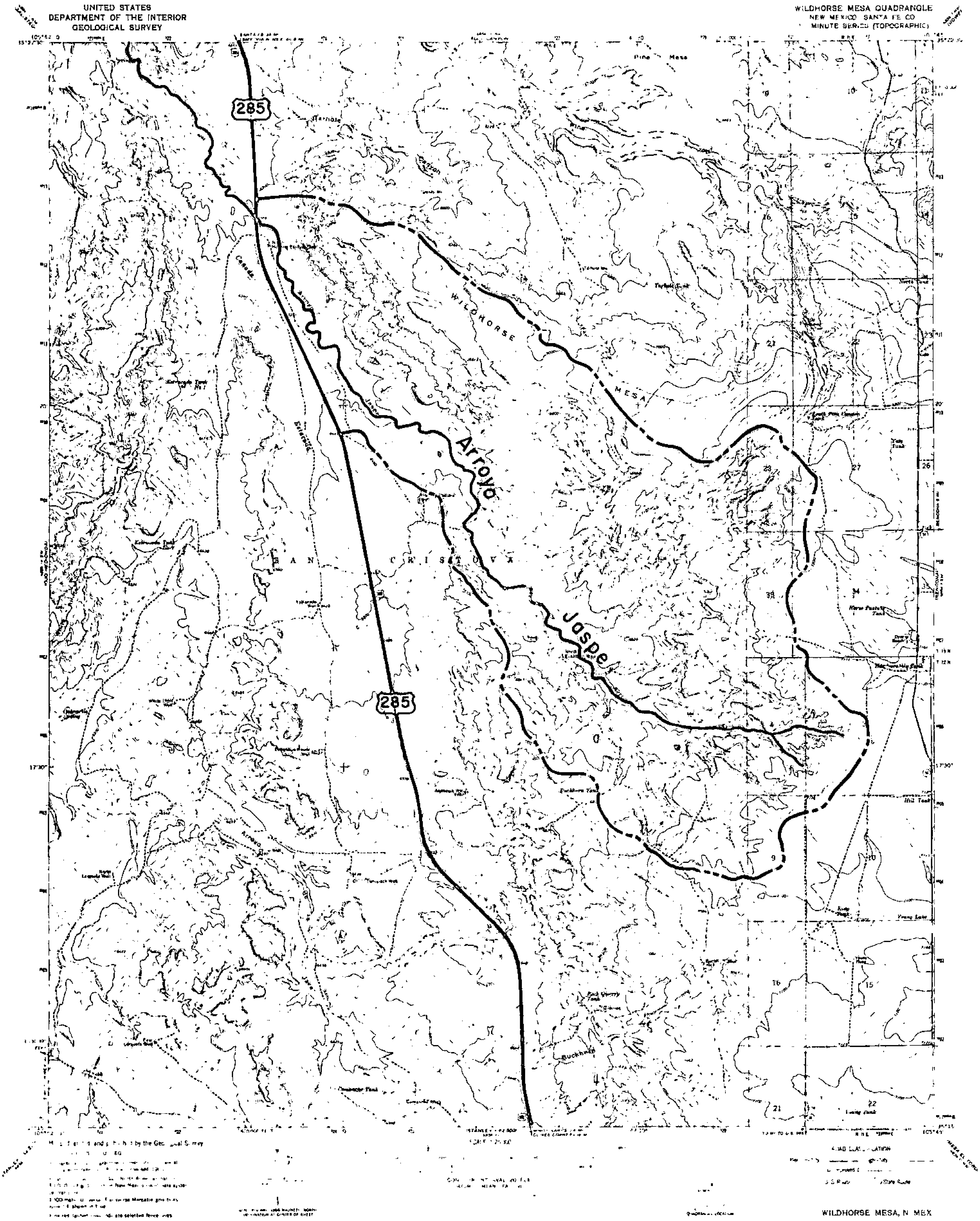

Figure 2.--Arroyo Jaspe drainage basin.

Flood magnitude at a gaged site

Flood magnitudes (expressed as weighted average discharges) can be estimated at a gaged site in an unregulated basin using the log-Pearson Type III derived discharges and the discharge computed using one of the equations presented in this report. The log-Pearson Type III derived discharges for unregulated basins in New Mexico are presented in Thomas and Dunne (1981). The method presented here was first described by Sauer (1974) and has subsequently been used in many U.S. Geological Survey flood-estimation procedures.

The weighted average discharge is computed from the equation:

$$Q_{t(W)} = \frac{Q_{t(S)}\,N + Q_{t(R)}\,E}{N + E} \tag{10}$$

where

$Q_{t(W)}$ = the weighted discharge at recurrence interval t, in cubic feet per second;

$Q_{t(S)}$ = the log-Pearson Type III discharge for the flood at recurrence interval t, in cubic feet per second;

N = the number of years of station data used to compute $Q_{t(S)}$;

$Q_{t(R)}$ = discharge at recurrence interval t, estimated using equations (2-9) presented in this report, in cubic feet per second; and

E = the equivalent years of record for $Q_{t(R)}$. A value of 5 years is to be used as a result of an accuracy appraisal that was made using the error analysis described by Hardison (1971).

Flood magnitude at an ungaged site near a gaged site on the same stream

Flood magnitudes may be estimated at an ungaged site near a gaged site on the same stream if the drainage area of the ungaged site is within 50 percent of the drainage area of the gaged site. The estimate can be computed according to the following equation, which was first described by Sauer (1974):

$$Q_{t(Z)} = Q_{t(R)} \left(U - \frac{\Delta A \, (U - 1.00)}{0.5 \, Ag} \right) \quad (11)$$

where

$Q_{t(Z)}$ = estimated discharge at an ungaged site near a gaged site on same stream at recurrence interval t, in cubic feet per second;

$Q_{t(R)}$ = discharge at an ungaged site at recurrence interval t, estimated using equations (2-9) presented in this report, in cubic feet per second;

$U = \frac{Q_{t(W)}}{Q_{t(R)}}$

$Q_{t(W)}$ = weighted discharge at gaged site at recurrence interval t, in cubic feet per second (computed with equation 10);

ΔA = difference between contributing drainage area of the gaged and ungaged sites, in square miles; and

Ag = contributing drainage area of the gaged site, in square miles.

ACCURACY AND LIMITATIONS

The standard error of estimate, which is expressed as a percentage in this report, is a measure of the accuracy of the regression equation; it is the standard deviation of the residuals about the regression equation. If the residuals are normally distributed, two-thirds of the observed values used to develop the regression equation will plot within the standard error of the computed estimates. If the data set used to develop the equation is fairly large and is a representative sample, the standard error of estimate will be almost equal to the standard error of prediction (a measure of the error in the regression equation as well as the scatter about the equation) and thus can be used to assess the general predictive value of the equation. The standard error of prediction was computed for the equations presented in this report using methods outlined by Hardison (1971) and was found to be nearly equal to the standard error of estimate.

The standard errors of estimate of the equations presented in this report are large; they reflect the extreme variability of conditions in New Mexico that affect flood characteristics. Runoff-producing storms are generally small convective cells that are variable in size, direction, and speed. Topography and climatic conditions also are variable. Improvements in the accuracy of the estimating equations might result from a better definition of precipitation patterns, identification of additional significant basin characteristics, use of other forms of statistical modeling, or collection of specialized data such as soil moisture, solar radiation, and wind.

Flood estimates may have errors larger than those indicated by the estimating equations if they are made at sites where the values of the basin characteristics are outside of the range of values used to develop the equations. The mean and extremes of those values used to develop the equations presented in this report are given in table 2. Caution and judgment need to be used when using a variable with a value outside of this specified range.

