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Colorado Department of Transportation
and the Bureau of Land Management

Analysis of the Magnitude and Frequency of Floods in Colorado

Water-Resources Investigations Report 99–4190

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

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By J.E. Vaill

U.S. GEOLOGICAL SURVEY

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Denver, Colorado
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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch	25.4	millimeter
foot (ft)	0.3048	meter
mile	1.609	kilometer
square mile (mi^2)	2.59	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Analysis of the Magnitude and Frequency of Floods in Colorado

By J.E. Vaill

Abstract

Regionalized flood-frequency relations need to be updated on a regular basis (about every 10 years). The latest study on regionalized flood-frequency equations for Colorado used data collected through water year 1981. A study was begun in 1994 by the U.S. Geological Survey, in cooperation with the Colorado Department of Transportation and the Bureau of Land Management, to include streamflow data collected since water year 1981 in the regionalized flood-frequency relations for Colorado. Longer periods of streamflow data and improved statistical analysis methods were used to define regression relations for estimating peak discharges having recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years for unregulated streams in Colorado. The regression relations can be applied to sites of interest on gaged and ungaged streams. Ordinary least-squares regression was used to determine the best explanatory basin or climatic characteristic variables for each peak-discharge characteristic, and generalized least-squares regression was used to determine the best regression relation. Drainage-basin area, mean annual precipitation, and mean basin slope were determined to be statistically significant explanatory variables in the regression relations. Separate regression relations were developed for each of five distinct hydrologic regions in the State. The mean standard errors of estimate and average standard error of prediction associated with the regression relations generally ranged from 40 to 80 percent, except for one hydrologic region where the errors ranged from about 200 to 300 percent. Methods are presented for determining the magnitude of peak discharges for sites located at gaging stations, for sites located near gaging stations on the same stream when the ratio of drainage-basin areas is between about 0.5 and 1.5, and for sites where the drainage basin crosses a flood-region boundary or a State boundary. Methods are presented for determining the magnitude of peak discharges for sites located at gaging stations, for sites located near gaging stations on the same stream when the ratio of drainage-basin areas is between about 0.5 and 1.5, and for sites where the drainage basin crosses a flood-region boundary or a State boundary.

INTRODUCTION

In Colorado, various Federal, State, and local governments use hydrologic data collected and published by the U.S. Geological Survey (USGS) in making decisions about the cost-effective planning and design of highway bridges and culverts, flood-plain management, reservoir management, and other water issues. The data are collected from a network of streamflow-gaging stations operated by the USGS, and part of that data is used to develop regression equations for determining the magnitude and frequency of floods on Colorado streams.

Because of recent improvements in statistical analysis, longer periods of record at more streamflow-gaging stations, and the need to update regression equations regularly (about every 10 years) as recommended by the Federal Highway Administration (FHWA) (L.A. Arneson, Federal Highway Administration, oral commun., 1994), in 1994, the USGS, in cooperation with the Colorado Department of Transportation (CDOT) and the Bureau of Land Management (BLM), developed new regression equations for determining flood magnitude and frequency on unregulated streams.

Purpose and Scope

This report presents the regression equations and the methods for determining the magnitude and frequency of floods on unregulated streams in Colorado. In addition to data used in previous studies (see the "Previous Studies" section), about 2,700 additional years of record (12–22 years for each gaging station) and 64 additional gaging stations were available for the new analysis of flood magnitude and frequency. Data through water year 1993 were used, and additional periods of record included water years 1983–85 when high runoff resulted in peaks of record at numerous gaging stations west of the Continental Divide.

The regression equations were developed for recurrence intervals ranging from 2 to 500 years. The methods for determining peak discharges depended on whether the site was gaged, was on a stream near a gaged site, or was ungaged and whether the drainage area upstream from a site crossed a hydrologic region boundary.

Previous Studies

Hydrologic data collected from the gaging-station network in Colorado have been used in previous studies to develop regionalized flood-frequency equations. A series of reports in the 1960's defined flood-frequency relations for the Arkansas (Patterson, 1964), Rio Grande (Patterson, 1965), Colorado (Patterson and Somers, 1966), and South Platte (Matthai, 1968) River Basins. Livingston (1970) developed equations for a range of flow characteristics for the mountains of Colorado. Hedman and others (1972) improved the accuracy of some of Livingston's (1970) equations by relating measurements of channel geometry to mean annual and peak flows. McCain and Jarrett (1976) used improved methods for estimating flood frequency and used additional streamflow records to estimate flood characteristics for unregulated streams in Colorado. Kircher and others (1985) developed equations for flow characteristics in Colorado, excluding the plains region, using additional streamflow records and improved statistical methods for equation selection. Livingston and Minges (1987) developed equations for estimating flood characteristics for small (less than 20 mi^2) rural drainage basins in the plains region of eastern Colorado. Jarrett and Costa (1988) developed regression equations for a relatively homogeneous hydrologic foothill region in the South Platte River Basin (excluding drainage areas upstream from the South Platte River at South Platte, Colo.). Each of these previous flood-frequency studies identified geographical areas of the State where additional data would improve the accuracy of the regression equations.

Approach

This study differs from most of the previous flood-frequency studies in areal coverage, number of gaging stations used, and lengths of streamflow records used. Results in this study were based on as much as 12 additional years of streamflow record at gaging stations used in previous studies and include 64 gaging stations not used previously. Only one gaging station per stream was used unless the drainage area of a downstream gaging station was greater than about 2.5 times the drainage area of the upstream gaging station. Drainage areas for the gaging stations used in the analysis ranged from about 5 mi^2 to about 1,000 mi^2 (table 3 in the "Supplemental Data" section at the back of the report). The regression equations are based on at least 10 or more years of streamflow records for 328 gaging stations in Colorado and adjacent States (fig. 1). A gaging station was not in the regression analysis for a region if basin characteristics were not available.

Flood-Frequency Analysis at Streamflow-Gaging Stations

Records of annual peak discharges at gaging stations and drainage-basin characteristics are the data bases used in this study. The data bases are compiled and maintained by the USGS. Records throughout the study area were selected and examined for accuracy and for the assumptions needed for a valid flood-frequency analysis. The following assumptions are used to validate flood-frequency analyses: (1) the data represent independent, random events, (2) the process generating the events is stationary with respect to time, (3) the data are from the same population and are identically distributed, and (4) the sample is representative of the entire population. Data through water year 1993 were used in the analyses.

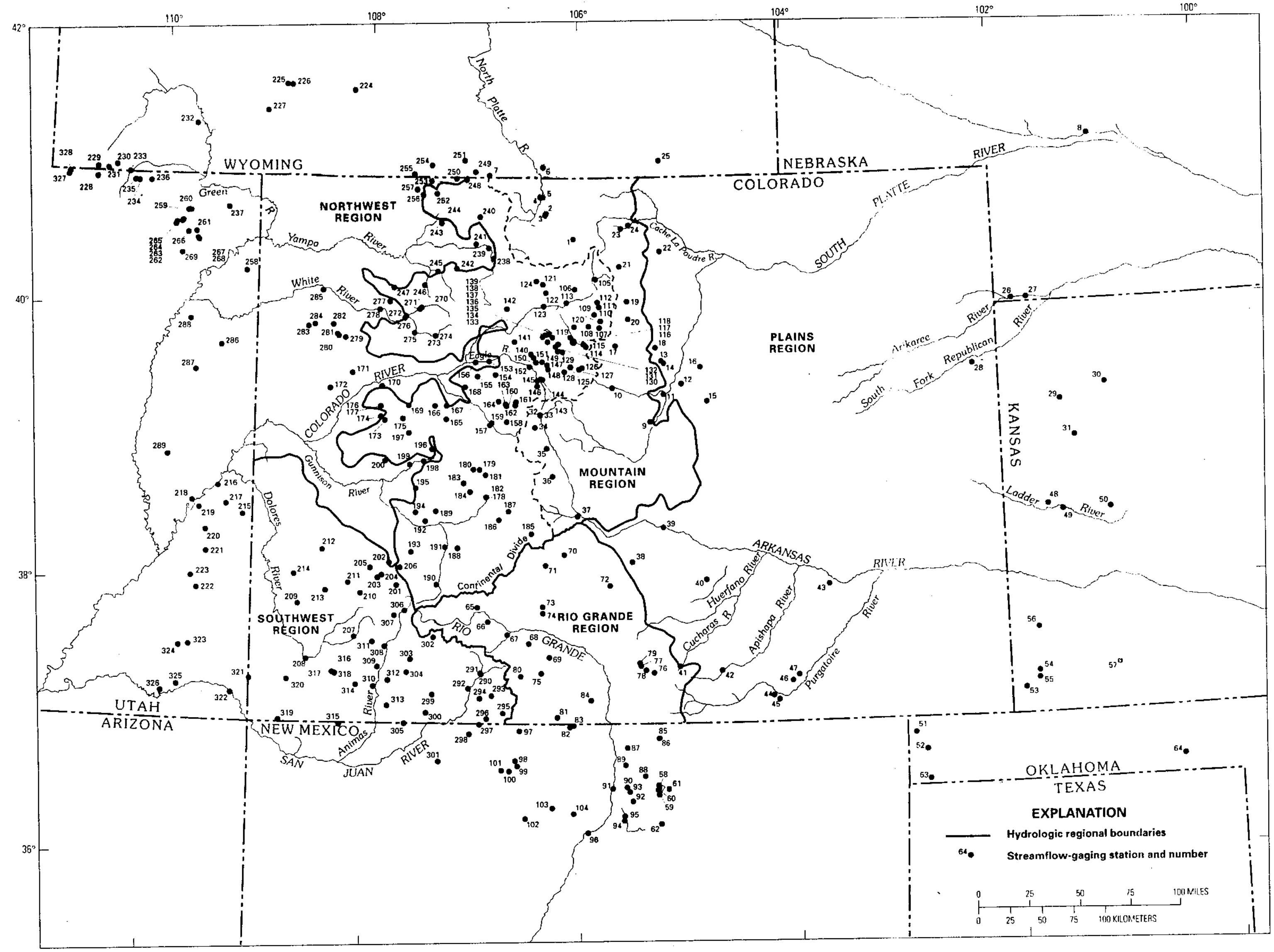

Figure 1. Boundaries of hydrologic regions and location of streamflow-gaging stations in Colorado and adjacent States.

Peak discharges for selected recurrence intervals were determined for each gaging station from a flood-frequency curve based on a Log-Pearson Type III probability distribution as recommended by the Interagency Advisory Committee on Water Data (IACWD) (1982). These peak discharges are listed in table 3 (in the "Supplemental Data" section at the back of the report). Three parameters required for fitting a Log-Pearson Type III probability distribution to a series of annual peak discharges are the mean, standard deviation, and skew coefficient of the logarithms of the peak discharges. The skew of a frequency distribution has a large effect on the resulting shape of the distribution. The skew coefficient of the station record is sensitive to extreme events, making it difficult to obtain an estimate of an accurate skew coefficient from a small sample. The accuracy of the estimated skew coefficient can be improved by weighting the gaging-station skew with a generalized skew coefficient estimated by pooling information from nearby sites. Generalized skew coefficients of logarithms of annual maximum streamflow from a generalized skew map developed by the IACWD (1982) (fig. 2) were weighted with gaging-station skew to determine a weighted skew coefficient. Using the assumption that the generalized skew coefficient is unbiased and independent of the gaging-station skew, the mean square error of the weighted estimate is minimized by weighting the gaging-station and the generalized skew coefficients in inverse proportion to their individual mean square errors (Tasker, 1978).

Historical adjustments to the recorded gaging-station data were used where applicable, and low outliers were deleted using the low-outlier test recommended by the IACWD (1982). Low outliers are small peak discharges (less than a given base) that depart from the low end of a fitted flood-frequency curve. Low outliers can have an adverse effect on computed flood-frequency curves for gaged sites by causing a large negative skew coefficient that can distort the upper end of the flood-frequency curve. Flood-frequency curves for gaging stations within about 50 miles of the Colorado State line that were developed by other investigators in neighboring States may differ from the flood-frequency curves developed for this analysis because of the use of a different skew-coefficient map or the deletion of different low outliers.

A flood-frequency curve (fig. 3) graphically depicts the relation of annual peak discharge to annual exceedance probability as determined from the Log-Pearson probability distribution. Annual exceedance probability is the probability, in percent, that a given flood magnitude would be exceeded in any 1 year. A recurrence interval is the reciprocal of the annual exceedance probability multiplied by 100 and is the average time interval, in years, between exceedances of a given flood. For example, a flood having a 1-percent exceedance probability has a recurrence interval of 100 years. Because recurrence intervals are long-term averages, flood magnitudes greater than those of a specific recurrence interval may have occurred more or less frequently than indicated by the recurrence interval. For example, 10-year floods may occur in successive years at some sites and may not occur for more than 10 years at other sites. In this report, the term "recurrence interval" is used to describe the exceedance probability of a flood magnitude. Flood-frequency curves were developed for 328 gaging stations on unregulated streams having a minimum of 10 years of record. The flood magnitudes that were determined from the flood-frequency curves for each gaging station are listed in table 3 (in the "Supplemental Data" section at the back of the report). Included are data for recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years.

Regional Flood-Frequency Analysis

The regional regression equations discussed in this report relate flood magnitude, the dependent variable, to easily measured drainage-basin and climatic characteristics, the independent variable. The study area was divided into five distinct hydrologic regions; each region representing an area of similar basin physiographic and climatic characteristics. The hydrologic regional boundaries were defined by McCain and Jarrett (1976) and Kircher and others (1985). These boundaries were determined by plotting the regression residuals (the difference between the discharge predicted from the regression equation and the discharge determined from the station flood-frequency curve) on a map and drawing boundaries around physiographic regions in which the regression residuals were similar. Examination of regression residuals for the current study did not indicate any need to change the previously defined regional boundaries.

