



Methods for Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Utah



Prepared in cooperation with the
UTAH DEPARTMENT OF NATURAL RESOURCES, DIVISIONS OF WATER RIGHTS and WATER RESOURCES,
and the UTAH DEPARTMENT OF TRANSPORTATION

Scientific Investigations Report 2008–5230
Version 2.0, April 2, 2011

Cover: Photographic montage of U.S. Geological Survey streamflow gaging stations in Utah and Wyoming. All photographs are by U.S. Geological Survey personnel.

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By Christopher D. Wilkowske, Terry A. Kenney, and Shane J. Wright

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

U.S. Department of the Interior
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Conversion Factors and Datums

Multiply	By	To obtain
Length		
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Area		
acre	0.004047	square kilometer (km ²)
Flow rate		
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second (m ³ /s)

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Abbreviations and Acronyms Used in the Text

(Clarification or additional information given in parentheses)

ADAPS	Automated Data Processing System
DVSTAT	daily values statistical program
GIS	geographic information system
GLS	generalized least squares
MSE	mean square error
NHD	National Hydrography Dataset
NWIS	National Water Information System (USGS)
OLS	ordinary least squares
RMSE	root mean square error
StreamStats	A Web-based tool developed by the USGS that integrates published stream-flow-gaging station data and regional regression equations with a Web-based GIS.
USGS	U.S. Geological Survey
WLS	weighted least squares

Methods for Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Utah

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Abstract

The monthly 80-, 50-, and 20-percent exceedance streamflows were calculated for 266 streamflow-gaging stations in Utah and the surrounding states. Using geographic information systems software, 24 physiographic and climatic basin characteristics were computed for each gaging station location. Using these data, regional regression equations were created to predict monthly 80-, 50-, and 20-percent streamflow and annual mean streamflow at ungaged sites in Utah. The state of Utah was divided into seven distinct geohydrologic regions on the basis of a variety of physiographic, climatic, and hydrologic characteristics. Separate regression equations were developed for each region except region 3, which was combined with region 5 because of the small number of gaging stations in region 3. Root mean square error percent for the equations ranged from 34 to 379 percent. The equations are more reliable for predicting high-streamflow statistics (20-percent exceedance) than for predicting the low-streamflow statistics (80-percent exceedance). In general, the mean annual streamflow equations had smaller errors than the monthly predicting equations. The developed equations documented in this report will be implemented in StreamStats, a USGS Web-based tool that allows users to obtain a variety of streamflow statistics and basin characteristics by selecting a location on a map interface.

Introduction

Monthly and annual streamflow information is required by fish and wildlife, water rights, and other land-use managers to assist in their decision-making processes. This type of information is available at sites where streamflow-gaging stations are located; however, there are numerous drainage basins in Utah with no existing streamflow information. Estimates are therefore needed for monthly and annual streamflow statistics in these areas. The generally accepted estimating method has been to use regionally based multiple-linear regression techniques to develop equations that predict certain streamflow statistics. The equations are typically valid only for a given geographic region and are based on existing streamflow

information and measurable basin characteristics such as area and mean elevation. The U.S. Geological Survey (USGS), in cooperation with the Utah Department of Natural Resources, Divisions of Water Rights and Water Resources, and the Utah Department of Transportation, completed this study to develop new equations for estimating the monthly 80-, 50-, and 20-percent exceedance streamflows and the annual mean streamflow for natural drainage basins in Utah. The term “exceedance” refers to the streamflow value that is met or exceeded for a certain percentage of the time. For example, if the 80-percent exceedance value for a given month is 25 ft³/s, that means that the streamflow at that location exceeds 25 ft³/s 80 percent of the time for that month.

Previous Studies

Whitaker (1971) evaluated the accuracy of estimates of mean annual streamflow by regionalizing data available up until the 1970 water year. Cruff (1975) estimated monthly and mean annual streamflows at sites in the Duchesne River Basin using a method termed the “monthly measurement method” described by Riggs (1969). Fields (1975) developed equations for estimating annual mean and peak streamflows in Utah using measured channel-geometry parameters. Fields and Adams (1976) developed regression equations to estimate mean annual streamflow in streams in northeastern Utah on the basis of drainage area and mean annual precipitation. They also described a technique for estimating monthly mean streamflow from the mean annual streamflow in the same area. Christensen and others (1985) presented methods for estimating mean annual streamflow for natural drainage basins in the Colorado River Basin using regional regression equations.

Streamstats Web-Based Application

StreamStats is a Web-based tool developed by the USGS that integrates published streamflow-gaging station data and regional regression equations with a Web-based geographic information system (GIS) (Ries and others, 2004). StreamStats allows a user to obtain a variety of streamflow statistics and basin characteristics by selecting a location on a map interface.

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The software then delineates the drainage basin upstream from that location, computes drainage basin characteristics, and applies the developed streamflow regression models. Published data can be obtained if the user selects the location of a USGS streamflow-gaging station. If the location of interest does not have a gaging station, StreamStats will apply published regression equations for that location and estimate the associated streamflow statistics. The methods used in computing the predictor variables used in the development of the regression equations is preserved in the StreamStats application. StreamStats can be accessed at <http://water.usgs.gov/osw/streamstats/>. To use StreamStats with the equations described in this report, navigate within the above StreamStats website to the state application for Utah.

Purpose and Scope

This report documents the development of regional regression equations that can be used to estimate the 80-, 50-, and 20-percent exceedance streamflows and the annual mean streamflow for ungaged locations on unregulated streams in Utah. Limitations associated with the regional regression equations including uncertainty, presented as the root mean square error expressed as a percent, are discussed. Streamflow data used in the development of the regression equations are tabulated in this report. StreamStats, a Web-based tool that allows users to obtain streamflow statistics, drainage-basin characteristics, and other information for user-selected sites on streams, is also discussed.