Table 2. Statistics of basin characteristics used for regression analysis

Basin characteristic	Minimum	Maximum	Mean
Contributing drainage area, in square miles	0.05	15,300	576
Site altitude, in feet above sea level	2,900	10,600	6,060

As a means of defining the limits of accuracy of the equations that resulted from the regression analysis, outstanding recorded historical peak flows were reviewed for sites in the southwestern United States. The results of the review indicated that the estimating equations are applicable only to drainage areas greater than 1 square mile. Additionally, estimates of flood magnitudes made for small streams at lower site altitudes (about 3,000 feet) seem to indicate a greater error. The relatively short flood record for most of the sites with small drainage areas may account for part of such inaccuracy in flood estimates.

It should be emphasized that the equations presented are only a means to estimate flood magnitudes. Knowledge of hydrologic conditions in a specific area, including historic floods and streamflow measured at the site, may result in an estimate of flood magnitude different from that which results from the equations presented in this report.

SUMMARY

This report is a result of data collected and analyzed as part of a 10-year project begun during 1969 to investigate the flood characteristics of small streams. Results of this project may be helpful to planners and designers in the field of water resources.

One aspect of the project, the calculation of long-term synthetic flood-frequency curves from rainfall and runoff data collected at certain sites, proved to be unsuccessful due, in part, to the absence of recorded storm events. However, flood peaks collected at 277 sites throughout New Mexico and parts of adjacent States were used to calculate flood-frequency curves. Data from such curves were used as the dependent variables and basin characteristics were used as the independent variables in a multiple-regression analysis. A set of regression equations was developed to estimate flood magnitudes for unregulated streams in New Mexico at the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals. The basin characteristics found to be the most significant were contributing drainage area and site altitude.

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Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
1	7124500	5,980	795.0	38.0	41.0	18.0	16.0
2	7153400	6,420	73.0	99.0	17.3	20.1	12.0
3	7153500	4,900	500.0	50.0	54.0	16.0	14.0
4	7154400	4,380	111.0	38.0	34.2	15.4	17.0
5	7154500	4,262	1,038.0	26.2	104.0	16.0	16.0
6	7154650	4,557	25.4	36.5	11.4	16.0	16.0
7	7155100	4,600	11.0	29.1	8.1	16.0	16.0
8	7199000	6,248	229.0	53.8	47.4	18.0	12.0
9	7201000	6,640	14.4	143.0	7.6	17.8	12.0
10	7201200	6,480	5.2	255.0	3.8	-	-
11	7201450	6,499	18.2	55.0	7.7	-	-
12	7203000	6,365	301.0	62.9	51.4	19.0	11.0
13	7203600	6,148	6.7	64.0	4.8	-	-
14	7204000	8,197	73.8	81.0	14.4	20.0	4.0
15	7204500	8,195	56.0	102.0	15.7	19.0	4.0
16	7205000	8,195	10.5	429.0	6.5	20.0	4.0
17	7206400	7,860	7.4	878.0	3.4	17.0	7.0
18	7207500	6,630	171.0	99.0	28.0	18.0	8.0
19	7208500	6,720	65.0	212.0	17.5	21.0	6.0
20	7211000	5,770	1,032.0	40.9	58.5	17.9	7.3
21	7211500	5,635	2,850.0	34.4	87.2	17.0	12.0
22	7213700	5,908	3.1	97.0	3.2	14.2	14.0
23	7214000	4,893	4,066.0	27.1	127.8	17.0	13.0
24	7214500	7,845	57.0	156.0	12.9	22.0	6.0
25	7214800	7,635	23.0	446.0	10.8	24.0	10.0
26	7215500	7,000	173.0	65.2	32.6	21.0	6.0
27	7216500	6,750	267.0	46.5	43.6	20.5	7.4
28	7217000	8,450	48.0	39.3	7.5	19.0	4.0
29	7217100	7,605	71.0	68.4	18.1	19.0	4.0
30	7218000	6,785	215.0	45.3	41.0	19.0	7.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
31	7220000	6,910	132.0	67.4	23.7	23.0	14.0
32	7220900	6,300	18.4	99.0	10.2	17.0	11.0
33	7221000	6,145	1,033.0	25.1	80.0	19.0	12.0
34	7221500	5,712	5,712.0	18.4	162.8	17.0	13.0
35	7222000	4,130	5,900.0	18.4	164.0	17.0	13.0
36	7222300	4,580	65.0	60.0	19.0	14.0	22.0
37	7222500	4,430	393.0	48.4	52.3	15.0	22.0
38	7222800	4,290	12.0	47.0	10.6	-	-
39	7225000	4,520	55.0	41.0	16.0	14.1	24.0
40	7225500	5,800	256.0	44.0	33.5	15.6	14.0
41	7226200	4,540	33.4	61.0	14.3	15.8	18.0
42	7226300	5,450	68.0	34.0	19.1	14.5	15.0
43	7226500	3,815	1,443.0	25.7	120.7	15.0	17.0
44	7227000	3,668	10,031.0	27.0	267.5	16.0	16.0
45	7227050	4,750	0.4	360.0	1.1	16.0	22.0
46	7227100	4,740	786.0	13.2	63.1	15.0	22.0
47	7227200	5,100	556.0	25.0	40.0	16.0	17.0
48	7227295	5,250	1.3	53.0	2.7	16.0	17.0
49	8080600	4,250	95.0	15.0	26.0	15.8	21.0
50	8246500	8,272	282.0	43.0	52.0	26.0	6.0
51	8247500	7,970	110.0	64.0	28.0	11.0	4.0
52	8248000	8,040	167.0	80.0	34.0	24.0	4.0
53	8251500	7,428	4,760.0	-	-	-	-
54	8252500	9,429	25.1	227.0	10.0	25.0	4.0
55	8253000	9,404	16.6	461.0	5.2	25.0	4.0
56	8253500	9,487	2.1	862.0	3.4	26.0	4.0
57	8255000	8,900	12.0	629.0	6.4	26.0	2.0
58	8263000	8,280	10.0	704.0	5.4	24.0	4.0
59	8264000	9,394	19.1	477.0	6.2	25.0	4.0
60	8264500	8,872	25.7	300.0	7.7	25.0	4.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