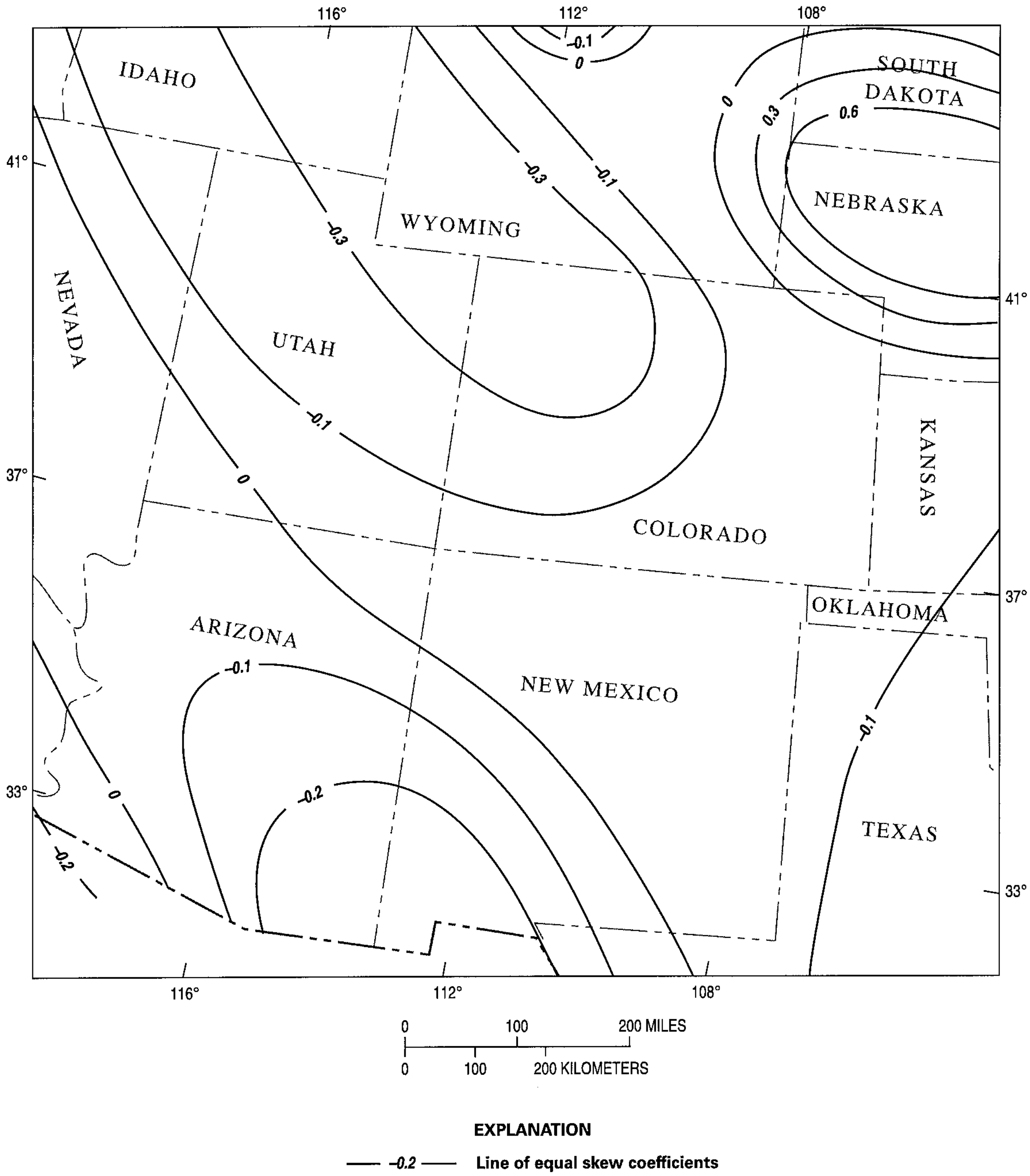

Figure 2. Generalized skew coefficients of the logarithms of annual maximum streamflow for Colorado and adjacent States (from Interagency Advisory Committee on Water Data, 1982).

Separate regression equations for estimating flood magnitude were developed for each of these five regions. The five hydrologic regions used in the study area (fig. 1) are referred to as the mountain region, Rio Grande region, southwest region, northwest region, and the plains region. The mountain region consists of the high topographic relief of the Rocky Mountains north of the Continental Divide and north of the Rio Grande drainage basin to the Colorado-Wyoming border and is defined by the 7,500-ft elevation contour along the eastern and western slopes of the Rocky Mountains. The Rio Grande region includes all the Rio Grande drainage basin, the San Juan Mountains east of the Continental Divide, the San Luis Valley, and the Sangre de Cristo Mountains, which includes a part of the headwaters

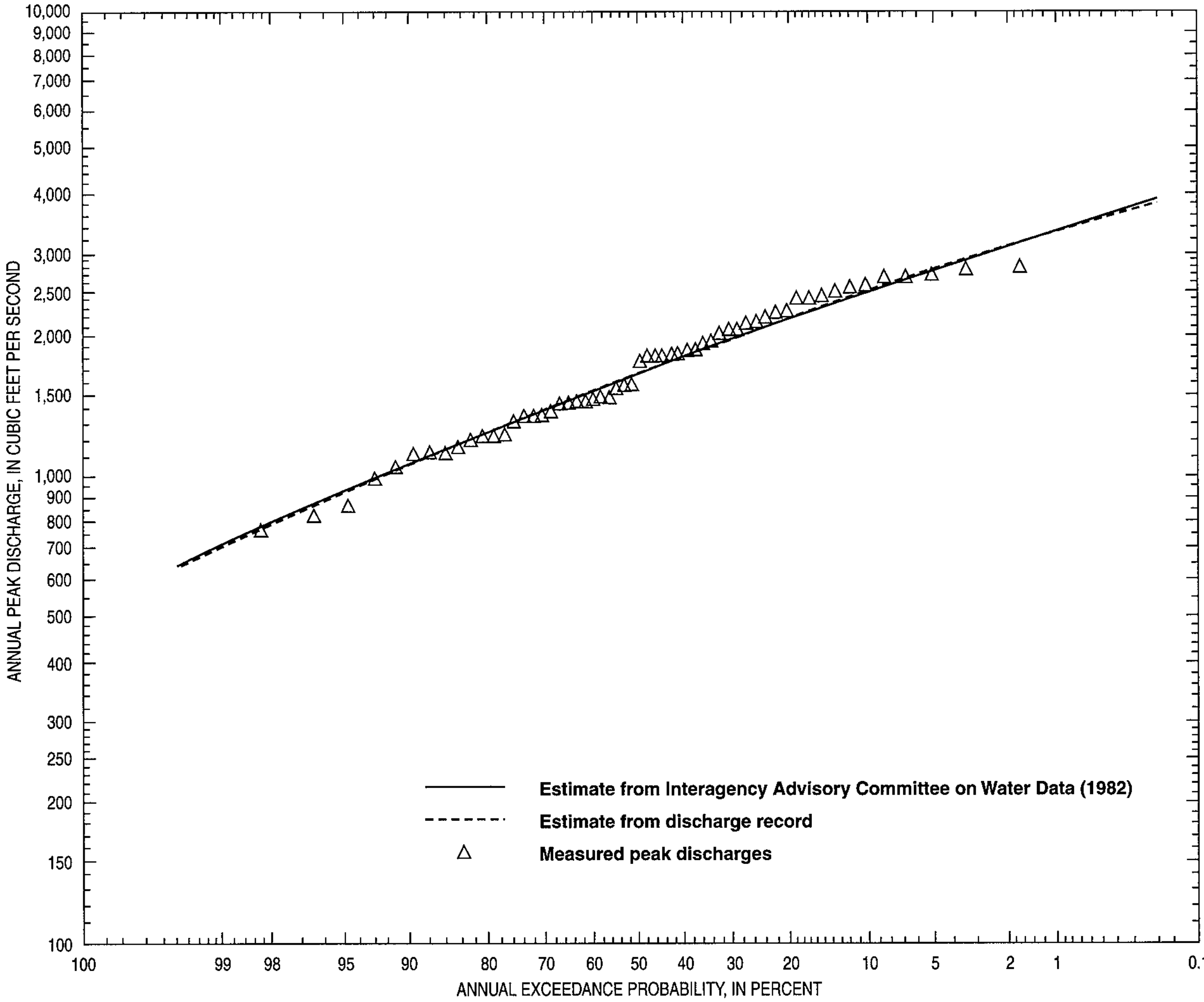

Figure 3. Flood-frequency curve for Lake Fork at Gateview, Colorado.

of the Arkansas drainage basin above 9,000 ft on the eastern slope of the Sangre de Cristo Mountains. Elevations range from about 7,500 to 14,000 ft in the region. The Continental Divide forms a topographic barrier between the mountain and Rio Grande regions and between the Rio Grande and southwest regions. The southwest region includes the San Juan Mountains west of the Continental Divide to the Colorado-Utah State line and south from the 7,500-ft elevation along the north side of the Uncompahgre Plateau. Elevations in the southwest region range from about 5,000 ft near the Colorado-Utah State line to about 14,000 ft near the Continental Divide. The Uncompahgre Plateau forms a major orographic barrier to air masses moving north from the south and southwest. Annual precipitation south of the Uncompahgre Plateau ranges from about 12 to 25 inches and decreases to about 8 inches at lower elevations north of the Uncompahgre Plateau in the northwest region (U.S. Geological Survey, 1984). The northwest region is located north of the 7,500-ft elevation along the north side of the Uncompahgre Plateau and west of the mountain region to the Colorado-Utah State line and the Colorado-Wyoming State line. Elevations in the northwest region range from about 5,000 to 7,500 ft, with the exception of the 8,000- to 9,000-ft Roan Plateau in the central part of the region. The western boundary of the plains region coincides with a line along an elevation of 7,500 ft in the South Platte River Basin, south to a transition zone near the Chaffee-Fremont County line, to a line along an elevation of about 9,000 ft in the Arkansas River Basin. The region extends east to the State lines of Kansas and Nebraska, south to the State lines of New Mexico and Oklahoma, and north to the Colorado-Wyoming State line.

REGRESSION ANALYSIS

Ordinary least-squares (OLS) and generalized least-squares (GLS) regression analyses were used in this study. OLS analysis was used for preliminary delineation of flood regions and selection of significant explanatory characteristics. GLS regression analysis was used to further define the explanatory variables determined using OLS analysis and to compute the final regression equations. GLS regression is a more appropriate method for developing regional regression equations of streamflow characteristics than OLS regression (Stedinger and Tasker, 1985) because using flood-frequency characteristics at gaged sites as a response variable could violate two assumptions of OLS regression. Those assumptions are that the response variable at each site is independent and has equal variance and that peak discharges for nearby drainage basins may be correlated as a result of similar climatic events.

Multiple Regression and Drainage-Basin Characteristics

Multiple-regression equations, expressing flood magnitudes as a function of drainage-basin characteristics, were developed for each hydrologic region. Base 10 logarithmic transformations were performed on all streamflow and drainage-basin-characteristic data prior to the regression analyses. These data were transformed to normalize the variables and residuals, to obtain a constant variance about the regression line, and to obtain linear relations between dependent and independent variables as required for regression analyses (Stedinger and Tasker, 1985). The regression relations based on logarithmic transformation of the variables were:

$$\log Q_t = \log K + a \log A + b \log B + \ldots n \log N \quad (1)$$

or, taking antilogs,

$$Q_t = KA^aB^b\ldots N^n \quad (2)$$

where

Q_t (the response variable) is the estimated flood magnitude, in cubic feet per second, having a T-year recurrence interval; K is a regression constant; $A, B, \ldots N$ (the explanatory variables) are values of drainage-basin characteristics, and $a, b, \ldots n$ are regression coefficients.

Based on the results of previous streamflow regionalization studies (McCain and Jarrett, 1976; Kircher and others, 1985) and on consideration of physical characteristics that affect streamflow, a set of drainage-basin and climatic characteristics were evaluated for inclusion as explanatory variables in the regression equations. These characteristics included drainage area, mean drainage-basin slope, mean channel slope, gaging-station elevation, percentage of drainage area covered by lakes and ponds, mean annual precipitation, and percentage of drainage basin covered by forest. Richter and others (1984) defined these characteristics in greater detail and summarized the characteristics for most of the drainage basins used in this report. Drainage-basin-characteristic data used in this study that have been determined since Richter and others (1984) are unpublished.

Combinations of the explanatory variables were evaluated using OLS multiple-regression methods. Stepwise regression adds explanatory variables, one at a time, to the basic regression equation until all statistically significant variables have been included. The statistical significance of certain variables already in the equation may change as other variables are added. Consequently, variables that may be added at one step could be removed at a later step. The purpose of using stepwise regression is to include all the explanatory variables that have a great effect on the response variable and to exclude the variables that have little effect on the response variable. Drainage area was the most statistically significant variable in all of the regression equations. Other statistically significant variables were mean annual precipitation and mean drainage-basin slope.

Generalized Least-Squares Regression

After acceptable drainage-basin characteristics were determined and the five hydrologic regions were delineated, GLS regression was performed. Stedinger and Tasker (1985) reported that the GLS method provides more accurate estimates of the regression coefficients, better estimates of the accuracy of the regression equation, and almost unbiased estimates of the model-error variance. The GLS analysis was performed using ANNIE/WDM, a set of programs designed for analyzing hydrologic data (Flynn and others, 1995).