Hydrologic and Physiographic Description of Utah

The study area for this report includes the entire state of Utah and areas of adjacent states that include overlapping hydrologic boundaries (fig. 1). The major drainage basins in Utah are the Green River Basin, the Colorado River Basin, the Virgin River Basin, the Sevier River Basin, and the Great Basin (Great Salt Lake) (fig. 1). Land-surface elevations range from 13,528 ft at Kings Peak in the Uinta Mountains of northeastern Utah, to about 2,000 ft near Beaver Dam Wash in southwestern Utah. Hydrologic conditions in Utah can vary greatly across the state because of the wide range in topography and geology, changing seasonal atmospheric conditions, and changes in climatic conditions from year to year. Mountain ranges and plateaus in many parts of Utah are characterized by steep slopes, sparse vegetation, and thin soils. Drainages in these areas typically receive most of their precipitation as snowfall and experience the highest streamflow during the spring snowmelt runoff from April to June. Much of the Colorado River Basin is characterized by large expanses of exposed bedrock and steep-walled canyons that can cause rapid runoff and flooding at any time of the year. The large valleys and basins in the western part of Utah have a fairly flat topography and are underlain with alluvial soils composed of

clay, silt, sand, and gravel. The average annual precipitation in Utah ranges from about 5 in. in the Great Salt Lake Desert to about 60 in. on some of the state's highest mountains.

Acknowledgments

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Regional Regression Methods For Estimating Streamflow Statistics At Ungaged Sites

Streamflow Data

For over 100 years, the USGS in Utah has been calculating and publishing daily mean discharge at streamflow-gaging stations. Daily mean discharge is calculated by measuring river stage, typically at 15-minute intervals, at a station. The stage values are converted to discharge using an updated stage-discharge relation called a "rating table." Daily mean discharge is calculated from the instantaneous discharge values. All of the daily and annual mean streamflow data were obtained from the USGS National Water Information System (NWIS) database. The daily values statistical program (DVSTAT) in the Automated Data Processing System (ADAPS) version 4.7 database was used to compute the monthly 80-, 50-, and 20-percent exceedance values. All exceedance values calculated for this report were based on data collected through water year 2006. Exceedance values from 266 streamflow-gaging stations were obtained to develop the regional regression equations in Utah (fig. 1). Daily mean streamflow has been computed for each of these stations for 10 years or more, and has not been significantly affected by regulation or diversions. Of the 266 gages, 50 were not used in the regression analysis after they were screened for statistical outliers in the streamflow and basin characteristics dataset. The monthly exceedance values and annual mean streamflow computed for each station are listed in [appendices A–F](#).

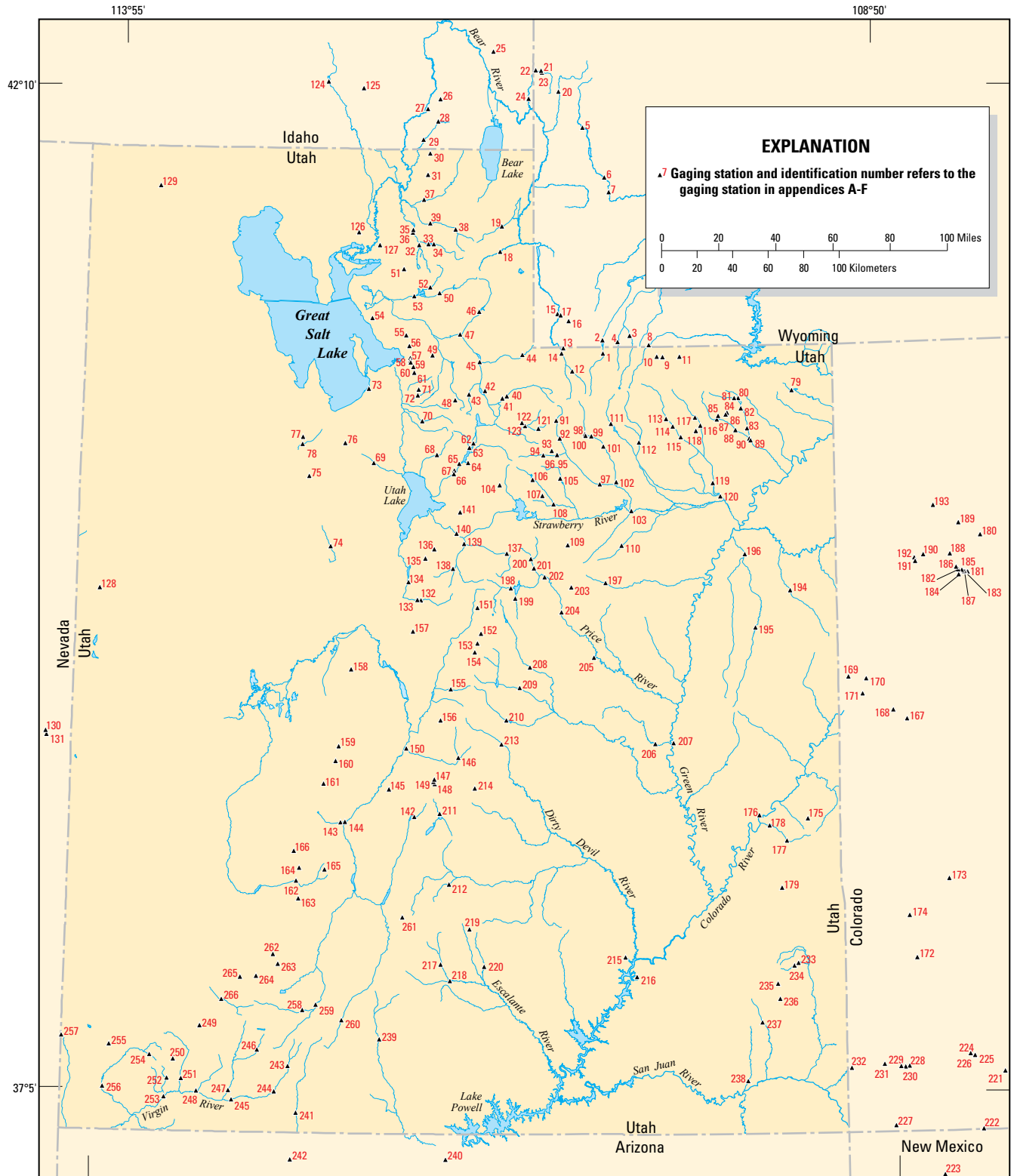


Figure 1. Streamflow-gaging stations in Utah and bordering states used in the regional regression analysis.