				Main channel			
Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Slope, feet per mile	Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
61	8265000	7,452	113.0	137.0	22.8	21.0	5.0
62	8267000	6,600	190.0	104.0	33.4	22.0	5.0
63	8267500	7,650	36.2	336.0	11.7	23.0	8.0
64	8268500	6,670	65.6	219.0	19.5	20.0	8.0
65	8269000	7,380	66.6	210.0	15.3	25.0	8.0
66	8271000	8,051	16.6	406.0	8.8	24.0	8.0
67	8275000	7,140	71.7	126.0	15.5	20.0	6.0
68	8275500	7,238	83.0	194.0	19.0	22.0	7.0
69	8275600	7,223	37.0	168.0	16.8	22.0	6.0
70	8279000	5,859	305.0	113.0	39.6	21.0	10.0
71	8281200	8,310	27.7	296.0	9.9	27.4	4.0
72	8283500	7,280	405.0	79.8	33.0	22.0	3.0
73	8284000	7,520	49.7	138.0	17.0	20.5	6.0
74	8284100	7,083	480.0	63.6	41.3	24.0	3.0
75	8284300	7,189	45.0	83.3	12.8	18.0	3.0
76	8284500	6,945	193.0	48.3	17.8	18.0	2.0
77	8286650	6,300	144.0	123.0	20.6	-	-
78	8286700	8,044	162.0	121.2	29.7	-	
79	8288000	7,400	50.5	166.0	17.8	22.0	6.0
80	8289000	6,359	419.0	104.0	35.9	16.0	6.0
81	8290000	5,654	3,044.0	27.8	129.2	15.0	7.0
82	8291000	6,460	86.0	320.0	16.7	20.0	14.0
83	8292000	6,120	34.5	200.0	18.2	20.4	15.0
84	8293700	5,845	0.7	92.0	1.8	-	-
85	8294300	6,514	25.1	346.0	8.5	27.0	13.0
86	8295000	6,280	38.2	400.0	12.3	22.0	16.0
87	8295200	10,600	0.6	100.0	0.9	27.0	13.0
88	8302200	9,670	1.6	200.0	1.8	26.0	14.0
89	8302500	7,100	11.6	450.0	8.3	17.0	16.0
90	8313100	6,450	1.2	142.0	2.6	11.0	17.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
91	8313400	6,210	7.6	250.0	5.0	17.0	20.0
92	8316000	7,718	18.2	343.0	11.5	23.0	16.0
93	8316600	7,150	0.3	153.0	1.3	13.0	16.0
94	8316650	7,030	1.3	119.0	2.5	13.0	16.0
95	8316700	6,830	2.9	95.0	5.4	12.0	16.0
96	8317100	6,017	0.5	159.0	1.5	10.5	16.0
97	8317500	6,940	11.3	181.0	6.9	17.1	15.0
98	8317600	6,190	116.0	73.0	19.2	13.7	16.0
99	8317700	6,270	2.1	169.0	3.4	13.0	16.0
100	8317720	6,120	1.8	95.0	2.9	-	-
101	8317800	7,195	0.6	468.0	1.8	15.0	16.0
102	8318000	5,255	640.0	37.6	47.0	13.0	16.0
103	8318900	6,280	45.2	60.0	11.0	12.3	16.0
104	8321500	6,703	173.0	57.1	29.2	25.0	5.0
105	8321900	8,120	26.8	232.0	11.2	24.6	10.0
106	8323000	6,016	235.0	132.0	32.9	22.0	4.0
107	8324000	5,622	470.0	140.0	36.3	23.0	6.0
108	8329000	5,096	1,038.0	71.0	60.0	17.0	16.0
109	8330500	5,660	75.3	95.0	16.2	15.5	18.0
110	8330600	4,961	133.0	83.0	28.8	14.8	19.0
111	8331100	5,250	0.2	350.0	0.4	-	-
112	8331650	5,800	35.0	190.0	9.3	12.5	20.0
113	8331700	6,080	0.2	133.0	0.8	13.0	16.0
114	8334000	5,949	420.0	23.4	58.8	16.0	9.0
115	8340500	5,921	1,390.0	21.9	51.8	14.0	14.0
116	8341300	7,430	75.0	44.0	18.0	16.3	13.0
117	8342000	6,720	209.0	65.0	23.0	14.0	8.0
118	8343100	6,450	13.0	57.0	7.5	11.0	16.0
119	8343300	6,400	0.1	600.0	1.0	-	-
120	8348500	6,650	6.2	254.6	7.1	11.9	17.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel Slope, feet per mile	Main channel Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
121	8351400	5,550	411.0	37.0	64.9	10.0	18.0
122	8351500	5,475	2,530.0	33.0	92.8	11.0	14.0
123	8352500	5,009	5,460.0	15.1	136.0	14.0	15.0
124	8353000	4,722	6,220.0	14.0	169.2	10.0	15.0
125	8353500	6,110	195.0	87.0	19.1	12.5	18.0
126	8354000	4,765	1,380.0	35.6	75.0	12.0	16.0
127	8358600	5,440	1.3	112.0	1.8	-	-
128	8359300	5,090	26.9	182.0	13.9	-	-
129	8359400	4,950	0.9	114.0	3.4	9.0	22.0
130	8360000	6,142	403.0	73.5	28.1	16.0	14.0
131	8361650	5,740	21.5	282.0	8.3	18.4	24.0
132	8361660	5,680	0.6	279.4	8.4	14.0	24.0
133	8361700	5,400	35.4	202.0	11.4	17.5	24.0
134	8361800	4,230	119.0	81.0	31.2	14.6	24.0
135	8363100	3,900	0.4	259.0	1.4	10.0	26.0
136	8363200	4,670	25.4	70.0	12.1	10.0	24.0
137	8363600	4,035	-	146.0	12.3	10.0	26.0
138	8377900	7,890	53.2	235.0	15.7	29.0	13.0
139	8378500	7,502	189.0	144.0	23.2	24.0	14.0
140	8379300	6,240	122.0	79.0	29.4	19.6	18.0
141	8379500	5,130	1,050.0	35.7	110.0	18.0	15.0
142	8379550	6,659	11.2	117.0	5.2	-	-
143	8379600	5,430	0.2	116.0	0.5	14.0	20.0
144	8380300	7,140	7.6	144.0	4.3	22.6	14.0
145	8380500	6,875	84.0	196.0	16.3	22.0	15.0
146	8381000	6,675	87.0	195.0	18.7	21.5	16.0
147	8381700	6,714	8.1	122.0	7.0	-	-
148	8382000	5,928	313.0	82.0	36.0	19.0	16.0
149	8382500	4,944	610.0	37.0	81.0	17.0	16.0
150	8383000	4,538	2,650.0	19.8	169.0	16.0	17.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
151	8383200	7,065	29.2	144.0	8.0	16.0	15.0
152	8383210	6,459	0.5	25.0	0.3	-	-
153	8383300	4,610	896.0	35.0	68.2	13.5	22.0
154	8383370	4,500	0.4	371.0	1.0	13.0	24.0
155	8383500	4,311	3,970.0	17.1	198.0	15.0	19.0
156	8384500	4,143	4,390.0	8.0	308.0	15.0	20.0
157	8385530	4,950	9.7	20.0	5.0	15.5	23.0
158	8385600	4,720	242.0	27.0	34.0	13.0	22.0
159	8385670	6,330	6.1	203.0	4.8	19.0	22.0
160	8385690	6,735	0.6	24.0	1.4	15.4	21.0
161	8385700	6,710	1.8	138.0	6.0	16.0	21.0
162	8387000	6,365	120.0	252.0	16.7	25.0	22.0
163	8388000	5,181	290.0	78.0	36.7	21.0	20.0
164	8389500	5,205	295.0	58.0	33.6	19.0	21.0
165	8390050	5,150	0.2	475.0	0.8	-	-
166	8390100	4,945	715.0	65.0	47.0	20.0	21.0
167	8390500	4,190	947.0	42.8	66.6	18.0	22.0
168	8393200	4,059	31.0	110.0	11.0	13.4	22.0
169	8393600	3,575	19.5	47.8	4.6	12.0	24.0
170	8393900	3,740	397.0	39.0	64.4	14.3	22.0
171	8394500	3,403	932.0	39.4	108.0	16.0	22.0
172	8396500	3,292	15,300.0	40.0	155.0	14.0	23.0
173	8397400	7,620	3.1	359.0	2.9	23.0	22.0
174	8397600	5,309	583.0	78.0	47.6	21.0	22.0
175	8398500	3,385	1,060.0	47.7	95.5	18.0	23.0
176	8400000	3,299	265.0	40.1	64.8	14.0	24.0
177	8401200	3,276	220.0	77.0	41.0	14.0	23.0
178	8401800	3,550	254.0	60.0	43.3	13.2	28.0
179	8401900	3,250	285.0	70.0	40.0	14.5	26.0
180	8404600	3,145	0.5	255.0	1.0	-	-