Regression coefficients were estimated by considering the time-sampling error in the streamflow characteristics and the cross correlation between sites. The time-sampling error is associated with the length of record for a gaging station. A gaging station with a short period of record may have a large time-sampling error because the record may not be representative of the actual flood history of the site based on a larger number of years. A short period of record has the possibility of falling within a wet or dry climatic cycle (Thomas and Lindskov, 1983).

Use of the GLS method requires estimates of the cross correlation between streamflows at every pair of sites. Sample estimates of cross correlation based on recorded streamflows from short periods of record are often imprecise. To overcome this problem, the sample correlations were smoothed by relating them to distance between gaging stations using a nonlinear-regression model (Tasker and Stedinger, 1989).

The regression equations that were developed using the GLS method related drainage-basin characteristics to peak discharges by using a weighting matrix to account for the different time-sampling errors and cross correlations of concurrent peak-discharge records of the various gaging stations. The final regression equations developed for each region using GLS, the standard errors of estimate, and the average standard error of prediction are listed in table 1.

Limitations and Accuracy of Regression Equations

The regression equations provide a means for determining flood peaks for selected recurrence intervals for ungaged streams in Colorado. The equations were developed from gaging-station data on streams with little or no regulation in the basin and where significant urban development or other major basin changes have not occurred. Thus, the regression equations may not be valid where regulation is a factor or where a drainage basin has been altered by urban development. The regression equations also will not be valid where unique, localized geologic features affect floods. As with any regression analysis, the regression equations are defined only within the range of the independent variables used. For this study, the range of values of the basin characteristics used is listed in table 2. Extrapolation beyond the range of basin characteristics given may provide unreliable results.

The accuracy of a regression equation generally is assessed in terms of the standard error of estimate and the average standard error of prediction. The standard error of estimate is a measure of how well the observed peak streamflows agree with the regression estimate of the peak streamflows. The largest standard errors of estimate were found in the plains region. The standard errors ranged from 204 to 306 percent. These large errors may be attributed to the sparsity of gaging stations within the streamflow-gaging-station network in this region and the variability of the magnitude of annual peak streamflows. The smallest standard errors of estimate were found in the mountain region where the errors ranged from 41 to 58 percent. Standard errors of estimate and the average standard error of prediction for the regression equations in each hydrologic region are listed in table 1.

The average standard error of prediction at an ungaged site is a measure of the expected accuracy with which the regression equation can estimate a flood of a given recurrence interval. The average standard error of prediction includes errors associated with the regression equation and any time sampling error. The largest average standard errors of prediction were found in the plains region where errors ranged from 89 to 100 percent. The smallest average standard errors of prediction were found in the mountain region where errors ranged from 44 to 52 percent.

ESTIMATING MAGNITUDE OF PEAK DISCHARGES

The regression equations developed for this study are for estimation of peak discharges at ungaged sites. Peak-discharge estimates also are often required at or near gaged sites or at an ungaged site on the same stream as a gaged site. The methods for estimating the magnitude of peak discharges in general are explained in this section.

Gaged Sites

Magnitudes of peak discharges for gaged sites can be estimated using equations defined in this study. Table 3 (in the "Supplemental Data" section at the back of the report) lists the peak discharges from the flood-frequency curve for each gaging station for various recurrence intervals. Once the recurrence

Table 1. Regional flood-frequency equations, Colorado

[Q, discharge, in cubic feet per second; A, drainage area, in square miles; P, mean annual precipitation, in inches; S, mean drainage-basin slope, in foot per foot]

Recurrence interval, in years	Regression equation	Standard error of the model, in percent	Average standard error of prediction, in percent
Mountain region			
2	$Q = 11.0 (A)^{0.663} (S + 1.0)^{3.465}$	58	52
5	$Q = 17.9 (A)^{0.677} (S + 1.0)^{2.739}$	48	47
10	$Q = 23.0 (A)^{0.685} (S + 1.0)^{2.364}$	44	45
25	$Q = 29.4 (A)^{0.695} (S + 1.0)^{2.004}$	41	44
50	$Q = 34.5 (A)^{0.700} (S + 1.0)^{1.768}$	41	44
100	$Q = 39.5 (A)^{0.706} (S + 1.0)^{1.577}$	42	44
200	$Q = 44.6 (A)^{0.710} (S + 1.0)^{1.408}$	44	45
500	$Q = 51.5 (A)^{0.715} (S + 1.0)^{1.209}$	48	47
Rio Grande region			
2	$Q = 0.03 (A)^{0.979} (P)^{1.615}$	78	61
5	$Q = 0.12 (A)^{0.940} (P)^{1.384}$	64	55
10	$Q = 0.25 (A)^{0.914} (P)^{1.277}$	58	53
25	$Q = 0.52 (A)^{0.884} (P)^{1.117}$	53	51
50	$Q = 0.81 (A)^{0.864} (P)^{1.121}$	51	50
100	$Q = 1.19 (A)^{0.846} (P)^{1.074}$	50	49
200	$Q = 1.67 (A)^{0.828} (P)^{1.036}$	49	49
500	$Q = 2.48 (A)^{0.808} (P)^{0.995}$	50	49
Southwest region			
2	$Q = 28.7 (A)^{0.699}$	85	62
5	$Q = 50.5 (A)^{0.693}$	74	58
10	$Q = 66.0 (A)^{0.697}$	71	57
25	$Q = 86.3 (A)^{0.704}$	71	57
50	$Q = 102.0 (A)^{0.709}$	73	58
100	$Q = 118.4 (A)^{0.715}$	76	59
200	$Q = 135.5 (A)^{0.720}$	79	60
500	$Q = 159.4 (A)^{0.728}$	85	62
Northwest region			
2	$Q = 0.39 (A)^{0.684} (P)^{1.304}$	83	62
5	$Q = 2.84 (A)^{0.674} (P)^{0.833}$	71	58
10	$Q = 7.56 (A)^{0.671} (P)^{0.601}$	68	56
25	$Q = 20.6 (A)^{0.669} (P)^{0.362}$	67	56
50	$Q = 38.8 (A)^{0.667} (P)^{0.210}$	67	56
100	$Q = 104.7 (A)^{0.624}$	75	59
200	$Q = 118.5 (A)^{0.624}$	78	60
500	$Q = 137.6 (A)^{0.623}$	83	61
Plains region			
2	$Q = 39.0 (A)^{0.486}$	233	93
5	$Q = 195.8 (A)^{0.399}$	204	89
10	$Q = 364.6 (A)^{0.400}$	212	90
25	$Q = 725.3 (A)^{0.395}$	232	92
50	$Q = 1116 (A)^{0.392}$	250	95
100	$Q = 1640 (A)^{0.388}$	267	96
200	$Q = 2324 (A)^{0.385}$	285	98
500	$Q = 3534 (A)^{0.380}$	306	100

interval of interest is selected, a weighted estimate of the peak discharge can be computed for a site using the regression equation for the appropriate region and the peak-discharge value from the flood-frequency curve.

Weighted estimates are used for unregulated streams to reduce the time-sampling error that may occur in a station flood-frequency estimate. This time-sampling error is associated with the length of record for a gaging station. A station with a short period of record may have a large time-sampling error because its record may not be representative of the actual flood history of the site based on a large number of years. The observed period of record has the possibility of falling within a wet or dry climatic cycle. The weighted estimate of flood frequency should be a better indicator of the true value because the regression estimate is an average of the flood histories of many gaging stations over a long period of time (Thomas and Lindskov, 1983).

Table 2. Basin characteristics and the range of values used in the analysis

Basin characteristics	Range of values
Drainage-basin area, in square miles	5.5 to 988.0
Mean annual precipitation, in inches	7.0 to 49.0
Mean drainage-basin elevation, in feet	2.805 to 12,200
Mean drainage-basin slope, in foot per foot	0.081 to 0.562

Sites near Gaging Stations on the Same Stream

Peak discharges for sites near gaging stations on the same stream can be estimated by using a ratio of drainage area for the sites near the ungaged sites and the gaged sites. This method is considered to be reliable when the drainage-area ratio is between about 0.5 and 1.5 and when the two sites have similar drainage-basin and climatic characteristics. If the sites of interest have similar basin and climatic characteristics and meet the drainage-area-ratio requirement, peak discharges can be computed by the following equation:

$$Q_{T(u)} = Q_{T(g)}(A_u/A_g)^x, \quad (3)$$

where

$Q_{T(u)}$ is the peak discharge, in cubic feet per second, at the ungaged site for T-year recurrence interval;

$Q_{T(g)}$ is the weighted peak discharge, in cubic feet per second, at the gaged site for T-year recurrence interval;

A_u is the drainage area, in square miles, at the ungaged site;

A_g is the drainage area, in square miles, at the gaged site; and

x is the average exponent for drainage area for each flood region as follows:

Flood region	Exponent
Mountains	0.69
Rio Grande	0.88
Southwest	0.71
Northwest	0.64
Plains	0.40

The following is an example calculation to determine the 100-year peak discharge for an ungaged site near a gaged site on the same stream in the mountain region. The drainage area at the ungaged site is given as 350 mi^2 and at the gaged site is 450 mi^2. The weighted discharge for the 100-year peak at the gaged site is given as 11,500 ft^3/s.

1. Check that the drainage area ratio A_u/A_g is between 0.5 and 1.5. That ratio is as follows:

$$A_u/A_g = 350/450 = 0.78$$

which meets the ratio requirement.

2. Compute the discharge at the ungaged site using the specified values in equation 3:

$$Q_{100(u)} = 11,500(350/450)^{0.69} = 9,670 \text{ ft}^3/\text{s}.$$

Ungaged Sites

Peak discharges at ungaged sites can be computed using the appropriate regional equation shown in table 1. For sites on streams that cross regional boundaries, results from more than one of the regional equations need to be weighted as described below.

For streams that cross regional boundaries, peak-discharge estimates for a given recurrence interval can be quite different depending on the regional equation used. The following equation for weighting estimates from two regional equations can be used:

$$Q_{T(W)} = Q_{T(a)}\ \text{Area}_{(a)} + Q_{T(b)}\ \text{Area}_{(b)} / \text{Area}_{(t)} \qquad (4)$$

where

$Q_{T(W)}$ is the weighted discharge, in cubic feet per second, for T-year recurrence interval;

$Q_{T(a)}$ is the discharge for region (*a*), in cubic feet per second, for T-year recurrence interval;

$\text{Area}_{(a)}$ is the drainage area in region (*a*), in square miles;

$Q_{T(b)}$ is the discharge for region (*b*), in cubic feet per second, for T-year recurrence interval;

$\text{Area}_{(b)}$ is the drainage area in region (*b*), in square miles; and

$\text{Area}_{(t)}$ is the total drainage area in both regions, in square miles.

An example calculation to determine the 50-year peak discharge for an ungaged site with a drainage area in the northwest region and in the southwest region follows. The total drainage area is composed of 280 mi^2 in the northwest region and 55 mi^2 in the southwest region. Mean annual precipitation is given as 25 inches for the site.

Calculate the 50-year peak discharge using the appropriate equation for each region from table 1 and the drainage area in each region:

- Southwest region drainage area

$$Q_{50} = 102.0\ (A)^{0.709}$$

where

A is the drainage area, in mi^2

$$Q_{50} = 102.0\ (55)^{0.709} = 1,750\ \text{ft}^3/\text{s}.$$

- Northwest region drainage area

$$Q_{50} = 38.8(A)^{0.667}(P)^{0.210}$$

where

A is the drainage area, in square miles; and

P is the mean annual precipitation, in inches.

$$Q_{50} = 38.8(280)^{0.667}(25)^{0.210} = 3,270\ \text{ft}^3/\text{s}.$$

- Total drainage area using equation (4)

$$Q_{T(W)} = Q_{T(a)}\ \text{Area}_{(a)} + Q_{T(b)}\ \text{Area}_{(b)} / \text{Area}_{(t)}$$

$$Q_{50(W)} = 1,750(55) + 3,270(280)/(280+55) = 3{,}020\ \text{ft}^3/\text{s}.$$

When a site is on a stream that crosses a State boundary, peak discharge can be calculated by averaging estimates from relations for both States. For example, to determine the 10-year recurrence-interval peak discharge at a site near the Colorado-Wyoming State line, the 10-year peak discharge needs to be calculated as the average of the estimates obtained using both the equation for Colorado and the equation for Wyoming (Lowham, 1988). Regional regression equations for Utah, Arizona, and parts of Wyoming and New Mexico are presented by Thomas and others (1994). Regression equations are presented for Kansas by Clement (1987) and for Oklahoma by Tortorelli and Bergman (1985). Regional equations are presented for Texas by Asquith and Slade (1997) and for Nebraska by Soenksen and others (1999).

SUMMARY

Various Federal, State, and local governments in Colorado use hydrologic data collected and published by the USGS in making decisions about the cost-effective planning and design of highway bridges and culverts, flood-plain management, reservoir management, and other water issues. Part of that data is used to develop regression equations for determining the magnitude and frequency of floods in Colorado. Regression equations and the methods for determining the magnitude and frequency of floods on unregulated streams were developed for recurrence intervals ranging from 2 to 500 years. The methods for determining peak discharges depended on whether the site was gaged, was on a stream near a gaged site, or was ungaged and on whether the drainage area upstream from a site crossed a hydrologic region boundary. This study differs from most of the previous flood-frequency studies in areal coverage, number of gaging stations used, and lengths of streamflow records used. Data used in the study were from previous flood-frequency studies, about 2,700 additional years of gaging-station record through water year 1993, and 64 additional gaging stations. Only one gaging station per stream was used unless the drainage area of a downstream gaging station was greater than about 2.5 times the drainage area of the upstream gaging station.