Geohydrologic Regionalization of Utah

In an effort to compute regression equations on the basis of localized basin physiographic and climatic characteristics, seven distinct geohydrologic regions for Utah were defined (fig. 2). The regions were determined on the basis of the following factors: (1) statistically significant groupings of basin and climatic characteristics of streamflow-gaging stations using cluster analysis techniques; (2) statewide landscape features; (3) climatic regions defined by the National Oceanic and Atmospheric Administration (National Oceanic and Atmospheric Administration, 1994); (4) physiographic provinces defined by the Utah Geological Survey (Utah Geological Survey, 2007); (5) defined flood regions of the southwestern United States as defined by Thomas and others (1997); and (6) scientific judgment that is based on general hydrologic knowledge of the area. For a more detailed description of factors 3, 4, and 5, see Kenney and others (2007). The seven regions

were divided along hydrologic boundaries except for a portion of the divisions between regions 3 and 5, 3 and 7, and 2 and 4. These nonhydrologic divisions agreed with the general definition of the surrounding regions, taking into account the factors listed above. The locations of streamflow-gaging stations used for the definition of the regions are shown in figure 1. Regions 1, 2, 4, and 5 generally are related to the geographic areas of the Wasatch and Uinta Mountains, the two principal mountain ranges in Utah. The north slope of the Uinta Mountains and most of the upper Bear River Basin are contained in region 1. The northern and central parts of the Wasatch Mountains define regions 2 and 5, respectively. The south slope of the Uinta Mountains, including the Uinta Basin, make up region 4. Region 3 includes the western part of the state, most of which is contained within the arid Basin and Range physiographic province. Region 6, the largest defined, encompasses most of the Colorado Plateau. The Virgin River Basin is mostly contained in region 7. There were only eight stations available

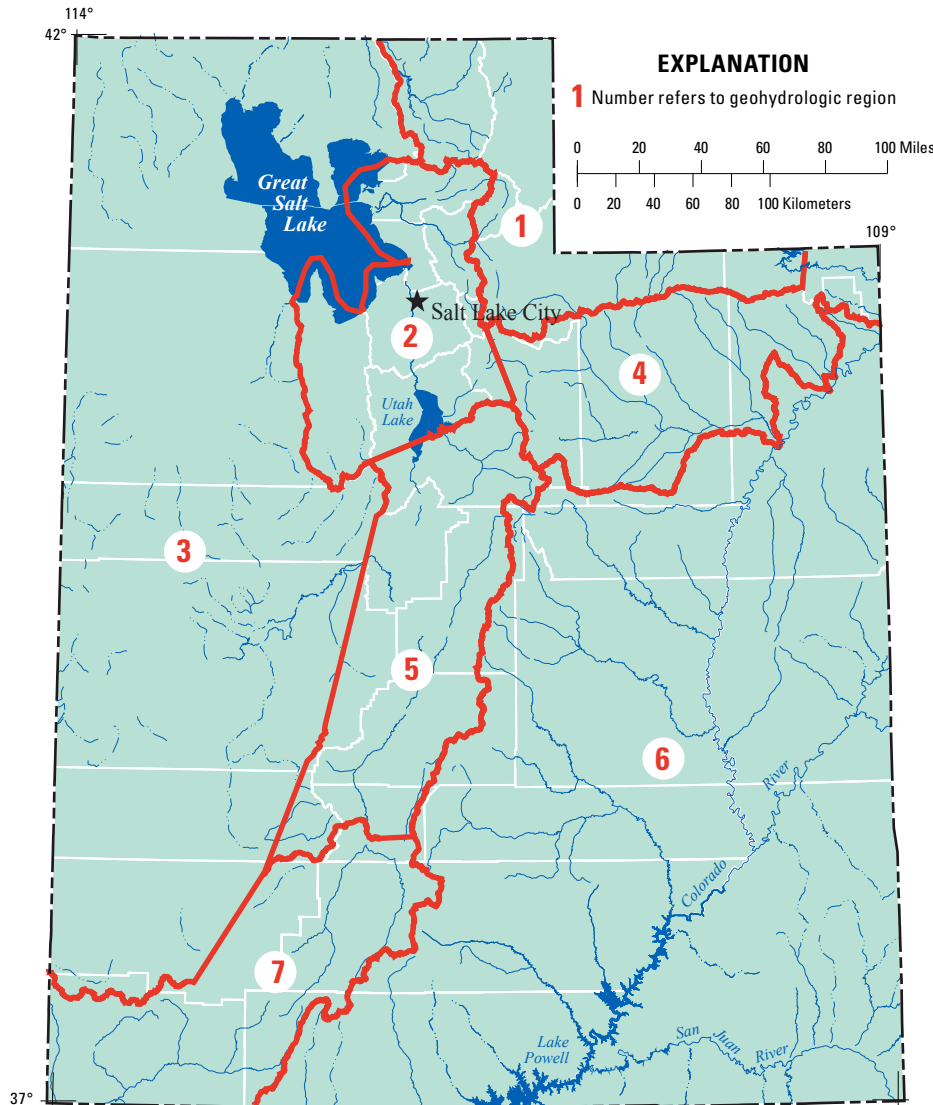


Figure 2. Geohydrologic regions of Utah used in the regional regression analysis.

from region 3 that met the minimum 10-year period of record length criteria. Therefore, the data from regions 3 and 5 have been combined to create regression equations that cover both regions.

Basin and Climate Characteristics

Using a GIS, 21 physiographic characteristics and 3 climatic characteristics were computed for the drainage basin of each streamflow-gaging station. Each of these characteristics potentially has an influence on the streamflow statistics of interest in this report. Geospatial algorithms, developed using Arc Macro Language programs written for ArcGIS (Environmental Systems Research Institute, Inc., 1999), were used to compute basin characteristics. The values generated for each characteristic (table 1) are directly dependent on the algorithm,

dataset, and spatial scale(s) used in their computation. The datasets used to compute basin characteristics are described in table 2. Of the 24 computed characteristics, area, relief, mean elevation, mean basin slope, percentage of basin slope greater than 30 percent, percentage of area covered by forest, percentage of area covered by herbaceous upland, mean annual precipitation, and mean monthly precipitation were selected for more extensive statistical testing.