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
181	8405050	4,180	0.2	15.0	0.6	13.9	28.0
182	8405100	3,625	14.6	72.0	7.5	-	-
183	8405500	3,070	343.0	47.6	56.7	15.0	28.0
184	8408500	2,901	689.0	39.5	60.2	14.0	27.0
185	8477000	5,972	152.0	97.8	26.1	21.0	28.0
186	8477500	5,033	440.0	51.3	51.0	18.0	26.0
187	8477560	6,050	5.1	115.0	4.8	17.5	23.0
188	8477570	5,990	2.1	143.0	3.6	17.0	23.0
189	8477580	5,900	10.0	106.0	6.4	17.5	23.0
190	8477590	5,925	4.6	198.0	6.1	-	-
191	8477600	5,863	26.5	95.0	7.1	16.0	24.0
192	8478000	5,990	18.8	144.0	8.5	17.2	24.0
193	8478500	4,330	1,370.0	35.0	87.9	14.0	24.0
194	8478600	4,410	0.5	164.0	1.3	10.0	26.0
195	8478800	4,451	0.2	181.5	3.6	-	-
196	8479300	5,170	4.3	179.0	4.0	13.0	28.0
197	8480150	5,560	31.0	78.0	12.6	16.8	23.0
198	8480650	5,440	9.7	82.0	6.5	16.0	24.0
199	8480700	6,240	6.8	730.0	5.7	26.6	24.0
200	8480900	5,290	11.1	475.0	9.5	23.7	24.0
201	8481000	4,510	96.0	150.0	19.6	21.2	26.0
202	8481100	4,500	13.8	199.0	12.2	15.6	26.0
203	8481500	5,450	120.0	146.0	20.6	21.0	24.0
204	8482000	4,800	140.0	123.0	27.9	20.0	25.0
205	8488170	6,550	2.7	63.0	3.9	-	-
206	8488200	6,550	10.0	75.0	6.4	13.0	16.0
207	8488500	6,680	18.2	184.0	10.6	20.0	18.0
208	8488600	6,680	11.8	99.0	6.1	-	-
209	8489000	6,750	3.9	83.0	4.0	12.5	18.0
210	8492500	5,430	16.6	105.0	11.6	15.2	23.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Obser-vation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precip-itation in inches	Mean minimum January temperature, in degrees Fahrenheit
211	9344000	7,941	69.8	200.0	13.0	37.0	2.0
212	9346200	6,720	168.0	50.0	23.8	17.7	3.0
213	9346400	6,090	1,230.0	30.0	60.0	30.0	1.0
214	9349800	6,148	629.0	68.0	60.0	27.0	3.0
215	9350500	5,972	1,990.0	39.8	65.4	27.0	2.0
216	9350800	6,640	60.5	40.0	21.1	15.0	2.0
217	9355000	6,160	58.0	97.3	17.5	12.0	7.0
218	9355700	6,410	19.8	74.0	6.1	12.1	8.0
219	9356400	7,000	3.2	80.0	2.0	10.6	9.0
220	9356500	5,540	3,560.0	23.9	107.4	25.0	4.0
221	9356520	6,965	9.1	65.0	4.0	-	-
222	9356750	5,480	1.3	121.6	2.0	9.8	14.0
223	9357200	6,790	0.2	70.0	1.1	11.1	14.0
224	9363100	6,470	16.7	36.3	12.4	18.0	7.0
225	9363500	5,960	1,090.0	32.0	78.0	30.0	4.0
226	9364500	5,280	1,360.0	41.2	113.2	29.0	6.0
227	9366500	5,975	331.0	96.7	37.2	35.0	11.0
228	9367400	5,380	1.0	108.0	3.3	-	-
229	9367530	5,230	3.0	76.0	5.4	8.0	16.0
230	9367840	6,810	2.1	229.0	3.2	16.0	15.0
231	9367860	6,520	8.7	118.0	6.9	14.0	15.0
232	9367880	6,320	26.9	124.0	10.2	13.0	15.0
233	9367900	6,280	7.0	96.0	7.9	12.8	15.0
234	9367950	4,980	4,350.0	34.0	55.0	9.0	18.0
235	9367960	5,916	80.0	90.3	22.6	-	-
236	9368000	4,849	1,290.0	30.0	131.0	17.0	8.0
237	9371100	7,600	16.0	411.0	11.2	16.5	17.0
238	9371200	6,160	24.5	145.0	11.8	11.6	17.0
239	9379060	5,820	1.4	72.2	2.4	9.8	17.0
240	9383500	8,550	83.4	78.0	12.6	20.0	8.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Continued

Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Main channel: Slope, feet per mile	Main channel: Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
241	9383600	9,160	15.9	164.0	8.1	26.1	10.0
242	9384000	6,020	747.0	89.5	41.7	20.0	10.0
243	9384200	6,100	0.2	267.0	1.0	11.6	13.0
244	9385800	6,350	0.3	417.0	0.5	11.1	14.0
245	9386100	6,900	151.0	62.0	26.5	15.6	12.0
246	9387050	7,180	19.0	50.0	7.3	12.8	10.0
247	9395400	7,420	14.0	147.0	5.7	15.5	10.0
248	9395500	6,480	558.0	22.0	49.4	12.9	18.0
249	9395600	6,500	0.4	111.0	1.0	11.5	15.0
250	9395900	7,500	500.0	11.2	47.6	15.8	13.0
251	9396200	6,380	0.05	139.0	0.8	-	-
252	9400100	6,770	11.1	55.5	4.1	11.8	12.0
253	9429900	7,270	89.6	175.2	8.1	18.2	18.0
254	9430500	4,656	1,864.0	37.1	86.3	18.0	16.0
255	9430900	4,500	228.0	51.0	35.7	16.8	26.0
256	9431000	4,456	2,438.0	52.0	80.0	16.0	19.0
257	9431500	4,090	2,829.0	31.5	115.2	17.0	20.0
258	9438200	5,020	157.0	31.0	15.1	15.3	28.0
259	9442630	7,084	4.2	191.0	5.2	-	-
260	9442650	8,250	10.8	160.0	6.0	19.0	11.0
261	9442660	7,310	31.9	107.0	12.6	19.5	12.0
262	9442680	5,820	350.0	59.8	40.9	17.0	12.0
263	9442690	6,750	89.0	129.0	13.8	14.3	13.0
264	9442692	6,750	94.0	100.0	12.0	13.0	14.0
265	9442695	7,900	9.6	280.0	6.0	12.0	14.0
266	9442700	6,760	94.6	72.1	11.1	14.5	12.0
267	9442740	5,900	426.0	75.0	33.8	14.4	15.0
268	9443000	4,842	1,546.0	28.0	52.0	17.6	15.0
269	9444000	4,560	1,653.0	54.6	70.3	17.6	16.0
270	9444200	6,910	506.0	65.3	40.8	20.7	17.0

Table 3. Selected basin characteristics upstream from streamflow-gaging stations on unregulated streams - Concluded