Flood-frequency curves were determined for 328 gaging stations on unregulated streams having at least 10 years of record based on a Log-Pearson Type III probability distribution. Historical adjustments to the recorded gaging-station data were used where applicable, and low outliers were deleted using the low-outlier test recommended by the IACWD (1982). The regional regression equations discussed in this report relate flood magnitude to easily measured drainage-basin and climatic characteristics. The study area was divided into five distinct hydrologic regions because basin physiography and climate differ greatly throughout the area: the mountain, Rio Grande, southwest, northwest, and the plains regions. Separate regression equations for estimating peak discharges were developed for each of these five regions for recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years.

An OLS regression was used for preliminary delineation of flood regions and selection of statistically significant explanatory drainage-basin and climatic characteristics. GLS regression analysis was used to compute the final regression equations. Drainage area was the most statistically significant variable in all of the regression equations. Other statistically significant variables were mean annual precipitation and mean drainage-basin slope. Application of the regression equations to sites having drainage-basin characteristics outside the range of those used in the study may provide unreliable results.

Methods are presented for determining the magnitude of peak discharges for sites located at gaging stations, for sites located near gaging stations on the same stream when the ratio of drainage-basin areas is between about 0.5 and 1.5, and for sites where the drainage basin crosses a flood-region boundary or a State boundary.

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SUPPLEMENTAL DATA

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
1	06616000	North Fork Michigan River near Gould, Colo.	40.5494	106.0206	20.5	25	9,800	26.0
2	06617100	Michigan River at Walden, Colo.	40.7411	106.2789	182.0	25	9,500	20.0
3	06618500	Illinois Creek at Walden, Colo.	40.7264	106.2900	259.0	25	9,000	19.0
4	06619000	Michigan River near Cowdrey, Colo.	40.8617	106.3367	478.0	11	9,100	21.0
5	06619500	Canadian River at Cowdrey, Colo.	40.8631	106.3108	181.0	12	8,800	20.0
6	06621000	Douglas Creek near Foxpark, Wyo.	41.0811	106.3069	120.0	26	9,190	30.0
7	06623800	Encampment River above Hog Park Creek near Encampment, Wyo.	41.0236	106.8242	72.7	20	9,700	26.0
8	06692000	Birdwood Creek near Hershey, Nebr.	41.2222	101.0700	940.0	60	3,470	18.5
9	06700500	Goose Creek above Cheesman Lake, Colo.	39.2089	105.3031	86.6	51	10,100	19.0
10	06706000	North Fork South Platte River below Geneva Creek, at Grant, Colo.	39.4572	105.6581	127.0	31	10,800	27.0
11	06707000	North Fork South Platte River at South Platte, Colo.	39.4089	105.1753	479.0	60	9,400	21.0
12	06709500	Plum Creek near Louviers, Colo.	39.4844	105.0019	302.0	28	6,900	16.0
13	06710500	Bear Creek at Morrison, Colo.	39.6531	105.1953	164.0	66	8,800	23.0
14	06711000	Turkey Creek near Morrison, Colo.	39.6356	105.1681	50.1	12	7,700	18.0
15	06712000	Cherry Creek near Franktown, Colo.	39.3558	104.7628	169.0	36	7,100	16.0
16	06712500	Cherry Creek near Melvin, Colo.	39.6050	104.8219	360.0	29	6,600	16.0
17	06716500	Clear Creek near Lawson, Colo.	39.7658	105.6256	147.0	26	10,800	26.0
18	06719500	Clear Creek near Golden, Colo.	39.7506	105.2483	399.0	62	9,600	22.0
19	06722500	South St. Vrain Creek near Ward, Colo.	40.0908	105.5139	14.4	24	10,500	23.0
20	06725500	Middle Boulder Creek at Nederland, Colo.	39.9617	105.5039	36.2	32	10,400	27.0
21	06732000	Glacier Creek near Estes Park, Colo.	40.3447	105.5833	20.8	18	10,700	30.0
22	06739500	Buckhorn Creek near Masonville, Colo.	40.4539	105.1983	134.0	11	7,400	16.0
23	06748530	Little Beaver Creek near Rustic, Colo.	40.6231	105.5644	12.3	13	9,700	23.0
24	06748600	South Fork Cache La Poudre River near Rustic, Colo.	40.6469	105.4930	92.4	19	9,900	22.0
25	06755000	South Crow Creek near Hecla, Wyo.	41.1264	105.1939	13.9	35	7,810	16.0
26	06823500	Buffalo Creek near Haigler, Nebr.	40.0394	101.8658	260.0	54	3,700	17.8
27	06824000	Rock Creek at Parks, Nebr.	40.0417	101.7278	20.0	54	3,350	18.0
28	06825500	Landsman Creek near Hale, Colo.	39.5756	102.2517	268.0	23	4,200	16.0
29	06844700	South Fork Sappa Creek near Brewster, Kans.	39.2853	101.4656	74.0	22	3,595	19.0
30	06847600	Prairie Dog Creek tributary at Colby, Kans.	39.3911	101.0453	7.5	21	3,204	20.0
31	06858500	North Fork Smoky Hill River near McAllaster, Kans.	39.0169	101.3475	670.0	24	3,990	17.5
32	07079500	East Fork Arkansas River near Leadville, Colo.	39.2597	106.3400	50.0	11	11,400	27.0
33	07081000	Tennessee Creek near Leadville, Colo.	39.2642	106.3403	48.0	15	10,800	25.0
34	07083000	Halfmoon Creek near Malta, Colo.	39.1722	106.3886	23.6	29	11,800	21.0
35	07086500	Clear Creek above Clear Creek Reservoir, Colo.	39.0181	106.2772	67.1	29	11,800	23.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
06616000	0.229	179	237	270	307	331	353	374	398
06617100	0.134	494	710	847	1,010	1,130	1,250	1,360	1,500
06618500	0.133	401	798	1,130	1,640	2,080	2,570	3,110	3,910
06619000	0.126	493	827	1,060	1,370	1,590	1,820	2,050	2,350
06619500	0.155	293	477	617	812	971	1,140	1,320	1,580
06621000	--	956	1,280	1,470	1,690	1,830	1,970	2,100	2,260
06623800	--	990	1,270	1,430	1,610	1,740	1,850	1,960	2,090
06692000	--	362	532	677	904	1,110	1,350	1,630	2,090
06700500	0.305	173	278	356	465	553	645	744	885
06706000	0.343	491	675	780	897	974	1,040	1,110	1,180
06707000	0.301	836	1,290	1,600	1,980	2,250	2,530	2,800	3,150
06709500	0.174	641	2,330	4,700	10,200	17,000	27,300	42,300	72,600
06710500	0.296	391	985	1,700	3,210	4,970	7,500	11,100	18,300
06711000	0.224	114	294	475	785	1,080	1,440	1,860	2,520
06712000	--	660	1,960	3,410	6,090	8,820	12,300	16,500	23,600
06712500	--	2,430	6,290	10,200	16,700	22,800	30,100	38,600	51,800
06716500	0.446	1,030	1,360	1,560	1,770	1,920	2,050	2,170	2,330
06719500	0.390	1,570	2,490	3,190	4,180	5,000	5,880	6,840	8,230
06722500	0.277	241	305	346	397	435	472	508	557
06725500	0.319	445	561	629	706	759	807	853	911
06732000	0.421	243	302	337	377	404	430	454	485
06739500	--	822	3,960	8,910	21,000	36,200	59,200	92,400	158,000
06748530	0.227	79	118	145	179	204	230	255	289
06748600	0.270	487	713	869	1,070	1,230	1,390	1,550	1,780
06755000	--	17	38	57	91	125	165	215	298
06823500	--	26	45	62	88	112	141	174	228
06824000	--	44	81	117	177	235	308	398	550
06825500	--	1,380	3,510	5,670	9,410	13,000	17,400	22,600	31,000
06844700	--	54	383	961	2,370	4,080	6,480	9,670	15,300
06847600	--	213	568	901	1,420	1,860	2,340	2,860	3,600
06858500	--	334	1,940	4,500	10,500	17,500	27,300	40,400	63,500
07079500	0.305	405	584	698	837	937	1,030	1,130	1,250
07081000	0.225	326	433	493	560	605	645	681	726
07083000	0.517	258	349	407	479	531	583	634	701
07086500	0.460	583	809	951	1,120	1,250	1,360	1,480	1,630

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
36	07089000	Cottonwood Creek below Hot Springs, near Buena Vista, Colo.	38.8128	106.2217	65.0	37	11,300	25.0
37	07093500	South Arkansas River near Salida, Colo.	38.5214	105.9892	208.0	14	9,500	25.0
38	07095000	Grape Creek near Westcliffe, Colo.	38.1861	105.4831	320.0	48	9,300	21.0
39	07096500	Fourmile Creek near Canon City, Colo.	38.4364	105.1908	434.0	10	8,100	15.0
40	07107500	St. Charles River at Burnt Mill, Colo.	38.0517	104.7931	172.0	18	8,000	21.0
41	07114000	Cucharas River at Boyd Ranch, near La Veta, Colo.	37.4200	105.0522	56.0	40	9,900	25.0
42	07118000	Apishapa River near Aguilar, Colo.	37.3864	104.6653	126.0	10	8,100	25.0
43	07121500	Timpas Creek at mouth near Swink, Colo.	38.0028	103.6550	496.0	12	4,900	12.0
44	07125100	Frijole Creek near Alfalfa, Colo.	37.2000	104.1936	80.0	12	6,400	15.0
45	07125500	San Francisco Creek near Alfalfa, Colo.	37.1683	104.1444	160.0	14	6,600	17.0
46	07126100	Luning Arroyo near Model, Colo.	37.3044	104.0150	86.0	10	5,600	14.0
47	07126200	Van Bremer Arroyo near Model, Colo.	37.3458	103.9575	168.0	11	5,500	12.0
48	07138600	White Woman Creek tributary near Selkirk, Kans.	38.5250	101.6211	38.0	19	3,580	18.0
49	07138650	White Woman Creek near Leoti, Kans.	38.4811	101.4878	750.0	20	--	17.0
50	07138800	Lion Creek tributary near Modoc, Kans.	38.4800	101.0500	7.0	21	3,124	19.0
51	07154650	Tesesquite Creek near Kenton, Okla.	36.8978	102.9011	25.4	19	4,557	15.5
52	07155100	Cold Springs Creek near Wheeless, Okla.	36.7722	102.8045	11.0	17	4,600	15.8
53	07155900	North Fork Cimarron River tributary near Elkhart, Kans.	37.1908	101.8983	75.0	19	3,553	18.0
54	07156000	North Fork Cimarron River tributary near Richfield, Kans.	37.3100	101.7717	103.0	19	3,513	18.0
55	07156010	North Fork Cimarron River at Richfield, Kans.	37.2583	101.7750	463.0	15	3,840	17.6
56	07156220	Bear Creek near Johnson, Kans.	37.6264	101.7611	835.0	28	3,920	17.5
57	07156600	Cimarron River tributary near Moscow, Kans.	37.3353	101.0500	13.0	19	2,937	18.5
58	07204000	Moreno Creek at Eagle Nest, N. Mex.	36.5539	105.2675	73.8	48	10,200	20.0
59	07204500	Cieneguilla Creek near Eagle Nest, N. Mex.	36.4853	105.2650	56.0	44	9,400	19.0
60	07205000	Sixmile Creek near Eagle Nest, N. Mex.	36.5186	105.2747	10.5	51	9,500	20.0
61	07206400	Clear Creek near Ute Park, N. Mex.	36.5264	105.1750	7.4	22	9,770	17.0
62	07217000	Coyote Creek below Black Lake, N. Mex.	36.2722	105.2472	48.0	12	9,300	19.0
63	07232650	Aqua Frio Creek near Felt, Okla.	36.5564	102.7861	31.0	12	4,572	15.6
64	07234100	Clear Creek near Elmwood, Okla.	36.6450	100.5019	170.0	27	2,805	19.8
65	08216500	Willow Creek at Creede, Colo.	37.8561	106.9269	35.3	25	11,500	24.0
66	08218500	Goose Creek at Wagonwheel Gap, Colo.	37.7519	106.8294	90.0	21	10,700	26.0
67	08219500	South Fork Rio Grande at South Fork, Colo.	37.6569	106.6486	216.0	52	10,400	30.0
68	08220500	Pinos Creek near Del Norte, Colo.	37.5917	106.4494	53.0	40	10,500	30.0
69	08223500	Rock Creek near Monte Vista, Colo.	37.4903	106.2589	32.9	25	10,400	15.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
07089000	0.416	330	462	550	661	744	827	910	1,020
07093500	0.347	310	536	713	964	1,170	1,400	1,640	1,990
07095000	0.203	391	876	1,330	2,090	2,780	3,610	4,570	6,090
07096500	0.252	513	1,290	2,110	3,610	5,110	7,020	9,410	13,500
07107500	--	1,720	5,420	10,000	19,700	30,500	45,600	66,000	104,000
07114000	0.359	124	244	340	477	588	707	833	1,010
07118000	0.253	2,130	3,910	5,200	6,870	8,110	9,350	10,600	12,200
07121500	--	1,280	3,420	5,710	9,840	14,000	19,100	25,500	36,100
07125100	--	2,090	5,140	8,390	14,300	20,500	28,300	38,300	55,600
07125500	--	2,990	6,980	10,800	17,200	23,100	30,100	38,200	51,100
07126100	--	421	2,300	5,110	11,200	17,900	26,700	37,800	56,300
07126200	--	642	2,320	4,270	7,790	11,200	15,300	20,100	27,500
07138600	--	53	168	302	561	831	1,180	1,620	2,370
07138650	--	122	1,940	6,950	24,000	49,900	92,700	158,000	289,000
07138800	--	91	182	251	342	411	480	550	640
07154650	--	1,510	4,190	6,790	11,000	14,600	18,800	23,300	29,900
07155100	--	88	408	913	2,160	3,780	6,260	9,940	17,400
07155900	--	57	734	2,480	8,310	17,400	32,700	56,900	108,000
07156000	--	738	2,390	4,340	8,080	12,000	17,000	23,400	34,200
07156010	--	763	3,530	8,030	19,500	35,000	59,500	97,000	177,000
07156220	--	761	3,280	6,580	13,200	20,200	29,100	40,000	58,000
07156600	--	461	1,400	2,340	3,870	5,220	6,730	8,370	10,700
07204000	--	62	124	171	232	279	325	371	432
07204500	--	111	240	347	503	631	769	914	1,120
07205000	--	27	53	77	113	146	184	227	293
07206400	--	23	52	80	127	172	227	293	399
07217000	--	42	176	384	906	1,600	2,710	4,410	8,060
07232650	--	140	700	1,560	3,570	6,010	9,500	14,300	23,300
07234100	--	996	5,680	12,800	28,600	46,200	69,500	99,100	149,000
08216500	--	191	301	376	472	543	613	683	776
08218500	--	371	555	684	851	980	1,110	1,250	1,430
08219500	0.295	1,500	2,320	2,920	3,760	4,430	5,150	5,920	7,020
08220500	0.308	180	315	419	562	678	800	928	1,110
08223500	0.315	86	148	192	247	288	328	368	420