Regional Regression Analysis

The regional method of regression analysis, as presented in this report, regresses streamflow statistics against several basin characteristics that have been determined at streamflow-gaging stations for the seven different geohydrologic regions of Utah. Equations to predict the 80-, 50-, and 20-percent

Table 1. Basin physiographic and climatic characteristics computed for Utah.

[**Datasets:** NED, National Elevation Dataset; NLCD, National Land Cover Dataset; PRISM, Parameter-Elevation Regressions on Independent Slopes Model; NOAA, National Oceanic and Atmospheric Administration]

Characteristic	Unit	Datasets used
Drainage area	Square miles	Watershed polygon generated by the Stream-Stats process
Perimeter length	Miles	Watershed polygon generated by the Stream-Stats process
Relief	Feet	10-meter NED
Relative relief	Feet per mile	10-meter NED
Mean basin elevation	Feet	10-meter NED
Maximum basin elevation	Feet	10-meter NED
Minimum basin elevation	Feet	10-meter NED
High elevation index—percentage of area with elevation greater than 6,000 feet	Percent	10-meter NED
Mean basin slope	Percent	10-meter NED
Percentage of basin with slope greater than 30 percent	Percent	10-meter NED
Percentage of basin with slope greater than 30 percent and facing north	Percent	10-meter NED
Elevation of basin at outlet	Feet	10-meter NED
Percentage of area covered by forest	Percent	NLCD 1992
Percentage of area covered by agriculture	Percent	NLCD 1992
Percentage of area covered by barren land	Percent	NLCD 1992
Percentage of area covered by developed land	Percent	NLCD 1992
Percentage of area covered by shrubland	Percent	NLCD 1992
Percentage of area covered by herbaceous upland	Percent	NLCD 1992
Percentage of area covered by wetland	Percent	NLCD 1992
Percentage of area covered by woody land	Percent	NLCD 1992
Mean annual precipitation (basin-wide average)	Inches	PRISM
Mean monthly precipitation (basin-wide average)	Inches	PRISM
24-hour storm total with 2-year return frequency, averaged throughout basin	Inches	NOAA-Atlas14 ¹ , NOAA-Atlas 2 ²

¹ Used for Utah, Nevada, Arizona, and New Mexico.

² Used for Idaho, Wyoming, and Colorado.

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exceedance streamflows and the annual mean streamflow were developed for all seven geohydrologic regions of Utah. Regions 3 and 5 use the same set of equations.

When developing regression equations for research purposes, it may be inappropriate to remove outliers from datasets (Helsel and Hirsch, 1992). However, for the purposes of this study, the authors decided to develop a tool for engineers and water managers that was not influenced by extreme basin characteristics or events. Therefore, streamflow data and basin characteristics were screened using boxplots to remove outliers from the data. Data were screened using boxplots to identify the 5th and 95th percentiles for the following basin characteristics: area, relief, mean elevation, mean basin slope, percentage of basin slope greater than 30 percent, percentage of area covered by forest, percentage of area covered by herbaceous upland, mean annual precipitation, and mean monthly precipitation. An “outlier score” was then developed by weighting the occurrence of basin characteristics that were below the 5th percentile or above the 95th. If a station exceeded an outlier score of 5 points, it was not used in the analysis. Because drainage basin area is the most influential characteristic in the regression equations, it was given the most weight in the outlier score (5 points). Therefore, if drainage area for a station fell below the 5th or above the 95th percentile for a given region, it was not used in the analysis. This was done in an effort to lessen the skew of the equations towards extreme events. Relief, mean elevation, mean annual precipitation, and mean monthly precipitation were given a slightly lower weight (2 points); and mean basin slope, percentage of basin slope greater than 30 percent, percentage of area covered by forest, and percentage of area covered by herbaceous upland were given the lowest weight (1 point). Most of the stations that were excluded were based on drainage basin size.

A similar approach to the one described above was used to screen for outliers in the streamflow exceedance data. If the streamflow value was below the 5th percentile or above the

95th percentile for two of the three calculated statistics (20-, 50-, or 80-percent exceedance) for a given month and region, the station was not used in the analysis. The streamflow data were evaluated by region and by month. Therefore, a different number of streamflow-gaging stations was used for different months in a given region. A total of 216 stations throughout the study area were used to create the final equations.

All streamflow data were transformed to base-10 logarithms. Basin characteristic data were transformed to a base-10 logarithm if it enhanced symmetry of the data by decreasing the magnitude of skew in the data distribution. Transformations were also used if they appeared to improve the linearity of the equation. If no noticeable improvement in the linearity of the data was observed, the data were left untransformed. For basin characteristics defined as percentages, such as slope percent, a value of 0.001 percent was added prior to the base-10 logarithm transformation to prevent null values that occur as a result of taking the logarithm of zero.

An ordinary least squares (OLS) regression technique, applied by the statistical computer program S-PLUS 7.0 (Insightful Corporation, 2005), was used to develop the 80-, 50-, and 20-percent exceedance streamflow and annual mean streamflow equations for each region. The OLS regression technique was chosen over weighted least squares (WLS) and generalized least squares (GLS) regression. WLS gives weights to certain variables used in the regression analysis. For instance, streamflow statistics calculated from a gage with 75 years of record could be more heavily weighted than those from a gage with only 10 years of record. To apply WLS regression technique, a weighting scheme that accurately describes which observations should be given more weight in the analysis needed to be defined. Such a scheme was not easily defined for the monthly exceedance and annual mean streamflow data used in this analysis. Also, when determining the uncertainty associated with equations developed from WLS regression technique, the weighting approach needed

Table 2. Data sources used to compute basin physiographic and climatic characteristics in Utah.