				Main channel			
Observation number	Streamflow gaging station number	Site altitude, in feet	Contributing drainage area, in square miles	Slope, feet per mile	Length, in miles	Mean annual precipitation in inches	Mean minimum January temperature, in degrees Fahrenheit
271	9444500	3,436	2,766.0	48.9	93.2	18.1	19.0
272	9451800	4,800	0.1	878.0	0.6	13.5	30.0
273	9455800	4,300	1.3	75.7	2.1	-	-
274	9489070	9,060	38.1	48.8	10.1	27.5	8.0
275	9489080	9,160	1.6	68.6	2.0	30.0	14.0
276	9536350	6,280	0.6	1,040.0	1.7	18.0	24.0
277	9537500	3,909	1,023.0	20.5	61.7	14.8	28.0

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals

Observation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
1	7124500	6,470	13,100	18,400	26,000	32,100	38,600	45,400	54,900
2	7153400	6,240	1,870	3,280	5,910	8,610	12,000	16,300	23,400
3	7153500	2,960	6,870	10,600	16,900	22,700	29,600	37,800	50,600
4	7154400	2,240	5,790	9,390	15,600	21,600	28,800	37,400	51,200
5	7154500	6,150	14,900	23,400	37,500	50,700	66,300	84,500	113,000
6	7154650	2,150	4,380	6,310	9,250	11,800	14,700	17,800	22,600
7	7155100	61	404	1,060	2,940	5,620	10,000	16,900	31,700
8	7199000	2,930	6,960	10,900	17,400	23,500	30,800	39,400	52,900
9	7201000	308	842	1,410	2,420	3,410	4,640	6,130	8,560
10	7201200	85	227	375	638	894	1,210	1,590	2,200
11	7201450	450	1,540	2,890	5,610	8,550	12,500	17,500	26,400
12	7203000	1,760	3,350	4,680	6,700	8,440	10,400	12,600	15,800
13	7203600	144	293	422	619	789	981	1,190	1,510
14	7204000	60	128	187	276	352	436	528	662
15	7204500	116	255	382	583	763	969	1,200	1,580
16	7205000	27	53	77	114	147	184	227	291
17	7206400	14	39	68	121	175	244	328	470
18	7207500	478	1,260	2,080	3,530	4,960	6,710	8,850	12,300
19	7208500	156	373	607	1,040	1,500	2,100	2,880	4,260
20	7211000	835	2,450	4,170	7,190	10,100	13,600	17,700	24,100
21	7211500	5,930	13,400	21,300	35,400	50,000	68,600	92,400	134,000
22	7213700	13	139	460	1,620	3,610	7,370	14,100	30,700
23	7214000	9,340	23,400	38,400	65,700	93,600	129,000	174,000	251,000
24	7214500	569	1,640	2,840	5,070	7,350	10,300	13,900	20,100
25	7214800	204	458	694	1,070	1,420	1,830	2,290	3,020
26	7215500	590	988	1,270	1,630	1,900	2,180	2,450	2,810
27	7216500	806	1,710	2,560	3,990	5,350	6,980	8,940	12,100
28	7217000	46	181	364	763	1,220	1,860	2,730	4,320
29	7217100	125	342	572	984	1,390	1,900	2,510	3,530
30	7218000	625	1,410	2,140	3,330	4,410	5,680	7,150	9,420

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Obser-vation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
31	7220000	2,280	4,560	6,530	9,520	12,100	15,000	18,300	23,200
32	7220900	986	1,980	2,830	4,130	5,250	6,510	7,920	10,000
33	7221000	2,370	5,690	8,790	13,800	18,200	23,200	29,000	37,500
34	7221500	8,110	21,100	35,200	61,200	87,900	122,000	166,000	240,000
35	7222000	10,900	22,500	32,700	48,300	62,100	77,600	95,000	121,000
36	7222300	1,910	4,620	7,280	11,700	16,000	21,000	26,900	36,200
37	7222500	3,660	8,770	14,000	23,400	32,700	44,400	58,900	83,400
38	7222800	1,180	5,000	10,500	23,000	38,000	59,500	89,400	146,000
39	7225000	984	1,690	2,220	2,980	3,590	4,240	4,930	5,920
40	7225500	6,230	9,320	11,400	14,200	16,300	18,400	20,600	23,500
41	7226200	3,270	4,670	5,610	6,790	7,670	8,550	9,430	10,600
42	7226300	302	592	835	1,200	1,510	1,850	2,230	2,790
43	7226500	8,540	17,600	25,300	36,700	46,400	57,000	68,600	85,300
44	7227000	41,500	84,400	125,000	192,000	256,000	333,000	426,000	577,000
45	7227050	172	355	516	764	983	1,230	1,510	1,930
46	7227100	6,150	12,400	17,900	26,100	33,300	41,300	50,200	63,500
47	7227200	774	6,000	17,100	51,300	103,000	193,000	340,000	670,000
48	7227295	55	147	244	416	583	789	1,040	1,440
49	8080600	427	1,980	4,350	9,950	16,900	27,000	41,400	69,100
50	8246500	2,690	3,690	4,360	5,220	5,870	6,540	7,210	8,140
51	8247500	479	825	1,080	1,420	1,690	1,960	2,240	2,620
52	8248000	1,280	1,900	2,320	2,830	3,210	3,580	3,940	4,420
53	8251500	2,850	6,280	9,230	13,600	17,300	21,300	25,600	31,700
54	8252500	54	126	206	366	543	786	1,120	1,750
55	8253000	57	100	132	176	211	247	286	338
56	8253500	8	12	16	20	23	26	29	34
57	8255000	30	71	110	173	232	301	381	507
58	8263000	48	77	99	129	152	177	203	239
59	8264000	106	166	208	265	309	354	401	466
60	8264500	94	159	208	276	331	389	450	537

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years: 2	5	10	25	50	100	200	500
61	8265000	243	425	569	776	946	1,130	1,330	1,620
62	8267000	308	474	592	748	869	992	1,120	1,290
63	8267500	153	254	330	436	521	611	707	843
64	8268500	139	280	407	606	786	993	1,230	1,600
65	8269000	154	322	469	697	897	1,120	1,380	1,760
66	8271000	112	182	230	294	342	390	439	505
67	8275000	45	103	157	245	325	419	528	698
68	8275500	117	248	365	549	712	898	1,110	1,430
69	8275600	64	137	201	303	394	498	616	796
70	8279000	904	1,790	2,490	3,480	4,270	5,110	5,970	7,180
71	8281200	578	931	1,190	1,540	1,810	2,100	2,400	2,820
72	8283500	4,030	5,780	6,960	8,470	9,600	10,700	11,900	13,500
73	8284000	272	481	645	879	1,070	1,280	1,500	1,820
74	8284100	3,340	5,540	7,190	9,470	11,300	13,200	15,300	18,100
75	8284300	167	437	716	1,210	1,690	2,270	2,980	4,130
76	8284500	1,150	1,920	2,490	3,280	3,920	4,580	5,280	6,270
77	8286650	793	1,430	1,940	2,670	3,290	3,950	4,670	5,710
78	8286700	310	577	795	1,110	1,390	1,680	2,010	2,480
79	8288000	222	422	589	836	1,050	1,280	1,540	1,910
80	8289000	1,000	1,690	2,190	2,880	3.420	3,980	4,570	5,390
81	8290000	5,530	8,230	10,100	12,500	14,400	16,300	18,200	20,900
82	8291000	281	559	807	1,200	1,560	1,970	2,460	3,210
83	8292000	101	256	414	687	951	1,270	1,660	2,280
84	8293700	107	276	451	757	1,050	1,420	1,860	2,580
85	8294300	102	234	358	562	750	971	1,230	1,630
86	8295000	198	633	1,160	2,210	3,340	4,860	6,840	10,300
87	8295200	7	12	16	21	25	30	35	42
88	8302200	9	15	20	27	32	37	43	52
89	8302500	84	214	347	579	803	1,080	1,400	1,930
90	8313100	14	66	145	334	571	920	1,420	2,400