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
70	08224500	Kerber Creek at Ashley Ranch, near Villa Grove, Colo.	38.2411	106.1158	38.0	43	10,500	19.0
71	08227000	Saguache Creek near Saguache, Colo.	38.1633	106.2900	595.0	64	10,200	16.0
72	08227500	North Crestone Creek near Crestone, Colo.	38.0136	105.6922	10.7	40	11,300	20.0
73	08230500	Carnero Creek near La Garita, Colo.	37.8597	106.3189	117.0	52	10,100	20.0
74	08231000	La Garita Creek near La Garita, Colo.	37.8133	106.3178	61.0	55	10,100	18.0
75	08236000	Alamosa River above Terrace Reservoir, Colo.	37.3747	106.3342	107.0	47	11,000	29.0
76	08240500	Trinchera Creek above Turners Ranch, near Fort Garland, Colo.	37.3747	105.2944	45.0	53	10,400	22.0
77	08241000	Trinchera Creek above Mountain Home Reservoir, near Fort Garland, Colo.	37.3947	105.3686	61.0	32	10,000	18.0
78	08241500	Sangre De Cristo Creek near Fort Garland, Colo.	37.4250	105.4144	190.0	52	9,200	15.0
79	08242500	Ute Creek near Fort Garland, Colo.	37.4472	105.4250	32.0	53	10,000	16.0
80	08245500	Conejos River at Platoro, Colo.	37.3539	106.5244	44.4	17	11,200	35.0
81	08246500	Conejos River near Mogote, Colo.	37.0539	106.1869	282.0	43	10,300	26.0
82	08247500	San Antonio River at Ortiz, Colo.	36.9931	106.0381	110.0	60	9,500	11.0
83	08248000	Los Pinos River near Ortiz, Colo.	36.9822	106.0731	167.0	66	9,900	24.0
84	08248500	San Antonio River at Mouth, near Manassa, Colo.	37.1769	105.8775	348.0	52	9,100	12.0
85	08252500	Costilla Creek above Costilla Dam, N. Mex.	36.8978	105.2544	25.1	44	11,430	25.0
86	08253000	Casias Creek near Costilla, N. Mex.	36.8967	105.2597	16.6	46	11,100	25.0
87	08263000	Latir Creek near Cerro, N. Mex.	36.8292	105.5472	10.5	32	11,500	24.0
88	08264000	Red River near Red River, N. Mex.	36.6222	105.3889	19.1	24	10,790	25.0
89	08265000	Red River near Questa, N. Mex.	36.7033	105.5678	113.0	53	9,930	21.0
90	08267500	Rio Hondo near Valdez, N. Mex.	36.5417	105.5558	36.2	48	10,100	23.0
91	08268500	Arroyo Hondo at Arroyo Hondo, N. Mex.	36.5322	105.6850	65.6	48	9,730	20.0
92	08269000	Rio Pueblo De Taos near Taos, N. Mex.	36.4394	105.5031	66.6	48	9,500	25.0
93	08271000	Rio Lucero near Arroyo Seco, N. Mex.	36.5083	105.5303	16.6	54	10,790	24.0
94	08275500	Rio Grande Del Rancho near Talpa, N. Mex.	36.2978	105.5819	83.0	30	9,400	22.0
95	08275600	Rio Chiquito near Talpa, N. Mex.	36.3319	105.5783	37.0	24	9,350	22.0
96	08279000	Embudo Creek at Dixon, N. Mex.	36.2108	105.9131	305.0	46	8,980	21.0
97	08281200	Wolf Creek near Chama, N. Mex.	36.9556	106.5361	27.7	13	9,600	27.4
98	08283500	Rio Chama at Park View, N. Mex.	36.7375	106.5778	405.0	33	9,270	22.0
99	08284000	Rito De Tierra Amarilla at Tierra Amarilla, N. Mex.	36.6986	106.5569	49.7	23	8,850	20.5
100	08284100	Rio Chama near La Puente, N. Mex.	36.6625	106.6325	480.0	27	9,000	24.0
101	08284500	Willow Creek near Park View, N. Mex.	36.6681	106.7042	193.0	34	8,000	18.0
102	08286650	Canjilon Creek above Abiquiu Reservoir, N. Mex.	36.3153	106.4847	144.0	14	6,300	--
103	08288000	El Rito near El Rito, N. Mex.	36.3917	106.2389	50.5	33	8,700	22.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
08224500	0.358	95	162	215	292	356	427	504	618
08227000	0.233	310	513	662	862	1,020	1,180	1,350	1,580
08227500	0.573	84	150	209	306	396	505	635	848
08230500	0.259	140	323	500	796	1,080	1,410	1,810	2,440
08231000	0.292	158	291	394	537	651	771	897	1,070
08236000	0.306	944	1,400	1,730	2,190	2,550	2,940	3,360	3,950
08240500	0.368	114	219	309	447	567	704	859	1,090
08241000	0.309	114	229	321	452	559	672	791	957
08241500	0.239	148	336	523	848	1,170	1,560	2,040	2,840
08242500	0.318	135	211	264	334	388	444	500	578
08245500	0.346	1,030	1,220	1,330	1,450	1,540	1,620	1,700	1,800
08246500	0.255	2,650	3,660	4,400	5,400	6,200	7,050	7,950	9,230
08247500	0.155	471	816	1,080	1,430	1,710	2,000	2,310	2,740
08248000	0.156	1,300	1,890	2,270	2,710	3,020	3,310	3,590	3,940
08248500	0.140	819	1,440	1,860	2,360	2,710	3,040	3,360	3,740
08252500	0.251	63	145	235	408	596	851	1,190	1,830
08253000	--	61	100	128	166	194	223	253	294
08263000	--	47	77	100	132	158	185	215	258
08264000	--	107	166	207	261	302	343	385	443
08265000	--	254	434	570	757	907	1,060	1,230	1,460
08267500	--	165	272	351	458	543	632	725	854
08268500	--	155	319	470	713	937	1,200	1,510	1,990
08269000	--	180	380	549	803	1,020	1,250	1,510	1,880
08271000	--	121	189	235	294	337	379	421	477
08275500	--	147	303	427	600	738	881	1,030	1,230
08275600	--	71	156	232	351	458	581	720	931
08279000	--	1,060	1,820	2,310	2,900	3,300	3,670	4,020	4,440
08281200	--	561	922	1,210	1,630	1,990	2,390	2,840	3,500
08283500	--	4,020	5,770	6,970	8,520	9,700	10,900	12,100	13,800
08284000	--	285	541	742	1,020	1,250	1,480	1,730	2,070
08284100	--	3,990	6,670	8,650	11,300	13,500	15,700	18,000	21,100
08284500	--	1,160	1,870	2,420	3,220	3,880	4,600	5,390	6,550
08286650	--	681	1,190	1,590	2,190	2,690	3,250	3,860	4,770
08288000	--	220	406	570	831	1,070	1,350	1,670	2,190

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
104	08289000	Rio Ojo Caliente at La Madera, N. Mex.	36.3497	106.0436	419.0	51	8,640	16.0
105	09012500	North Inlet at Grand Lake, Colo.	40.2533	105.8108	45.9	11	10,700	29.0
106	09020000	Willow Creek near Granby, Colo.	40.1806	106.0086	109.0	19	9,600	25.0
107	09024000	Fraser River at Winter Park, Colo.	39.9000	105.7761	27.6	22	10,700	35.0
108	09026500	St. Louis Creek near Fraser, Colo.	39.9100	105.8778	32.9	33	10,700	30.0
109	09032000	Ranch Creek near Fraser, Colo.	39.9500	105.7650	19.9	14	10,300	29.0
110	09032500	Ranch Creek near Tabernash, Colo.	39.9975	105.8231	51.3	17	9,900	23.0
111	09033000	Meadow Creek near Tabernash, Colo.	40.0508	105.7769	8.0	21	10,500	30.0
112	09033500	Strawberry Creek near Granby, Colo.	40.0867	105.7942	11.6	10	9,500	26.0
113	09034500	Colorado River at Hot Sulphur Springs, Colo.	40.0833	106.0875	825.0	28	9,900	26.0
114	09034900	Bobtail Creek near Jones Pass, Colo.	39.7603	105.9058	5.5	10	11,800	38.0
115	09035500	Williams Fork below Steelman Creek, Colo.	39.7789	105.9278	16.3	15	11,600	36.0
116	09035700	Williams Fork above Darling Creek, near Leal, Colo.	39.7894	106.0217	34.7	10	11,300	32.0
117	09035800	Darling Creek near Leal, Colo.	39.8047	106.0197	8.2	10	10,800	24.0
118	09035900	South Fork of Williams Fork near Leal, Colo.	39.7956	106.0303	27.2	10	10,900	32.0
119	09036000	Williams Fork near Leal, Colo.	39.8314	106.0542	89.3	35	10,900	24.0
120	09036500	Keyser Creek near Leal, Colo.	39.9075	106.0167	13.8	10	10,500	21.0
121	09039000	Troublesome Creek near Pearmont, Colo.	40.2175	106.3125	44.6	22	9,900	27.0
122	09040000	East Fork Troublesome Creek near Troublesome, Colo.	40.1575	106.2828	76.0	29	9,300	24.0
123	09040500	Troublesome Creek near Troublesome, Colo.	40.0592	106.3050	168.0	23	9,100	25.0
124	09041100	Antelope Creek near Kremmling, Colo.	40.2406	106.3731	11.5	13	8,900	25.0
125	09047000	Blue River at Dillon, Colo.	39.6139	106.0514	128.0	44	10,800	28.0
126	09047500	Snake River near Montezuma, Colo.	39.6056	105.9425	57.7	28	11,400	27.0
127	09047700	Keystone Gulch near Dillon, Colo.	39.5944	105.9719	9.1	18	11,000	25.0
128	09050100	Tenmile Creek below North Tenmile Creek, at Frisco, Colo.	39.5769	106.1092	93.3	18	11,200	25.0
129	09050500	Tenmile Creek at Dillon, Colo.	39.6125	106.0542	111.0	40	11,000	29.0
130	09052000	Rock Creek near Dillon, Colo.	39.7231	106.1281	15.8	23	10,800	28.0
131	09052400	Boulder Creek at Upper Station, near Dillon, Colo.	39.7281	106.1728	8.6	10	11,300	35.0
132	09052800	Slate Creek at Upper Station, near Dillon, Colo.	39.7631	106.1919	14.2	10	10,900	38.0
133	09053000	Slate Creek near Dillon, Colo.	39.7817	106.1672	16.6	12	10,700	34.0
134	09053500	Blue River above Green Mountain Reservoir, Colo.	39.8319	106.2222	511.0	19	10,700	27.0
135	09054000	Black Creek below Black Lake, near Dillon, Colo.	39.7992	106.2678	15.0	16	11,300	41.0
136	09054500	Black Creek above Green Mountain Reservoir, Colo.	39.8558	106.2519	18.5	10	10,700	30.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
08289000	--	1,060	1,730	2,190	2,790	3,230	3,670	4,100	4,680
09012500	0.156	751	901	990	1,090	1,170	1,240	1,300	1,390
09020000	0.249	558	713	802	901	967	1,030	1,080	1,150
09024000	0.366	317	441	525	633	715	798	882	997
09026500	0.340	218	350	430	521	580	634	682	738
09032000	0.317	190	237	264	295	316	336	354	377
09032500	0.280	357	455	517	592	646	699	751	819
09033000	0.220	187	234	262	294	317	338	359	386
09033500	--	71	97	115	136	152	169	185	207
09034500	0.281	5,220	7,060	8,210	9,590	10,600	11,500	12,400	13,600
09034900	0.407	137	177	201	230	250	270	289	313
09035500	0.411	279	344	379	417	441	463	482	506
09035700	0.376	395	492	551	621	671	720	767	828
09035800	0.342	100	151	186	231	266	301	337	386
09035900	0.384	293	372	416	464	496	524	549	580
09036000	0.366	1,000	1,260	1,400	1,550	1,640	1,720	1,790	1,880
09036500	0.372	148	170	183	198	209	218	228	239
09039000	0.336	207	336	428	551	646	743	844	981
09040000	0.276	305	520	678	893	1,060	1,240	1,420	1,670
09040500	0.254	452	674	826	1,020	1,170	1,320	1,480	1,680
09041100	0.173	22	42	61	91	119	152	191	254
09047000	0.283	725	926	1,050	1,180	1,280	1,370	1,450	1,560
09047500	0.379	535	720	831	961	1,050	1,140	1,220	1,320
09047700	0.315	39	61	76	97	113	130	148	172
09050100	0.336	940	1,280	1,500	1,750	1,920	2,090	2,250	2,450
09050500	0.324	1,080	1,380	1,550	1,740	1,870	1,990	2,110	2,260
09052000	0.353	93	239	265	294	314	332	350	370
09052400	0.484	151	200	231	270	300	329	358	397
09052800	0.495	214	273	313	364	402	442	482	537
09053000	0.449	183	230	258	291	313	334	354	379
09053500	0.314	2,970	4,010	4,610	5,270	5,710	6,110	6,480	6,920
09054000	0.554	274	324	351	381	401	419	436	457
09054500	--	261	330	374	428	467	505	542	592