[**Datasets:** NED, National Elevation Dataset; NLCD, National Land Cover Dataset; PRISM, Parameter-Elevation Regressions on Independent Slopes Model; NOAA, National Oceanic and Atmospheric Administration]

Dataset name	Source description
10-meter National Elevation Dataset (NED)	U.S. Geological Survey, 1999 (http://erg.usgs.gov/isb/pubs/factsheets/fs14899.html)
National Land Cover Dataset (NLCD, 1992)	Vogelmann and others, 1998 (http://edcwww.cr.usgs.gov/programs/lccp/)
Precipitation frequency atlas of the United States (National Oceanic and Atmospheric Administration Atlas 14)	Bonnin and others, 2006 (http://hdsc.nws.noaa.gov/hdsc/pfds/docs/NA14Vol1.pdf)
Precipitation frequency atlas of the United States (National Oceanic and Atmospheric Administration Atlas 2)	Miller and others, 1973 (http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm)
Parameter-elevation Regressions on Independent Slopes Model (PRISM) climate mapping system, total precipitation (30-year average, 1971–2000)	Daly and others, 1994 (http://prism.oregonstate.edu/products/)

to be considered and used in the uncertainty computation. Unfortunately, this information was not readily available from the computer program used. A disadvantage of not using WLS is that a time-sampling error that could be caused by a short period of record is not accounted for in the calculation. The GLS regression technique developed by Stedinger and Tasker (1985) and Tasker and Stedinger (1989) is designed to be used for peak-flow and low-flow analyses and does not lend itself to monthly exceedance or annual mean streamflow data analyses.

For some of the drier regions of Utah, zero-flow values for monthly exceedances were calculated, indicating that the stream is not perennial. These zero-flow values strongly skew the data in the negative direction and cannot be properly dealt with using OLS regression. A logistic regression could have been applied to determine the probability of flow reaching zero; however, it is beyond the scope of this report. Therefore, zero-flow values in the streamflow data were removed during the outlier screening process. Most of the zero-flow values occur in region 6. If the equations developed in this report are used on ephemeral or intermittent streams, the estimated flow will most likely be too high.

Prior to the regression analysis, a correlation matrix of all the basin characteristics was examined to avoid problems with multicollinearity. Initially, an exploratory stepwise regression approach was used to identify the basin and climatic characteristics that best predicted the 50-percent exceedance value for each month and region. Following this analysis, one, two, or three basin characteristics were tested together with the 80-, 50-, and 20-percent exceedance values as the response variables. To prevent the 80-percent exceedance equation from predicting a higher streamflow than the 50- or 20-percent exceedance equations, the set of predictor variables was kept the same for each exceedance equation within a given month. The combination of variables with the highest F-statistic and lowest residual standard error was chosen, and the final regression calculation was performed for each exceedance statistic. The F-statistic is a test of the analysis of variance that takes into account the loss of degrees of freedom that would result when an additional explanatory variable is added. All equations were found to be statistically significant to the 0.01 level of the calculated p-value. The p-value is a measure of the level of significance of the equation that is based on the probability that the variables in the given equation truly explain the predicted value. The annual mean streamflow equations were created using the same process.

The developed equations all have the linear form:

$$Q = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \quad (1)$$

Where:

- Q is the response variable in cubic feet per second,
- β_0 is the intercept,
- β_1 is the slope coefficient of the first explanatory variable,
- x_1 is the first explanatory variable,

- β_2 is the slope coefficient of the second explanatory variable,
- x_2 is the second explanatory variable,
- β_n is the slope coefficient of the nth explanatory variable, and
- x_n is the nth explanatory variable.

The base-10 logarithm form of the equations takes the following form:

$$\log Q = \log \beta_0 + \beta_1 \log x_1 + \beta_2 \log x_2 + \dots + \beta_n \log x_n \quad (2)$$

The antilogarithms of equations where all of the variables have been base-10 logarithm transformed take the following form:

$$Q = \beta_0 x_1^{\beta_1} x_2^{\beta_2} \dots x_n^{\beta_n} \quad (3)$$

For equations that use both base-10 logarithm transformed and nontransformed variables, the equations are in the following form:

$$Q = \beta_0 x_1^{\beta_1} 10^{\beta_2 x_2 + \dots + \beta_n x_n} \quad (4)$$

Calculation of the Standard Error of the Regression Equations

For each regression equation, the mean square error (MSE) has been calculated. The MSE was calculated using the squared prediction residual that is computed from the “hat matrix,” which is a matrix of computed equation coefficients with the i th observation left out. The “hat matrix” is defined as:

$$\mathbf{H} = \mathbf{X}(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \quad (5)$$

Where:

- \mathbf{H} is the hat matrix
- \mathbf{X} is a matrix of the equation coefficients, and
- \mathbf{X}^T is the transpose matrix of equation coefficients.

The prediction residual is calculated from the i th diagonal term of \mathbf{H} and is denoted as \mathbf{h}_i and calculated as:

$$e(i) = \frac{e_i}{(1 - \mathbf{h}_i)} \quad (6)$$

Where:

- $e(i)$ is the prediction residual for the i th observation,
- e_i is the i th observed value, and
- \mathbf{h}_i is the i th diagonal observation of the hat matrix.

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The MSE is then calculated as the mean of the squared prediction residuals. To describe the error associated with the regression equations in terms of percent, the MSE was converted to root mean square error (RMSE), expressed as a percentage using the following equation (Aitchison and Brown (1957), modified for use of base-10 logarithms:

$$RMSE_p = 100 \left[e^{(10 \log_{10} MSE)^2} - 1 \right]^{0.5} \quad (7)$$

Where:

$RMSE_p$ is the root mean square error in percent,
 e is the base of the natural logarithm

and

MSE is the mean square error calculated from the prediction residual

Sources of Error

The RMSE in percent represents the total error for the regional regression equations in this report. Total error is comprised of time-sampling error and model error variance. Time-sampling error consists of errors in the streamflow data and is a function of sample size, in this case, the length of data records. For instance, if a station operated for 10 years during a dry cycle, it may not be a good predictor of future streamflow in the area. The OLS regression technique used in this analysis does not account for time-sampling error. Model error variance represents the error in the relation between a streamflow statistic and a set of basin characteristics used to predict that statistic. One of the basic assumptions of multiple linear regression is that the input data are truly linear, or in this study, log-linear. A portion of the model error may result because some of the data used in the regression may not be truly log-linear. No attempt was made to distinguish between model variance error and time-sampling error for this study.