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years: 2	5	10	25	50	100	200	500
91	8313400	30	64	95	143	186	236	292	379
92	8316000	98	235	369	597	811	1,070	1,370	1,860
93	8316600	126	261	380	565	729	916	1,130	1,450
94	8316650	380	1,200	2,170	4,050	6,060	8,690	12,100	17,900
95	8316700	413	1,640	3,350	7,120	11,600	17,800	26,400	42,600
96	8317100	18	66	128	260	410	616	893	1,400
97	8317500	915	1,320	1,590	1,950	2,210	2,480	2,760	3,130
98	8317600	1,750	3,810	5,690	8,710	11,400	14,600	18,300	23,900
99	8317700	416	859	1,250	1,860	2,410	3,030	3,740	4,810
100	8317720	95	262	445	777	1,110	1,530	2,060	2,930
101	8317800	21	103	235	564	991	1,640	2,600	4,520
102	8318000	6,300	11,000	14,600	19,800	24,000	28,600	33,600	40,700
103	8318900	971	2,130	3,210	4,950	6,540	8,410	10,600	13,900
104	8321500	454	868	1,210	1,730	2,170	2,670	3,210	4,020
105	8321900	227	381	498	660	792	932	1,080	1,290
106	8323000	368	746	1,080	1,600	2,060	2,590	3,190	4,110
107	8324000	1,430	2,600	3,540	4,910	6,060	7,320	8,690	10,700
108	8329000	3,770	9,180	14,600	23,800	32,600	43,300	56,100	76,600
109	8330500	1,030	2,580	4,160	6,910	9,580	12,900	16,800	23,300
110	8330600	926	1,450	1,830	2,340	2,750	3,170	3,620	4,240
111	8331100	193	319	414	546	653	767	889	1,060
112	8331650	431	1,270	2,240	4,080	6,000	8,490	11,600	17,100
113	8331700	86	155	212	294	364	440	524	646
114	8334000	2,290	3,460	4,260	5,290	6,070	6,850	7,650	8,710
115	8340500	4,970	7,680	9,580	12,100	14,000	15,900	17,900	20,700
116	8341300	159	411	676	1,150	1,610	2,190	2,890	4,050
117	8342000	896	2,250	3,640	6,060	8,430	11,300	14,900	20,600
118	8343100	282	665	1,040	1,680	2,290	3,020	3,890	5,290
119	8343300	16	45	79	143	210	297	408	598
120	8348500	126	458	899	1,840	2,930	4,440	6,500	10,300

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
121	8351400	404	1,660	3,470	7,610	12,600	20,000	30,300	50,300
122	8351500	1,820	3,750	5,480	8,240	10,700	13,600	17,000	22,200
123	8352500	6,880	12,600	17,200	24,200	30,200	36,800	44,200	55,200
124	8353000	4,170	7,560	10,300	14,200	17,500	21,100	25,000	30,700
125	8353500	1,950	3,380	4,490	6,060	7,350	8,730	10,200	12,400
126	8354000	7,040	15,900	23,600	35,000	44,500	54,800	65,900	81,500
127	8358600	151	267	359	493	604	725	857	1,050
128	8359300	111	800	2,190	6,290	12,300	22,400	38,400	73,500
129	8359400	174	339	475	677	848	1,040	1,240	1,540
130	8360000	2,650	5,070	7,050	9,960	12,400	15,100	18,000	22,300
131	8361650	589	1,150	1,610	2,290	2,850	3,470	4,140	5,100
132	8361660	77	164	240	355	456	567	691	873
133	8361700	948	2,520	4,120	6,860	9,450	12,600	16,200	22,000
134	8361800	1,200	3,300	5,470	9,270	12,900	17,400	22,700	31,100
135	8363100	130	216	280	365	432	502	574	674
136	8363200	1,790	5,070	8,610	14,900	21,200	28,900	38,300	53,500
137	8363600	347	835	1,300	2,060	2,760	3,570	4,500	5,930
138	8377900	196	338	447	601	726	860	1,000	1,210
139	8378500	577	1,070	1,470	2,050	2,540	3,070	3,650	4,490
140	8379300	1,650	4,260	7,010	11,900	16,900	23,000	30,600	43,300
141	8379500	6,670	12,800	17,900	25,400	31,800	38,800	46,500	57,800
142	8379550	228	607	1,010	1,720	2,430	3,310	4,390	6,170
143	8379600	20	65	119	227	344	498	698	1,050
144	8380500	73	405	983	2,500	4,560	7,800	12,700	22,800
145	8380500	633	1,670	2,770	4,770	6,780	9,310	12,400	17,700
146	8381000	484	1,200	1,930	3,180	4,400	5,870	7,640	10,500
147	8381700	27	91	169	327	497	724	1,020	1,540
148	8382000	2,770	4,120	5,050	6,260	7,190	8,130	9,100	10,400
149	8382500	3,290	6,960	10,100	14,700	18,700	23,000	27,600	34,400
150	8383000	9,290	18,500	25,900	36,400	44,900	53,800	63,200	76,200

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Obser-vation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
151	8383200	90	165	226	315	390	473	564	697
152	8383210	4	27	68	184	349	620	1,050	1,970
153	8383300	2,450	3,210	3,690	4,280	4,700	5,120	5,530	6,070
154	8383370	90	269	475	866	1,270	1,800	2,460	3,580
155	8383500	10,000	17,300	23,000	31,100	37,800	45,100	53,000	64,400
156	8384500	8,850	15,200	20,000	26,800	32,400	38,300	44,700	53,700
157	8385530	38	206	489	1,220	2,180	3,660	5,880	10,400
158	8385600	1,690	4,240	6,840	11,300	15,700	21,000	27,400	37,700
159	8385670	406	715	960	1,310	1,610	1,930	2,270	2,780
160	8385690	9	24	41	72	103	142	192	275
161	8385700	20	91	202	473	820	1,340	2,110	3,640
162	8387000	218	424	600	868	1,100	1,360	1,650	2,090
163	8388000	946	2,690	4,620	8,230	11,900	16,600	22,500	32,500
164	8389500	2,040	5,160	8,200	13,200	17,900	23,300	29,500	39,100
165	8390050	20	108	261	667	1,220	2,100	3,450	6,300
166	8390100	1,630	7,910	18,000	43,200	76,100	126,000	201,000	352,000
167	8390500	2,720	7,950	14,100	26,000	38,800	55,900	78,100	118,000
168	8393200	647	2,250	4,310	8,610	13,500	20,100	28,900	45,100
169	8393600	18	80	177	409	702	1,140	1,770	3,020
170	8393900	303	1,640	4,010	10,500	19,700	34,700	58,500	111,000
171	8394500	4,600	15,600	25,700	39,500	49,800	59,500	68,500	79,100
172	8396500	10,600	21,300	30,700	45,400	58,300	73,100	89,800	115,000
173	8397400	24	57	90	144	195	255	327	442
174	8397600	1,510	5,820	12,000	26,300	43,900	70,000	108,000	183,000
175	8398500	2,630	7,470	12,900	22,900	33,200	46,400	62,900	90,900
176	8400000	611	3,020	6,170	12,100	17,900	24,800	32,600	44,200
177	8401200	1,700	10,400	26,700	73,000	139,000	250,000	425,000	808,000
178	8401800	4,110	13,000	23,500	43,700	64,900	92,200	127,000	186,000
179	8401900	3,450	13,500	27,300	58,200	94,600	147,000	219,000	355,000
180	8404600	12	147	540	2,160	5,270	11,800	24,500	59,600