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
137	09055000	Otter Creek above Green Mountain Reservoir, Colo.	39.8528	106.2672	8.4	10	9,800	20.0
138	09055300	Cataract Creek near Kremmling, Colo.	39.8353	106.3158	12.0	10	10,800	35.0
139	09055500	Cataract Creek above Green Mountain Reservoir, Colo.	39.8500	106.2908	13.6	10	10,500	31.0
140	09058500	Piney River below Piney Lake, near Minturn, Colo.	39.7081	106.4272	13.0	19	10,900	36.0
141	09059500	Piney River near State Bridge, Colo.	39.8000	106.5833	86.2	31	9,800	29.0
142	09060500	Rock Creek near Toponas, Colo.	40.0411	106.6553	47.6	23	9,400	23.0
143	09063200	Wearyman Creek near Red Cliff, Colo.	39.5206	106.3183	8.8	11	10,900	36.0
144	09063400	Turkey Creek near Red Cliff, Colo.	39.5256	106.3356	23.8	12	10,800	34.0
145	09063500	Turkey Creek at Red Cliff, Colo.	39.5139	106.3667	29.4	20	10,500	33.0
146	09064500	Homestake Creek near Red Cliff, Colo.	39.4733	106.3672	58.2	30	11,100	27.0
147	09065500	Gore Creek at Upper Station, near Minturn, Colo.	39.6278	106.2733	14.4	21	11,100	36.0
148	09066000	Black Gore Creek near Minturn, Colo.	39.5964	106.2644	12.6	21	10,800	40.0
149	09066200	Booth Creek near Minturn, Colo.	39.6506	106.3211	6.0	11	10,900	36.0
150	09066300	Middle Creek near Minturn, Colo.	39.6472	106.3800	5.9	11	10,400	35.0
151	09066400	Red Sandstone Creek near Minturn, Colo.	39.6828	106.4008	7.3	12	10,700	33.0
152	09066500	Gore Creek near Minturn, Colo.	39.6147	106.4394	101.0	12	10,400	32.0
153	09067500	Eagle River at Eagle, Colo.	39.6567	106.8247	629.0	14	9,800	27.0
154	09068000	Brush Creek near Eagle, Colo.	39.5572	106.7625	71.4	22	9,800	28.0
155	09069500	Gypsum Creek near Gypsum, Colo.	39.5456	106.9342	62.7	11	9,600	28.0
156	09070000	Eagle River below Gypsum, Colo.	39.6494	106.9530	945.0	29	9,500	27.0
157	09073500	Roaring Fork River at Aspen, Colo.	39.1894	106.8139	109.0	13	11,000	30.0
158	09073700	Hunter Creek above Midway Creek, near Aspen, Colo.	39.2139	106.6553	6.2	11	12,200	39.0
159	09074000	Hunter Creek near Aspen, Colo.	39.2058	106.7969	41.1	13	10,700	32.0
160	09078000	Fryingpan River at Norrie, Colo.	39.3308	106.6575	90.6	31	10,500	29.0
161	09078100	North Fork Fryingpan River above Cunningham Creek, near Norrie, Colo.	39.3589	106.5678	12.0	12	11,400	38.0
162	09078200	Cunningham Creek near Norrie, Colo.	39.3342	106.5747	7.1	12	10,700	29.0
163	09078500	North Fork Fryingpan River near Norrie, Colo.	39.3428	106.6653	42.0	33	10,600	30.0
164	09080100	Fryingpan River at Meredith, Colo.	39.3625	106.7319	191.0	13	10,600	30.0
165	09081600	Crystal River above Avalanche Creek, near Redstone, Colo.	39.2322	107.2267	167.0	20	10,200	33.0
166	09082800	North Thompson Creek near Carbondale, Colo.	39.3297	107.3328	26.8	12	9,500	34.0
167	09083000	Thompson Creek near Carbondale, Colo.	39.3306	107.2239	75.7	14	9,100	31.0
168	09084000	Cattle Creek near Carbondale, Colo.	39.4667	107.0517	31.1	15	9,500	24.0
169	09089500	West Divide Creek near Raven, Colo.	39.3311	107.5794	64.6	20	8,400	27.0
170	09092500	Beaver Creek near Rifle, Colo.	39.4719	107.8319	7.9	23	9,400	26.0
171	09093000	Parachute Creek near Parachute, Colo.	39.5669	108.1103	141.0	13	8,100	18.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09055000	--	56	77	90	106	117	127	138	151
09055300	0.368	213	249	269	290	304	317	329	343
09055500	--	274	331	365	405	433	460	486	519
09058500	0.499	275	350	396	452	493	532	571	621
09059500	0.329	608	801	913	1,040	1,130	1,210	1,280	1,370
09060500	0.196	331	429	481	533	566	593	617	645
09063200	0.280	73	107	129	157	177	196	216	241
09063400	0.303	206	330	420	541	636	734	836	977
09063500	0.316	308	423	488	559	605	646	683	727
09064500	0.359	781	994	1,110	1,230	1,310	1,380	1,440	1,520
09065500	0.440	352	479	555	643	703	759	812	878
09066000	0.309	205	270	307	348	376	401	424	452
09066200	0.518	150	213	256	309	349	389	430	484
09066300	0.386	67	91	105	121	132	143	152	164
09066400	0.259	107	151	180	214	239	263	286	316
09066500	0.396	1,190	1,510	1,690	1,880	2,000	2,110	2,210	2,330
09067500	0.330	4,750	5,940	6,630	7,410	7,940	8,430	8,900	9,470
09068000	0.362	297	442	545	681	788	898	1,010	1,170
09069500	0.338	164	249	307	382	439	496	554	632
09070000	0.320	3,770	5,030	5,800	6,700	7,340	7,940	8,520	9,260
09073500	0.369	1,620	2,230	2,620	3,080	3,420	3,740	4,050	4,460
09073700	0.485	288	400	475	570	641	713	785	882
09074000	0.302	643	828	928	1,030	1,100	1,160	1,220	1,280
09078000	0.403	978	1,310	1,490	1,710	1,850	1,980	2,100	2,250
09078100	0.445	223	296	342	395	433	469	504	549
09078200	0.355	138	198	238	291	331	371	412	467
09078500	0.367	533	737	869	1,030	1,150	1,270	1,380	1,530
09080100	0.368	1,680	1,980	2,150	2,340	2,460	2,570	2,680	2,810
09081600	0.426	2,260	2,860	3,220	3,650	3,960	4,250	4,540	4,910
09082800	0.202	232	318	368	424	461	495	526	564
09083000	0.257	430	665	823	1,020	1,170	1,310	1,460	1,640
09084000	0.292	141	229	287	356	406	452	497	552
09089500	0.260	382	605	764	971	1,130	1,290	1,460	1,680
09092500	0.244	46	65	78	93	105	116	127	142
09093000	0.369	298	703	1,070	1,640	2,140	2,700	3,310	4,220

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
172	09095000	Roan Creek near De Beque, Colo.	39.4533	108.3164	321.0	17	7,500	18.0
173	09096000	Plateau Creek at upper station, near Collbran, Colo.	39.2236	107.8014	24.1	13	9,400	29.0
174	09096500	Plateau Creek near Collbran, Colo.	39.2506	107.8400	80.4	36	9,700	31.0
175	09096800	Buzzard Creek below Owens Creek, near Heiberger, Colo.	39.2361	107.6333	49.7	15	9,400	35.0
176	09097500	Buzzard Creek near Collbran, Colo.	39.3250	107.8414	143.0	54	8,400	23.0
177	09097600	Brush Creek near Collbran, Colo.	39.3250	107.8417	9.6	12	9,600	30.0
178	09110000	Taylor River at Almont, Colo.	38.6644	106.8447	477.0	18	10,900	27.0
179	09110500	East River near Crested Butte, Colo.	38.8644	106.9092	90.3	12	10,900	39.0
180	09111500	Slate River near Crested Butte, Colo.	38.8656	106.9672	70.1	12	10,400	33.0
181	09112000	Cement Creek near Crested Butte, Colo.	38.8244	106.8522	26.1	12	10,900	32.0
182	09112500	East River at Almont, Colo.	38.6644	106.8475	289.0	47	10,200	31.0
183	09113300	Ohio Creek at Bladwin, Colo.	38.7656	107.0578	47.2	12	10,200	32.0
184	09113500	Ohio Creek near Baldwin, Colo.	38.7022	106.9978	121.0	24	10,000	22.0
185	09115500	Tomichi Creek at Sargents, Colo.	38.3950	106.4219	149.0	41	10,100	23.0
186	09117000	Tomichi Creek at Parlin, Colo.	38.4972	106.7256	427.0	14	9,600	19.0
187	09118000	Quartz Creek near Ohio City, Colo.	38.5597	106.6358	106.0	24	10,700	25.0
188	09122000	Cebolla Creek at Powderhorn, Colo.	38.2914	107.1139	340.0	18	10,500	19.0
189	09122500	Soap Creek near Sapinero, Colo.	38.5608	107.3161	57.4	11	9,900	29.0
190	09123500	Lake Fork at Lake City, Colo.	38.0250	107.3078	115.0	14.	11,500	28.0
191	09124500	Lake Fork at Gateview, Colo.	38.2989	107.2294	334.0	59	10,900	24.0
192	09125000	Curecanti Creek near Sapinero, Colo.	38.4878	107.4144	35.0	27	9,700	22.0
193	09126000	Cimarron River near Cimarron, Colo.	38.2625	107.5442	66.6	16	10,900	31.0
194	09127500	Crystal Creek near Maher, Colo.	38.5519	107.5056	42.2	21	9,600	25.0
195	09128500	Smith Fork near Crawford, Colo.	38.7278	107.5061	42.8	40	9,200	23.0
196	09130500	East Muddy Creek near Bardine, Colo.	39.0133	107.3578	133.0	19	8,700	26.0
197	09130600	West Muddy Creek near Ragged Mountain, Colo.	39.1308	107.5747	7.4	10	9,400	38.0
198	09132500	North Fork Gunnison River near Somerset, Colo.	38.9258	107.4336	526.0	27	8,900	25.0
199	09133000	North Fork Gunnison River near Paonia, Colo.	38.8992	107.5631	653.0	10	8,800	27.0
200	09134500	Leroux Creek near Cedaredge, Colo.	38.9264	107.7931	34.5	29	9,700	33.0
201	09145000	Uncompahgre River at Ouray, Colo.	38.0192	107.6756	42.0	14	11,400	30.0
202	09146200	Uncompahgre River near Ridgway, Colo.	38.1839	107.7453	149.0	17	9,500	27.0
203	09146400	West Fork Dallas Creek near Ridgway, Colo.	38.0736	107.8506	14.1	15	10,200	35.0
204	09146500	East Fork Dallas Creek near Ridgway, Colo.	38.0933	107.8131	16.8	16	10,800	32.0
205	09146600	Pleasant Valley Creek near Noel, Colo.	38.1456	107.9192	8.2	12	9,100	20.0
206	09147100	Cow Creek near Ridgway, Colo.	38.1494	107.6442	45.4	18	10,700	29.0
207	09165000	Dolores River below Rico, Colo.	37.6389	108.0597	105.0	24	10,600	31.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09095000	0.456	578	1,110	1,500	2,030	2,440	2,840	3,250	3,790
09096000	0.194	201	310	386	487	564	643	724	835
09096500	0.169	1,230	1,580	1,800	2,080	2,290	2,510	2,720	3,010
09096800	0.158	362	522	624	749	838	924	1,010	1,120
09097500	0.200	558	906	1,140	1,440	1,650	1,860	2,070	2,330
09097600	0.345	88	156	211	291	358	432	513	631
09110000	0.247	2,080	2,840	3,300	3,810	4,150	4,470	4,770	5,130
09110500	0.422	1,000	1,120	1,180	1,250	1,300	1,350	1,400	1,450
09111500	0.375	1,050	1,150	1,200	1,260	1,290	1,320	1,350	1,380
09112000	0.272	210	272	310	355	387	417	447	485
09112500	0.333	2,200	3,050	3,660	4,470	5,110	5,780	6,500	7,500
09113300	0.315	368	525	626	750	839	926	1,010	1,120
09113500	0.256	670	965	1,140	1,340	1,480	1,600	1,720	1,860
09115500	0.293	356	551	677	832	942	1,050	1,150	1,280
09117000	0.239	421	588	686	797	872	940	1,000	1,080
09118000	0.344	363	504	588	687	756	820	881	957
09122000	0.242	664	1,160	1,540	2,080	2,520	2,990	3,490	4,210
09122500	0.385	455	615	725	866	975	1,090	1,200	1,360
09123500	0.396	861	1,110	1,270	1,460	1,600	1,730	1,860	2,030
09124500	0.390	1,660	2,160	2,460	2,810	3,050	3,280	3,490	3,770
09125000	0.283	254	350	408	477	524	568	611	664
09126000	0.366	832	1,180	1,430	1,750	2,000	2,270	2,540	2,920
09127500	0.259	285	407	482	570	631	688	743	812
09128500	0.408	365	593	761	991	1,170	1,360	1,560	1,840
09130500	0.271	923	1,310	1,580	1,930	2,200	2,480	2,760	3,150
09130600	0.166	87	159	214	293	357	425	497	598
09132500	0.291	3,450	5,010	6,070	7,430	8,440	9,460	10,500	11,900
09133000	0.288	4,570	6,450	7,670	9,160	10,200	11,300	12,400	13,700
09134500	0.161	701	922	1,060	1,230	1,360	1,480	1,590	1,750
09145000	0.480	971	1,370	1,650	2,020	2,320	2,630	2,950	3,410
09146200	0.399	1,140	1,510	1,720	1,970	2,130	2,280	2,420	2,590
09146400	0.358	81	126	159	203	238	275	314	368
09146500	0.400	173	231	265	304	331	357	381	411
09146600	0.139	151	282	385	529	646	769	899	1,080
09147100	0.238	643	895	1,070	1,290	1,460	1,630	1,810	2,050
09165000	0.374	1,190	1,600	1,860	2,190	2,420	2,650	2,880	3,180