Regional Regression Results

Regression equations were developed for region 1 (table 3), region 2 (table 4), region 4 (table 5), region 6 (table 6), and region 7 (table 7) for each month to estimate the monthly 80-, 50-, and 20-percent exceedance streamflows. Regions 3 and 5 were combined for this study and use the same set of equations (table 8). Regression equations also were developed for each region to estimate annual mean discharge (tables 3–8).

The RMSE in percent has been calculated for each regression equation (tables 3–9). The root mean square error ranges from 34 percent for the May 20-percent exceedance equation in region 4 to 379 percent for the July 80-percent exceedance equation in region 6. For all regions, the equations are better at predicting high streamflow values (20-percent exceedance) than low-flow values (80-percent exceedance). This finding is consistent with other reports (Hortness and Berenbrock, 2001) and is logical because low flows are

strongly influenced by local geology that is difficult to quantify (Riggs, 1972). In general, the annual mean equations have a lower error than most of the monthly equations. Although region 6 had the greatest number of stations available to develop the equations (42 to 50 stations for the monthly analysis), in general, it also had the greatest amount of error. Region 6 incorporates the Colorado Plateau in Utah and is the largest defined region for this report. This region consists of high plateaus and mountain ranges that contribute relatively little flow to most streams, with large expanses of arid lowlands, often characterized by exposed bedrock. All of the regression equations in this report are based on the observation that areas with a larger contributing drainage basin generally have higher streamflows. In region 6, most of the drainage basins fit these criteria; however, because of the arid nature of the region, there are many large drainage basins that have very little or zero flow. The belief is that these opposing relations are part of the cause of the large error in region 6. Land-cover basin characteristics such as percentage of area covered by forest and percentage of area covered by herbaceous upland, were examined for region 6; however, neither of these factors appeared to be a good predictor of streamflow. The past efforts of Christensen and others (1985) created subregions in the mountainous areas of the Colorado Plateau to differentiate the different drainage types. This was not attempted for this report.

Figure 3 is a residual plot for the region 4 July exceedance equations. The 20-percent exceedance equation for July in region 4 had the lowest error (34 percent). For comparison, a residual plot for the July equations in region 6 is shown in figure 4. The July 80-percent exceedance equation had an error of 346 percent. For valid unbiased regression equations, the residuals should have a normal distribution. Problems with nonlinearity are shown by points forming a curve. Problems with non-normal distributions are shown when points are not equally above or below the zero-axis line. Residual plots were examined for each regression equation. In general, the residual plots appeared to be slightly nonhomoscedastic, with a slight trend toward smaller variance with smaller discharge. Logarithm base-10 transformations of the data did not appear to affect the distribution of the residuals dramatically.

On average, the error from the monthly equations in combined regions 3 and 5 was the lowest. However, it should be noted that most of the stations used for this analysis are located in region 5. If the equations are used to predict streamflow in region 3, the error is likely greater than that stated here.

The most widely used characteristics for the final regional regression equations were drainage area (100 percent of the equations), mean annual precipitation (40 percent of the equations), mean monthly precipitation (22 percent of the equations), and mean basin elevation (19 percent of the equations) (table 10). In general, most of the regression equations use drainage area and either mean annual basin precipitation or mean basin elevation, which are closely related. These predictors make hydrologic sense because most streamflow