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
181	8405050	109	234	348	533	701	897	1,120	1,480
182	8405100	2,840	6,280	9,510	14,800	19,700	25,400	32,100	42,600
183	8405500	3,220	11,000	20,400	38,700	57,700	82,100	113,000	164,000
184	8408500	4,500	12,500	21,600	39,200	57,900	82,500	114,000	171,000
185	8477000	524	961	1,310	1,810	2,230	2,680	3,170	3,870
186	8477500	3,000	6,530	9,570	14,100	18,000	22,200	26,800	33,400
187	8477560	536	672	753	847	911	973	1,030	1,100
188	8477570	451	952	1,380	2,030	2,590	3,210	3,880	4,870
189	8477580	858	1,520	2,030	2,730	3,290	3,880	4,500	5,360
190	8477590	966	2,040	2,970	4,370	5,570	6,900	8,360	10,500
191	8477600	2,030	3,170	3,960	4,990	5,780	6,570	7,380	8,480
192	8478000	515	1,020	1,430	2,030	2,530	3,070	3,650	4,490
193	8478500	524	952	1,280	1,750	2,120	2,520	2,930	3,520
194	8478600	143	258	345	468	567	671	781	935
195	8478800	66	175	285	470	644	850	1,090	1,470
196	8479300	260	567	838	1,260	1,620	2,020	2,470	3,140
197	8480150	1,380	2,840	4,140	6,180	8,010	10,100	12,500	16,100
198	8480650	868	1,800	2,630	3,930	5,090	6,410	7,920	10,200
199	8480700	123	404	750	1,450	2,210	3,220	4,550	6,910
200	8480900	175	459	756	1,290	1,810	2,460	3,250	4,560
201	8481000	2,060	4,980	7,870	12,800	17,500	23,100	29,800	40,500
202	8481100	285	855	1,510	2,760	4,060	5,750	7,890	11,600
203	8481500	703	1,740	2,790	4,590	6,330	8,440	11,000	15,100
204	8482000	2,230	4,890	7,360	11,300	15,000	19,200	24,100	31,600
205	8488170	34	105	190	355	531	762	1,060	1,580
206	8488200	299	687	1,060	1,670	2,250	2,930	3,730	4,990
207	8488500	107	494	1,100	2,560	4,420	7,230	11,300	19,500
208	8488600	293	749	1,220	2,050	2,860	3,870	5,090	7,090
209	8489000	21	136	356	991	1,920	3,470	5,960	11,500
210	8492500	586	1,720	3,020	5,460	8,010	11,300	15,400	22,500

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years: 2	5	10	25	50	100	200	500
211	9344000	665	919	1,090	1,300	1,460	1,620	1,770	1,990
212	9346200	993	1,580	2,010	2,590	3,040	3,510	4,000	4,680
213	9346400	3,600	5,480	6,810	8,550	9,900	11,300	12,700	14,600
214	9349800	2,120	3,690	4,910	6,640	8,040	9,550	11,200	13,500
215	9350500	6,870	10,700	13,500	17,400	20,400	23,700	27,100	31,900
216	9350800	202	580	996	1,760	2,540	3,530	4,750	6,790
217	9355000	338	624	857	1,200	1,490	1,810	2,170	2,690
218	9355700	627	1,150	1,580	2,200	2,720	3,280	3,900	4,800
219	9356400	377	787	1,150	1,720	2,220	2,790	3,430	4,410
220	9356500	9,340	15,000	19,200	24,900	29,500	34,200	39,100	46,100
221	9356520	80	187	290	461	621	810	1,030	1,380
222	9356750	86	208	327	528	718	945	1,210	1,640
223	9357200	125	259	379	565	731	919	1,130	1,460
224	9363100	221	421	586	831	1,040	1,270	1,520	1,890
225	9363500	5,710	8,100	9,730	11,800	13,500	15,100	16,800	19,100
226	9364500	5,980	9,030	11,200	14,000	16,300	18,600	20,900	24,200
227	9366500	750	1,570	2,310	3,480	4,540	5,760	7,160	9,320
228	9367400	57	222	451	952	1,540	2,360	3,480	5,560
229	9367530	115	274	430	694	943	1,240	1,600	2,160
230	9367840	315	614	867	1,250	1,580	1,960	2,370	2,990
231	9367860	1,110	2,410	3,590	5,490	7,230	9,240	11,600	15,200
232	9367880	1,730	3,000	4,000	5,410	6,590	7,850	9,220	11,200
233	9367900	453	1,050	1,620	2,590	3,490	4,580	5,860	7,890
234	9367950	2,830	7,070	11,400	18,800	25,900	34,500	44,800	61,400
235	9367960	456	830	1,130	1,570	1,940	2,340	2,780	3,420
236	9368000	15,100	25,800	34,200	46,300	56,300	67,200	78,900	96,000
237	9371100	504	910	1,230	1,700	2,090	2,510	2,970	3,640
238	9371200	244	996	2,060	4,440	7,270	11,300	16,900	27,300
239	9379060	16	47	83	152	226	321	442	652
240	9383500	86	217	346	562	762	999	1,270	1,700

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Continued

Observation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
241	9383600	79	147	201	277	341	408	481	584
242	9384000	875	2,170	3,510	5,890	8,250	11,200	14,800	20,800
243	9384200	29	60	86	125	159	196	238	299
244	9385800	49	135	225	384	540	730	960	1,330
245	9386100	293	564	788	1,120	1,400	1,710	2,040	2,530
246	9387050	139	295	435	657	855	1,080	1,340	1,740
247	9395400	63	188	336	626	938	1,350	1,890	2,840
248	9395500	3,150	5,640	7,630	10,500	12,900	15,500	18,300	22,400
249	9395600	70	177	287	481	670	902	1,180	1,640
250	9395900	2,710	4,250	5,370	6,880	8,060	9,300	10,600	12,400
251	9396200	1	5	12	28	49	79	124	212
252	9400100	129	508	1,030	2,200	3,590	5,550	8,270	13,400
253	9429900	201	490	766	1,220	1,630	2,120	2,670	3,520
254	9430500	1,800	4,670	7,680	13,000	18,300	24,900	33,000	46,300
255	9430900	3,670	5,400	6,550	7,990	9,050	10,100	11,200	12,500
256	9431000	5,560	10,400	14,300	19,700	24,100	28,700	33,600	40,500
257	9431500	5,970	11,600	16,100	22,600	27,900	33,600	39,700	48,200
258	9438200	755	1,330	1,770	2,360	2,840	3,340	3,860	4,590
259	9442630	34	81	126	198	263	339	426	558
260	9442650	52	147	247	423	595	804	1,050	1,460
261	9442660	145	479	873	1,630	2,410	3,410	4,660	6,760
262	9442680	763	1,530	2,180	3,140	3,950	4,840	5,810	7,220
263	9442690	25	46	61	84	102	121	142	171
264	0442692	66	172	278	461	634	841	1,090	1,470
265	9442695	162	623	1,230	2,500	3,910	5,810	8,310	12,700
266	9442700	297	944	1,690	3,110	4,560	6,400	8,700	12,500
267	9442740	319	746	1,150	1,790	2,370	3,030	3,790	4,950
268	9443000	4,640	12,000	19,400	31,800	43,300	57,000	73,000	97,900
269	9444000	2,640	5,490	8,020	12,000	15,500	19,600	24,200	31,200
270	9444200	4,690	11,200	17,400	27,400	36,500	46,900	58,900	77,000