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
208	09166500	Dolores River at Dolores, Colo.	37.4725	108.4969	504.0	60	9,800	30.0
209	09168100	Disappointment Creek near Dove Creek, Colo.	37.8767	108.5825	147.0	18	8,000	22.0
210	09172000	Fall Creek near Fall Creek, Colo.	37.9583	108.0053	33.4	18	10,000	32.0
211	09172500	San Miguel River near Placerville, Colo.	38.0347	108.1208	308.0	40	10,200	25.0
212	09174500	Cottonwood Creek near Nucla, Colo.	38.2736	108.3622	38.8	10	7,700	17.0
213	09175000	West Naturita Creek near Norwood, Colo.	37.9758	108.3272	53.0	13	8,500	31.0
214	09175900	Dry Creek near Naturita, Colo.	38.0922	108.6214	78.6	10	7,400	18.0
215	09177500	Taylor Creek near Gateway, Colo.	38.5189	109.1092	15.4	23	9,000	17.0
216	09181000	Onion Creek near Moab, Utah	38.7250	109.3444	18.8	13	5,702	12.3
217	09182000	Castle Creek above Diversions, near Moab, Utah	38.5928	109.2650	7.6	24	9,480	24.7
218	09183000	Courthouse Wash near Moab, Utah	38.6128	109.5792	162.0	23	4,810	7.5
219	09184000	Mill Creek near Moab, Utah	38.5622	109.5133	74.9	34	7,170	16.7
220	09185200	Kane Springs Canyon near Moab, Utah	38.4000	109.4500	17.8	15	6,620	15.9
221	09185500	Hatch Wash near La Sal, Utah	38.2433	109.4394	378.0	22	6,550	13.1
222	09186500	Indian Creek above Cottonwood Creek, near Monticello, Utah	37.9750	109.5181	31.2	22	8,590	21.2
223	09187000	Cottonwood Creek near Monticello, Utah	38.0625	109.5736	115.0	16	7,210	17.9
224	09216537	Delaney Draw near Red Desert, Wyo.	41.6394	108.1286	32.8	24	7,040	7.0
225	09216550	Deadman Wash near Point Of Rocks, Wyo.	41.6750	108.7361	152.0	20	7,000	8.0
226	09216560	Bitter Creek near Point of Rocks, Wyo.	41.6778	108.7861	765.0	15	7,010	7.5
227	09216700	Salt Wells Creek near Rock Springs, Wyo.	41.4833	108.9667	515.0	18	7,340	9.5
228	09217900	Blacks Fork near Robertson, Wyo.	40.9592	110.5794	130.0	16	10,640	20.0
229	09218500	Blacks Fork near Millburne, Wyo.	41.0317	110.5786	152.0	31	10,270	19.0
230	09220000	East Fork of Smith Fork near Robertson, Wyo.	41.0542	110.3978	53.0	41	10,250	20.0
231	09220500	West Fork Of Smith Fork near Robertson, Wyo.	41.0222	110.4786	37.2	41	9,790	20.0
232	09224980	Summers Dry Creek near Green River, Wyo.	41.3736	109.6444	423.0	16	6,880	12.0
233	09226000	Henrys Fork near Lonetree, Wyo.	41.0064	110.2703	56.0	30	10,270	23.0
234	09226500	Middle Fork Beaver Creek near Lonetree, Wyo.	40.9444	110.1786	28.0	22	10,480	30.5
235	09227500	West Fork Beaver Creek near Lonetree, Wyo.	40.9472	110.2167	23.0	14	10,490	32.0
236	09228500	Burnt Fork near Burntfork, Wyo.	40.9464	110.0656	52.8	40	10,300	29.3
237	09235600	Pot Creek above Diversions, near Vernal, Utah	40.7681	109.3183	25.0	22	8,167	19.6
238	09238500	Walton Creek near Steamboat Springs, Colo.	40.4081	106.7864	42.4	10	9,300	49.0
239	09239500	Yampa River at Steamboat Springs, Colo.	40.4836	106.8317	604.0	69	8,800	25.0
240	09241000	Elk River at Clark, Colo.	40.7175	106.9153	216.0	48	9,000	37.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09166500	0.312	3,310	4,950	6,090	7,600	8,760	9,950	11,200	12,800
09168100	0.240	1,190	2,580	3,880	6,030	8,030	10,400	13,200	17,700
09172000	0.264	200	394	572	865	1,140	1,470	1,860	2,490
09172500	0.370	1,350	1,920	2,310	2,820	3,200	3,590	3,980	4,520
09174500	--	125	237	324	443	538	637	739	878
09175000	0.152	387	597	746	942	1,090	1,250	1,410	1,630
09175900	0.145	615	1,400	2,220	3,710	5,230	7,190	9,690	14,100
09177500	0.118	113	265	402	616	803	1,010	1,240	1,590
09181000	--	754	1,400	1,860	2,470	2,930	3,380	3,830	4,410
09182000	--	9	19	27	37	45	54	62	74
09183000	--	2,140	4,640	7,010	11,000	14,700	19,200	24,500	33,100
09184000	--	659	1,720	2,840	4,840	6,820	9,270	12,300	17,200
09185200	--	535	844	1,060	1,340	1,550	1,770	1,990	2,290
09185500	--	501	1,220	1,960	3,240	4,500	6,060	7,960	11,100
09186500	--	136	383	679	1,280	1,950	2,880	4,150	6,500
09187000	--	395	1,270	2,310	4,300	6,370	9,050	12,400	18,100
09216537	0.100	90	247	420	737	1,060	1,470	1,990	2,850
09216550	0.096	403	731	984	1,340	1,620	1,930	2,240	2,690
09216560	--	478	952	1,340	1,910	2,390	2,910	3,460	4,260
09216700	--	1,150	2,180	2,950	3,970	4,750	5,540	6,340	7,390
09217900	--	1,630	2,100	2,370	2,670	2,880	3,060	3,240	3,450
09218500	--	1,470	1,840	2,070	2,350	2,560	2,760	2,960	3,220
09220000	--	505	746	926	1,180	1,380	1,600	1,840	2,180
09220500	--	443	706	905	1,190	1,420	1,660	1,930	2,310
09224980	0.081	721	2,300	4,180	7,880	11,800	17,000	23,700	35,300
09226000	--	583	900	1,150	1,500	1,790	2,110	2,460	2,980
09226500	--	316	490	610	764	880	996	1,110	1,270
09227500	--	168	254	315	397	460	525	593	686
09228500	--	283	509	711	1,040	1,340	1,700	2,130	2,820
09235600	--	63	126	182	269	346	434	535	688
09238500	--	1,350	1,810	2,100	2,430	2,670	2,900	3,110	3,390
09239500	0.205	3,570	4,540	5,100	5,730	6,160	6,560	6,940	7,410
09241000	0.247	2,630	3,360	3,760	4,210	4,500	4,750	4,990	5,270

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
241	09242500	Elk River near Milner, Colo.	40.5147	106.9533	415.0	12	8,400	30.0
242	09244100	Fish Creek near Milner, Colo.	40.3342	107.1386	34.5	18	8,200	23.0
243	09245000	Elkhead Creek near Elkhead, Colo.	40.6697	107.2844	64.2	23	8,400	26.0
244	09245500	North Fork Elkhead Creek near Elkhead, Colo.	40.6806	107.2867	21.0	15	8,600	41.0
245	09249000	East Fork of Williams Fork near Pagoda, Colo.	40.3125	107.3194	150.0	18	9,200	26.0
246	09249200	South Fork of Williams Fork near Pagoda, Colo.	40.2122	107.4422	46.7	10	9,200	32.0
247	09250000	Milk Creek near Thornburgh, Colo.	40.1936	107.7317	65.0	23	7,800	18.0
248	09251500	Middle Fork Little Snake River near Battle Creek, Colo.	40.9906	107.0436	120.0	10	8,700	33.0
249	09251800	North Fork Little Snake River near Encampment, Wyo.	41.0500	106.9583	9.6	10	9,470	30.0
250	09253000	Little Snake River near Slater, Colo.	40.9994	107.1428	285.0	35	8,600	31.0
251	09253400	Battle Creek near Encampment, Wyo.	41.1333	107.0639	13.0	8	9,590	40.0
252	09254500	Slater Fork at Baxter Ranch, near Slater, Colo.	40.8894	107.3300	80.0	10	8,700	24.0
253	09255000	Slater Fork near Slater, Colo.	40.9817	107.3828	161.0	50	8,400	22.0
254	09256000	Savery Creek near Savery, Wyo.	41.0961	107.3789	330.0	30	7,870	19.0
255	09257000	Little Snake River near Dixon, Wyo.	41.0283	107.5486	988.0	47	8,030	18.0
256	09257500	Willow Creek near Baggs, Wyo.	40.8767	107.4639	5.0	10	9,000	20.0
257	09258000	Willow Creek near Dixon, Wyo.	40.9156	107.5211	24.0	27	8,200	19.0
258	09263700	Cliff Creek near Jensen, Utah	40.3000	109.1333	64.0	15	6,570	14.0
259	09264000	Ashley Creek below Trout Creek near Vernal, Utah	40.7333	109.6778	27.0	11	9,930	28.0
260	09264500	South Fork Ashley Creek near Vernal, Utah	40.7333	109.7028	20.0	12	10,480	30.3
261	09266500	Ashley Creek near Vernal, Utah	40.5775	109.6214	101.0	67	9,440	23.0
262	09268000	Dry Fork above Sinks, near Dry Fork, Utah	40.6264	109.8194	44.4	36	10,240	29.7
263	09268500	North Fork of Dry Fork near Dry Fork, Utah	40.6428	109.8103	8.6	35	10,122	29.6
264	09268900	Brownie Canyon above Sinks, near Dry Fork, Utah	40.6594	109.7503	8.2	19	10,107	28.0
265	09269000	East Fork of Dry Fork near Dry Fork, Utah	40.6500	109.7611	12.0	18	9,360	28.6
266	09270000	Dry Fork below springs near Dry Fork, Utah	40.5694	109.6969	97.4	21	9,360	27.5
267	09270500	Dry Fork at mouth near Dry Fork, Utah	40.5264	109.6050	115.0	26	9,190	23.0
268	09271000	Ashley Creek, Sign of the Maine, near Vernal, Utah	40.5172	109.5958	241.0	30	9,100	23.0
269	09271800	Halfway Hollow tributary near Lapoint, Utah	40.4167	109.7500	5.6	15	6,547	10.8
270	09302450	Lost Creek near Buford, Colo.	40.0503	107.4683	21.5	11	8,960	27.5

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09242500	0.240	3,830	4,560	4,980	5,460	5,790	6,090	6,380	6,740
09244100	0.216	161	246	299	361	404	443	481	527
09245000	0.189	943	1,420	1,730	2,090	2,350	2,600	2,830	3,130
09245500	0.210	408	654	829	1,060	1,240	1,420	1,610	1,860
09249000	0.222	917	1,220	1,420	1,660	1,830	2,000	2,170	2,400
09249200	0.235	632	766	844	934	996	1,050	1,110	1,180
09250000	0.171	359	624	833	1,140	1,390	1,660	1,960	2,390
09251500	0.190	1,750	2,750	3,470	4,430	5,180	5,950	6,750	7,850
09251800	--	371	468	527	598	647	695	741	801
09253000	0.227	2,110	2,920	3,420	4,030	4,450	4,860	5,260	5,760
09253400	--	326	441	519	619	695	772	851	959
09254500	0.185	611	791	907	1,050	1,160	1,260	1,360	1,500
09255000	0.181	830	1,170	1,400	1,710	1,940	2,180	2,420	2,750
09256000	--	1,090	1,630	1,950	2,320	2,560	2,790	2,990	3,240
09257000	--	4,490	6,000	6,940	8,060	8,860	9,620	10,400	11,300
09257500	--	90	102	109	116	120	124	128	132
09258000	0.168	161	248	306	378	431	483	534	600
09263700	--	166	745	1,510	3,040	4,630	6,640	9,080	13,000
09264000	--	436	562	633	712	764	812	856	910
09264500	--	316	414	471	535	578	618	655	700
09266500	--	1,080	1,600	1,940	2,360	2,650	2,940	3,220	3,570
09268000	--	526	745	886	1,060	1,190	1,310	1,430	1,590
09268500	--	76	116	143	178	204	231	257	293
09268900	--	188	281	341	415	469	520	571	636
09269000	--	131	191	226	264	290	312	332	356
09270000	--	527	761	912	1,100	1,230	1,360	1,480	1,650
09270500	--	496	962	1,280	1,680	1,950	2,200	2,440	2,720
09271000	--	1,390	2,030	2,460	2,990	3,390	3,780	4,180	4,700
09271800	--	91	301	532	937	1,320	1,780	2,300	3,110
09302450	0.97	503	766	924	1,100	1,220	1,330	1,430	1,550