Table 3. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in region 1 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; BSLDEM10M, average basin slope, in percent; PRECIP, mean annual precipitation, in inches; SLOP30, basin slope that exceeds 30 percent, in percent; PRC12, mean December precipitation, in inches; PRC2, mean February precipitation, in inches; ELEV, mean basin elevation, in feet; PRC6, mean June precipitation, in inches; FOREST, area covered by forest, in percent; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 5.5463E-03 \text{ DRNAREA}^{0.3643} (\text{BSLDEM10M}+0.001)^{1.0454} 10^{0.0386} \text{ PRECIP}$	105	
$Q_{P50} = 1.8088E-02 \text{ DRNAREA}^{0.3914} (\text{BSLDEM10M}+0.001)^{0.9229} 10^{0.0309} \text{ PRECIP}$	96.9	39
$Q_{P20} = 8.6139E-02 \text{ DRNAREA}^{0.4283} (\text{BSLDEM10M}+0.001)^{0.6905} 10^{0.0229} \text{ PRECIP}$	83.2	
November		
$Q_{P80} = 7.2879E-02 \text{ DRNAREA}^{0.4551} 10^{0.0368} \text{ PRECIP} + 0.0068 (\text{SLOP30}+0.001)$	103	
$Q_{P50} = 2.5038E-01 \text{ DRNAREA}^{0.4555} 10^{0.0252} \text{ PRECIP} + 0.0064 (\text{SLOP30}+0.001)$	93.6	39
$Q_{P20} = 5.8063E-01 \text{ DRNAREA}^{0.4765} 10^{0.0165} \text{ PRECIP} + 0.0064 (\text{SLOP30}+0.001)$	85.9	
December		
$Q_{P80} = 1.8724E-01 \text{ DRNAREA}^{0.3929} 10^{0.3916} \text{ PRC12}$	84.7	
$Q_{P50} = 3.6568E-01 \text{ DRNAREA}^{0.4040} 10^{0.3270} \text{ PRC12}$	81.2	39
$Q_{P20} = 5.6925E-01 \text{ DRNAREA}^{0.4354} 10^{0.2794} \text{ PRC12}$	78.8	
January		
$Q_{P80} = 1.3231E-02 \text{ DRNAREA}^{0.4043} (\text{BSLDEM10M}+0.001)^{1.5926}$	83.1	
$Q_{P50} = 3.7566E-02 \text{ DRNAREA}^{0.4168} (\text{BSLDEM10M}+0.001)^{1.3357}$	81.1	37
$Q_{P20} = 9.6962E-02 \text{ DRNAREA}^{0.4215} (\text{BSLDEM10M}+0.001)^{1.1148}$	78.6	
February		
$Q_{P80} = 1.9463E-01 \text{ DRNAREA}^{0.3956} 10^{0.3661} \text{ PRC2}$	85.1	
$Q_{P50} = 3.0186E-01 \text{ DRNAREA}^{0.4320} 10^{0.3181} \text{ PRC2}$	82.2	37
$Q_{P20} = 4.6752E-01 \text{ DRNAREA}^{0.4296} 10^{0.2930} \text{ PRC2}$	81.2	
March		
$Q_{P80} = 3.7827E-01 \text{ DRNAREA}^{0.5301} 10^{0.0072} \text{ PRECIP} + 0.0100 (\text{SLOP30}+0.001)$	97.7	
$Q_{P50} = 8.0168E-01 \text{ DRNAREA}^{0.5516} 10^{0.0005} \text{ PRECIP} + 0.0101 (\text{SLOP30}+0.001)$	91.7	39
$Q_{P20} = 2.2167E+00 \text{ DRNAREA}^{0.5521} 10^{-0.0090} \text{ PRECIP} + 0.0108 (\text{SLOP30}+0.001)$	92.5	
April		
$Q_{P80} = 5.7836E+08 \text{ DRNAREA}^{0.5743} \text{ ELEV}^{-2.1732}$	93.8	
$Q_{P50} = 3.9382E+11 \text{ DRNAREA}^{0.6543} \text{ ELEV}^{-2.8657}$	73.8	37
$Q_{P20} = 5.4702E+12 \text{ DRNAREA}^{0.7783} \text{ ELEV}^{-3.1417}$	62.7	
May		
$Q_{P80} = 2.8268E-01 \text{ DRNAREA}^{0.7487} 10^{0.0302} \text{ PRECIP}$	77.4	
$Q_{P50} = 3.6559E-01 \text{ DRNAREA}^{0.8340} 10^{0.0322} \text{ PRECIP}$	62.8	39
$Q_{P20} = 8.5921E-01 \text{ DRNAREA}^{0.8282} 10^{0.0290} \text{ PRECIP}$	57.9	
June		
$Q_{P80} = 1.7203E+00 \text{ DRNAREA}^{-0.0444} 10^{0.7648} \text{ PRC6} + 0.0061 (\text{FOREST}+0.001)$	149	
$Q_{P50} = 3.2516E+00 \text{ DRNAREA}^{0.0124} 10^{0.7813} \text{ PRC6} + 0.0041 (\text{FOREST}+0.001)$	140	39
$Q_{P20} = 8.5251E-00 \text{ DRNAREA}^{0.0543} 10^{0.6672} \text{ PRC6} + 0.0030 (\text{FOREST}+0.001)$	141	
July		
$Q_{P80} = 5.7876E-16 \text{ DRNAREA}^{0.2398} \text{ ELEV}^{3.5772} (\text{BSLDEM10M}+0.001)^{1.5323}$	119	
$Q_{P50} = 5.4488E-15 \text{ DRNAREA}^{0.2913} \text{ ELEV}^{3.5357} (\text{BSLDEM10M}+0.001)^{1.0531}$	105	38
$Q_{P20} = 1.7346E-15 \text{ DRNAREA}^{0.3558} \text{ ELEV}^{3.8161} (\text{BSLDEM10M}+0.001)^{0.7038}$	102	
August		
$Q_{P80} = 4.0244E-12 \text{ DRNAREA}^{0.2355} \text{ ELEV}^{2.5456} (\text{BSLDEM10M}+0.001)^{1.5444}$	94.4	
$Q_{P50} = 1.6535E-11 \text{ DRNAREA}^{0.2693} \text{ ELEV}^{2.5251} (\text{BSLDEM10M}+0.001)^{1.2482}$	93.2	37
$Q_{P20} = 7.2410E-12 \text{ DRNAREA}^{0.3286} \text{ ELEV}^{2.7303} (\text{BSLDEM10M}+0.001)^{0.9900}$	91.6	
September		
$Q_{P80} = 1.3140E-02 \text{ DRNAREA}^{0.2456} (\text{BSLDEM10M}+0.001)^{1.0630} 10^{0.0319} \text{ PRECIP}$	95.1	
$Q_{P50} = 3.4340E-02 \text{ DRNAREA}^{0.3116} (\text{BSLDEM10M}+0.001)^{0.7939} 10^{0.0319} \text{ PRECIP}$	95.4	37
$Q_{P20} = 8.6139E-02 \text{ DRNAREA}^{0.3815} (\text{BSLDEM10M}+0.001)^{0.7265} 10^{0.0313} \text{ PRECIP}$	96.6	
Annual Mean		
$Q_{ANNMEAN} = 6.5751E-02 \text{ DRNAREA}^{0.7838} 10^{0.0453} \text{ PRECIP}$	44.2	39