Table 4. Flood magnitudes, in cubic feet per second, at streamflow-gaging stations for selected recurrence intervals - Concluded

Observation number	Streamflow gaging station number	Recurrence interval, in years							
		2	5	10	25	50	100	200	500
271	9444500	7,280	18,200	29,600	50,000	70,300	95,700	127,000	180,000
272	9451800	13	32	50	79	104	134	168	219
273	9455800	159	226	268	321	359	396	433	482
274	9489070	240	591	929	1,490	2,000	2,600	3,290	4,360
275	9489080	14	36	59	97	133	177	227	307
276	9536350	39	91	138	212	279	354	439	567
277	9537500	1,910	2,980	3,690	4,590	5,250	5,900	6,550	7,380

Table 5. Years of record for streamflow-gaging stations used in this report

Observation number	Streamflow gaging station number	Years of systematic peak-flow record	Observation number	Streamflow gaging station number	Years of systematic peak-flow record
1	7124500	64	31	7220000	17
2	7153400	8	32	7220900	25
3	7153500	33	33	7221000	61
4	7154400	26	34	7221500	44
5	7154500	28	35	7222000	13
6	7154650	15	36	7222300	20
7	7155100	15	37	7222500	42
8	7199000	32	38	7222800	7
9	7201000	24	39	7225000	25
10	7201200	8	40	7225500	12
11	7201450	8	41	7226200	7
12	7203000	50	42	7226300	24
13	7203600	8	43	7226500	38
14	7204000	41	44	7227000	19
15	7204500	40	45	7227050	27
16	7205000	45	46	7227100	19
17	7206400	16	47	7227200	14
18	7207500	34	48	7227295	26
19	7208500	56	49	8080600	24
20	7211000	49	50	8246500	43
21	7211500	40	51	8247500	54
22	7213700	23	52	8248000	60
23	7214000	30	53	8251500	72
24	7214500	21	54	8252500	40
25	7214800	14	55	8253000	42
26	7215500	47	56	8253500	41
27	7216500	53	57	8255000	10
28	7217000	12	58	8263000	32
29	7217100	17	59	8264000	24
30	7218000	50	60	8264500	10

Table 5. Years of record for streamflow-gaging stations used in this report - Continued

Obser-vation number	Streamflow gaging station number	Years of systematic peak-flow record	Obser-vation number	Streamflow gaging station number	Years of systematic peak-flow record
61	8265000	49	91	8313400	16
62	8267000	28	92	8316000	13
63	8267500	44	93	8316600	13
64	8268500	40	94	8316650	14
65	8269000	44	95	8316700	14
66	8271000	50	96	8317100	20
67	8275000	17	97	8317500	22
68	8275500	26	98	8317600	24
69	8275600	22	99	8317700	27
70	8279000	42	100	8317720	9
71	8281200	13	101	8317800	26
72	8283500	33	102	8318000	26
73	8284000	21	103	8318900	25
74	8284100	23	104	8321500	18
75	8284300	16	105	8321900	22
76	8284500	34	106	8323000	31
77	8286650	10	107	8324000	34
78	8286700	8	108	8329000	13
79	8288000	33	109	8330500	26
80	8289000	47	110	8330600	24
81	8290000	15	111	8331100	24
82	8291000	48	112	8331650	18
83	8292000	25	113	8331700	25
84	8293700	8	114	8334000	27
85	8294300	13	115	8340500	35
86	8295000	33	116	8341300	24
87	8295200	15	117	8342000	13
88	8302200	11	118	8343100	17
89	8302500	34	119	8343300	8
90	8313100	31	120	8348500	18

Table 5. Years of record for streamflow-gaging stations used in this report - Continued

Observation number	Streamflow gaging station number	Years of systematic peak-flow record	Observation number	Streamflow gaging station number	Years of systematic peak-flow record
121	8351400	8	151	8383200	24
122	8351500	35	152	8383210	17
123	8352500	44	153	8383300	10
124	8353000	39	154	8383370	18
125	8353500	22	155	8383500	41
126	8354000	31	156	8384500	22
127	8358600	18	157	8385530	16
128	8359300	6	158	8385600	27
129	8359400	24	159	8385670	17
130	8360000	27	160	8385690	19
131	8361650	26	161	8385700	22
132	8361660	10	162	8387000	25
133	8361700	22	163	8388000	40
134	8361800	24	164	8389500	37
135	8363100	23	165	8390050	8
136	8363200	20	166	8390100	14
137	8363600	6	167	8390500	39
138	8377900	15	168	8393200	16
139	8378500	55	169	8393600	20
140	8379300	24	170	8393900	25
141	8379500	58	171	8394500	46
142	8379550	7	172	8396500	27
143	8379600	27	173	8397400	16
144	8380300	19	174	8397600	25
145	8380500	62	175	8398500	27
146	8381000	57	176	8400000	27
147	8381700	5	177	8401200	15
148	8382000	12	178	8401800	14
149	8382500	27	179	8401900	15
150	8383000	52	180	8404600	7

Table 5. Years of record for streamflow-gaging stations used in this report - Continued

Observation number	Streamflow gaging station number	Years of systematic peak-flow record	Observation number	Streamflow gaging station number	Years of systematic peak-flow record
181	8405050	20	211	9344000	42
182	8405100	9	212	9346200	22
183	8405500	33	213	9346400	17
184	8408500	41	214	9349800	16
185	8477000	42	215	9350500	43
186	8477500	29	216	9350800	23
187	8477560	20	217	9355000	28
188	8477570	17	218	9355700	23
189	8477580	21	219	9356400	23
190	8477590	8	220	9356500	27
191	8477600	12	221	9356520	8
192	8478000	25	222	9356750	8
193	8478500	24	223	9357200	27
194	8478600	20	224	9363100	18
195	8478800	11	225	9363500	44
196	8479300	20	226	9364500	65
197	8480150	18	227	9366500	59
198	8480650	21	228	9367400	9
199	8480700	21	229	9367530	28
200	8480900	22	230	9367840	29
201	8481000	22	231	9367860	29
202	8481100	25	232	9367880	18
203	8481500	31	233	9367900	28
204	8482000	11	234	9367950	11
205	8488170	11	235	9367960	6
206	8488200	18	236	9368000	35
207	8488500	25	237	9371100	10
208	8488600	9	238	9371200	9
209	8489000	22	239	9379060	14
210	8492500	20	240	9383500	11

Table 5. Years of record for streamflow-gaging stations used in this report - Concluded

Observation number	Streamflow gaging station number	Years of systematic peak-flow record	Observation number	Streamflow gaging station number	Years of systematic peak-flow record
241	9383600	13	271	9444500	69
242	9384000	39	272	9451800	14
243	9384200	14	273	9455800	20
244	9385800	14	274	9489070	13
245	9386100	25	275	9489080	12
246	9387050	22	276	9536350	12
247	9395400	26	277	9537500	55
248	9395500	27			
249	9395600	24			
250	9395900	15			
251	9396200	6			
252	9400100	14			
253	9429900	9			
254	9430500	52			
255	9430900	22			
256	9431000	29			
257	9431500	45			
258	9438200	20			
259	9442630	8			
260	9442650	19			
261	9442660	25			
262	9442680	20			
263	9442690	12			
264	9442692	13			
265	9442695	19			
266	9442700	17			
267	9442740	23			
268	9443000	16			
269	9444000	52			
270	9444200	13			

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