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
271	09302500	Marvine Creek near Buford, Colo.	40.0383	107.4875	59.7	12	9,780	32.2
272	09303000	North Fork White River at Buford, Colo.	39.9875	107.6139	259.0	24	9,529	30.9
273	09303300	South Fork White River at Budges Resort, Colo.	39.8433	107.3342	52.3	19	10,569	40.0
274	09303320	Wagonwheel Creek at Budges Resort, Colo.	39.8428	107.3361	7.4	14	10,640	40.0
275	09303400	South Fork White River near Budges Resort, Colo.	39.8642	107.5333	128.0	19	10,250	40.0
276	09304000	South Fork White River at Buford, Colo.	39.9744	107.6247	177.0	25	9,800	36.3
277	09304300	Coal Creek near Meeker, Colo.	40.0914	107.7694	25.1	11	7,956	28.5
278	09304500	White River near Meeker, Colo.	40.0336	107.8617	755.0	66	8,940	29.6
279	09306007	Piceance Creek below Rio Blanco, Colo.	39.8261	108.1825	177.0	21	7,628	24.5
280	09306058	Willow Creek near Rio Blanco, Colo.	39.8372	108.2436	48.4	12	7,500	21.8
281	09306061	Piceance Creek above Hunter Creek, near Rio Blanco, Colo.	39.8506	108.2583	309.0	14	7,552	21.2
282	09306200	Piceance Creek below Ryan Gulch, near Rio Blanco, Colo.	39.9211	108.2969	506.0	11	7,415	20.8
283	09306235	Corral Gulch below Water Gulch, near Rangely, Colo.	39.9061	108.5322	8.6	14	7,740	20.0
284	09306242	Corral Gulch near Rangely, Colo.	39.9203	108.4722	31.6	21	7,490	20.0
285	09306255	Yellow Creek near White River, Colo.	40.1686	108.4006	262.0	17	6,877	17.3
286	09306800	Bitter Creek near Bonanza, Utah	39.7533	109.3542	324.0	10	7,146	16.1
287	09307500	Willow Creek above diversions near Ouray, Utah	39.5664	109.5867	297.0	24	7,650	16.8
288	09308000	Willow Creek near Ouray, Utah	39.9389	109.6478	897.0	23	7,080	13.7
289	09328900	Crescent Wash near Crescent Junction, Utah	38.9422	109.8206	23.3	10	6,180	12.7
290	09340000	East Fork San Juan River near Pagosa Springs, Colo.	37.3694	106.8917	86.9	41	10,200	39.0
291	09341500	West Fork San Juan River near Pagosa Springs, Colo.	37.3786	106.8989	87.9	26	10,000	42.0
292	09342500	San Juan River at Pagosa Springs, Colo.	37.2661	107.0103	298.0	46	9,700	36.0
293	09343000	Rio Blanco near Pagosa Springs, Colo.	37.2128	106.7939	58.0	37	10,000	39.0
294	09343500	Rito Blanco near Pagosa Springs, Colo.	37.1936	106.9047	23.3	18	9,400	34.0
295	09344000	Navajo River at Banded Peak Ranch, near Chromo, Colo.	37.0853	106.6889	69.8	41	10,500	37.0
296	09345500	Little Navajo River at Chromo, Colo.	37.0456	106.8425	21.9	17	8,900	26.0
297	09346000	Navajo River at Edith, Colo.	37.0028	106.9069	172.0	36	9,200	33.0
298	09346200	Rio Amargo at Dulce, N. Mex.	36.9333	107.0000	168.0	26	7,930	17.7
299	09349500	Piedra River near Piedra, Colo.	37.2222	107.3422	371.0	34	9,400	33.0
300	09349800	Piedra River near Arboles, Colo.	37.0883	107.3972	629.0	20	8,300	27.0
301	09350800	Vaqueros Canyon near Gobernador, N. Mex.	36.7333	107.2833	60.5	31	7,500	15.0
302	09352500	Los Pinos River below Snowslide Canyon, near Weminuche Pass, Colo.	37.6389	107.3333	25.3	13	11,200	45.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09302500	0.245	318	400	447	498	532	563	591	626
09303000	0.237	1,380	1,890	2,230	2,640	2,940	3,240	3,540	3,930
09303300	0.198	924	1,380	1,700	2,120	2,440	2,760	3,090	3,540
09303320	0.159	188	260	307	365	406	447	488	540
09303400	0.256	1,700	2,480	3,030	3,770	4,350	4,940	5,570	6,440
09304000	0.259	1,800	2,310	2,600	2,920	3,140	3,340	3,530	3,760
09304300	0.285	50	80	100	126	144	162	180	203
09304500	0.222	3,170	4,210	4,840	5,600	6,140	6,650	7,150	7,780
09306007	0.283	148	294	411	576	710	851	1,000	1,210
09306058	0.272	14	36	58	99	140	191	254	360
09306061	0.263	193	381	534	758	943	1,140	1,360	1,660
09306200	0.243	145	255	345	479	594	723	867	1,080
09306235	0.253	14	69	158	382	673	1,120	1,780	3,110
09306242	0.236	39	175	383	883	1,510	2,450	3,810	6,490
09306255	0.197	154	508	982	2,040	3,310	5,170	7,850	13,200
09306800	0.287	115	451	894	1,820	2,840	4,210	6,000	9,150
09307500	--	241	476	692	1,050	1,380	1,780	2,260	3,030
09308000	--	636	1,860	3,170	5,510	7,810	10,600	14,000	19,300
09328900	--	439	1,140	1,890	3,260	4,670	6,460	8,720	12,600
09340000	0.387	924	1,350	1,640	2,020	2,300	2,600	2,900	3,310
09341500	0.400	1,320	1,830	2,170	2,590	2,910	3,230	3,550	3,970
09342500	0.342	2,610	4,160	5,480	7,570	9,460	11,700	14,300	18,400
09343000	0.428	853	1,200	1,450	1,780	2,030	2,290	2,570	2,950
09343500	0.239	190	313	401	519	610	704	800	932
09344000	0.368	650	897	1,070	1,280	1,450	1,620	1,790	2,020
09345500	0.225	146	253	334	447	538	633	733	874
09346000	0.277	852	1,310	1,660	2,160	2,570	3,020	3,510	4,230
09346200	--	1,030	1,490	1,830	2,280	2,650	3,040	3,440	4,030
09349500	0.344	2,090	3,480	4,640	6,400	7,950	9,710	11,700	14,800
09349800	0.290	2,420	3,960	5,130	6,790	8,150	9,610	11,200	13,500
09350800	--	196	490	822	1,470	2,180	3,130	4,410	6,760
09352500	--	324	518	656	839	981	1,130	1,280	1,480

Table 3. Drainage-basin characteristics and flood-frequency data at streamflow-gaging stations—Continued

[LATDEG, latitude in decimal degrees; LNGDEG, longitude in decimal degree; DAREA, drainage area in square miles; YRSPK, years P2, P5, P10, P25, P100, P200, and P500 are the indicated recurrence intervals for the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year,

Map number (fig. 1)	Station number	Station name	LATDEG	LNGDEG	DAREA	YRSPK	ELEV	PRECIP
303	09352900	Vallecito Creek near Bayfield, Colo.	37.4775	107.5431	72.1	13	11,400	46.0
304	09353500	Los Pinos River near Bayfield, Colo.	37.3828	107.5769	270.0	12	10,400	37.0
305	09355000	Spring Creek at La Boca, Colo.	37.0111	107.5964	58.0	32	7,300	12.0
306	09357500	Animas River at Howardsville, Colo.	37.8331	107.5989	55.9	40	11,900	31.0
307	09359000	Mineral Creek near Silverton, Colo.	37.7975	107.6947	43.9	14	11,700	38.0
308	09359500	Animas River above Tacoma, Colo.	37.5703	107.7800	348.0	11	11,200	34.0
309	09361000	Hermosa Creek near Hermosa, Colo.	37.4219	107.8444	172.0	45	9,600	34.0
310	09361500	Animas River at Durango, Colo.	37.2792	107.8797	692.0	55	10,200	30.0
311	09362000	Lightner Creek near Durango, Colo.	37.6039	107.8931	66.0	22	8,400	22.0
312	09363000	Florida River near Durango, Colo.	37.3253	107.7483	97.4	46	9,900	38.0
313	09363100	Salt Creek near Oxford, Colo.	37.1397	107.7528	17.7	22	6,800	18.0
314	09365500	La Plata River at Hesperus, Colo.	37.2897	108.0400	37.0	61	10,200	35.0
315	09366500	La Plata River at Colorado-New Mexico State line	36.9997	108.1881	331.0	63	7,712	35.0
316	09368500	West Mancos River near Mancos, Colo.	37.3817	108.2575	39.4	16	9,300	30.0
317	09369000	East Mancos River mear Mancos, Colo.	37.3703	108.2308	11.9	15	9,700	30.0
318	09369500	Middle Mancos River near Mancos, Colo.	37.3739	108.2300	12.1	15	9,300	28.0
319	09371000	Mancos River near Towaoc, Colo.	37.0275	108.7408	526.0	41	7,200	16.0
320	09371500	McElmo Creek near Cortez, Colo.	37.3228	108.6725	230.0	10	6,500	15.0
321	09372000	McElmo Creek near Colorado-Utah State line	37.3242	109.0150	346.0	30	6,300	10.5
322	09372200	McElmo Creek near Bluff, Utah	37.2167	109.1833	720.0	11	6,200	10.3
323	09378700	Cottonwood Wash near Blanding, Utah	37.5606	109.5781	205.0	22	6,820	16.4
324	09378950	Comb Wash near Blanding, Utah	37.5500	109.6667	10.3	10	5,760	12.0
325	09379000	Comb Wash near Bluff, Utah	37.2661	109.6750	280.0	10	6,060	11.5
326	09379300	Lime Creek near Mexican Hat, Utah	37.2167	109.8167	32.0	15	5,360	8.8
327	10011500	Bear River near Utah-Wyoming State line	40.9653	110.8528	172.0	38	9,770	31.7
328	10012000	Mill Creek at Utah-Wyoming State line	40.9917	110.8417	59.0	19	9,320	24.0

of record; ELEV, mean basin elevation in feet; PRECIP, mean annual precipitation in inches; BSLOPE, mean basin slope in foot per foot; 200-year, and 500-year peak discharge; --, not available]

Station number	BSLOPE	P2	P5	P10	P25	P50	P100	P200	P500
09352900	0.537	1,140	1,650	2,050	2,610	3,090	3,620	4,200	5,070
09353500	0.424	2,320	3,250	3,850	4,580	5,110	5,620	6,130	6,790
09355000	0.165	374	658	902	1,290	1,630	2,030	2,500	3,230
09357500	0.516	980	1,270	1,460	1,680	1,850	2,010	2,170	2,370
09359000	0.569	830	1,110	1,300	1,550	1,740	1,940	2,150	2,430
09359500	0.501	5,390	7,310	8,510	9,970	11,000	12,000	13,000	14,300
09361000	0.562	989	1,690	2,230	2,980	3,580	4,220	4,910	5,880
09361500	0.488	4,850	7,060	8,690	10,900	12,700	14,700	16,700	19,700
09362000	0.290	488	974	1,400	2,080	2,680	3,370	4,160	5,380
09363000	0.336	988	1,480	1,840	2,350	2,750	3,190	3,660	4,330
09363100	0.056	215	393	533	735	901	1,080	1,270	1,550
09365500	0.485	436	737	959	1,260	1,500	1,740	2,000	2,350
09366500	0.168	720	1,480	2,170	3,280	4,300	5,510	6,920	9,140
09368500	0.281	318	585	805	1,130	1,410	1,710	2,050	2,550
09369000	0.426	105	181	247	350	444	553	681	882
09369500	0.207	104	195	269	374	461	554	654	798
09371000	0.265	1,180	2,110	2,860	3,960	4,890	5,920	7,050	8,720
09371500	0.090	810	1,620	2,390	3,720	5,020	6,630	8,620	12,000
09372000	0.1280	961	1,540	1,980	2,600	3,110	3,650	4,230	5,070
09372200	--	659	1,810	3,190	6,030	9,280	13,800	20,100	32,100
09378700	--	1,080	2,740	4,600	8,170	12,000	17,100	23,700	35,700
09378950	--	751	1,450	2,080	3,110	4,070	5,210	6,560	8,720
09379000	--	1,830	3,170	4,320	6,110	7,710	9,570	11,700	15,100
09379300	--	1,690	4,160	6,530	10,400	14,000	18,100	22,800	30,100
10011500	--	1,850	2,390	2,710	3,090	3,350	3,600	3,830	4,130
10012000	--	391	544	642	760	845	927	1,010	1,110

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