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Table 4. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in region 2 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; ELEV, mean basin elevation, in feet; PRECIP, mean annual precipitation, in inches; PRC8, mean August precipitation, in inches; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 5.1251E-30 \text{ DRNAREA}^{0.5944} \text{ ELEV}^{7.4972}$	106	25
$Q_{P50} = 4.2511E-25 \text{ DRNAREA}^{0.6323} \text{ ELEV}^{6.2574}$	83.0	
$Q_{P20} = 1.1874E-21 \text{ DRNAREA}^{0.6757} \text{ ELEV}^{5.3919}$	75.9	
November		
$Q_{P80} = 1.9151E-26 \text{ DRNAREA}^{0.6486} \text{ ELEV}^{6.5661}$	95.7	25
$Q_{P50} = 4.1524E-23 \text{ DRNAREA}^{0.6754} \text{ ELEV}^{5.7309}$	79.6	
$Q_{P20} = 2.7064E-18 \text{ DRNAREA}^{0.7286} \text{ ELEV}^{4.5052}$	69.9	
December		
$Q_{P80} = 1.7624E-27 \text{ DRNAREA}^{0.6322} \text{ ELEV}^{6.8263}$	113	25
$Q_{P50} = 5.8318E-23 \text{ DRNAREA}^{0.6731} \text{ ELEV}^{5.6834}$	88.9	
$Q_{P20} = 3.1434E-17 \text{ DRNAREA}^{0.7165} \text{ ELEV}^{4.2252}$	73.3	
January		
$Q_{P80} = 4.3481E-26 \text{ DRNAREA}^{0.6459} \text{ ELEV}^{6.4596}$	111	25
$Q_{P50} = 2.2162E-22 \text{ DRNAREA}^{0.6699} \text{ ELEV}^{5.5287}$	93.3	
$Q_{P20} = 4.1562E-16 \text{ DRNAREA}^{0.7227} \text{ ELEV}^{3.9290}$	77.3	
February		
$Q_{P80} = 1.0083E-25 \text{ DRNAREA}^{0.6877} \text{ ELEV}^{6.3584}$	114	26
$Q_{P50} = 1.5470E-19 \text{ DRNAREA}^{0.7172} \text{ ELEV}^{4.7870}$	90.2	
$Q_{P20} = 2.9208E-09 \text{ DRNAREA}^{0.7971} \text{ ELEV}^{2.1504}$	84.0	
March		
$Q_{P80} = 1.5392E-01 \text{ DRNAREA}^{0.8798} 10^{0.0111} \text{ PRECIP}$	76.9	25
$Q_{P50} = 1.5603E-01 \text{ DRNAREA}^{0.8950} 10^{0.0151} \text{ PRECIP}$	62.1	
$Q_{P20} = 1.4894E-01 \text{ DRNAREA}^{0.9379} 10^{0.0204} \text{ PRECIP}$	63.1	
April		
$Q_{P80} = 1.2238E-01 \text{ DRNAREA}^{0.7886} 10^{0.0246} \text{ PRECIP}$	102	25
$Q_{P50} = 1.6730E-01 \text{ DRNAREA}^{0.8439} 10^{0.0263} \text{ PRECIP}$	71.9	
$Q_{P20} = 3.4190E-01 \text{ DRNAREA}^{0.8179} 10^{0.0261} \text{ PRECIP}$	54.3	
May		
$Q_{P80} = 8.0482E-02 \text{ DRNAREA}^{0.7769} 10^{0.0393} \text{ PRECIP}$	92.7	27
$Q_{P50} = 1.7246E-01 \text{ DRNAREA}^{0.7702} 10^{0.0379} \text{ PRECIP}$	71.9	
$Q_{P20} = 4.4771E-01 \text{ DRNAREA}^{0.7525} 10^{0.0337} \text{ PRECIP}$	59.5	
June		
$Q_{P80} = 9.0407E-02 \text{ DRNAREA}^{0.7945} 10^{0.0310} \text{ PRECIP}$	104	26
$Q_{P50} = 1.3877E-01 \text{ DRNAREA}^{0.7652} 10^{0.0351} \text{ PRECIP}$	84.7	
$Q_{P20} = 3.1369E-01 \text{ DRNAREA}^{0.6974} 10^{0.0345} \text{ PRECIP}$	70.3	
July		
$Q_{P80} = 6.7267E-37 \text{ DRNAREA}^{0.6244} \text{ ELEV}^{9.3200}$	104	26
$Q_{P50} = 1.3065E-32 \text{ DRNAREA}^{0.5978} \text{ ELEV}^{8.2849}$	91.1	
$Q_{P20} = 6.7097E-30 \text{ DRNAREA}^{0.5839} \text{ ELEV}^{7.6459}$	85.6	
August		
$Q_{P80} = 5.5233E-02 \text{ DRNAREA}^{0.1122} 10^{1.1410} \text{ PRC8}$	163	26
$Q_{P50} = 1.3605E-01 \text{ DRNAREA}^{0.1463} 10^{0.9838} \text{ PRC8}$	142	
$Q_{P20} = 3.2278E-01 \text{ DRNAREA}^{0.1876} 10^{0.8139} \text{ PRC8}$	131	
September		
$Q_{P80} = 1.9112E-33 \text{ DRNAREA}^{0.5914} \text{ ELEV}^{8.3741}$	105	25
$Q_{P50} = 2.8301E-30 \text{ DRNAREA}^{0.6037} \text{ ELEV}^{7.5980}$	91.4	
$Q_{P20} = 1.1790E-25 \text{ DRNAREA}^{0.6320} \text{ ELEV}^{6.4391}$	88.1	
Annual Mean		
$Q_{ANNMEAN} = 1.2954E-01 \text{ DRNAREA}^{0.8559} 10^{0.0264} \text{ PRECIP}$	63.1	25

Table 5. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in region 4 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; ELEV, mean basin elevation, in feet; PRECIP, mean annual precipitation, in inches; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 5.3790E-28 \text{ DRNAREA}^{0.9353} \text{ ELEV}^{6.6915}$	95.3	32
$Q_{P50} = 1.2706E-26 \text{ DRNAREA}^{0.9160} \text{ ELEV}^{6.3942}$	76.6	
$Q_{P20} = 7.9598E-26 \text{ DRNAREA}^{0.9068} \text{ ELEV}^{6.2354}$	67.4	
November		
$Q_{P80} = 4.5551E-03 \text{ DRNAREA}^{1.0664} 10^{0.0491} \text{ PRECIP}$	82.9	32
$Q_{P50} = 1.0328E-02 \text{ DRNAREA}^{1.0333} 10^{0.0432} \text{ PRECIP}$	71.6	
$Q_{P20} = 1.7466E-02 \text{ DRNAREA}^{1.0151} 10^{0.0407} \text{ PRECIP}$	65.4	
December		
$Q_{P80} = 3.7523E-03 \text{ DRNAREA}^{1.0626} 10^{0.0499} \text{ PRECIP}$	90.0	32
$Q_{P50} = 9.8333E-03 \text{ DRNAREA}^{1.0308} 10^{0.0415} \text{ PRECIP}$	74.2	
$Q_{P20} = 1.6084E-02 \text{ DRNAREA}^{1.0056} 10^{0.0395} \text{ PRECIP}$	67.4	
January		
$Q_{P80} = 3.1536E-03 \text{ DRNAREA}^{1.1080} 10^{0.0484} \text{ PRECIP}$	89.4	33
$Q_{P50} = 8.4918E-03 \text{ DRNAREA}^{1.0672} 10^{0.0401} \text{ PRECIP}$	74.1	
$Q_{P20} = 1.4808E-02 \text{ DRNAREA}^{1.0191} 10^{0.0382} \text{ PRECIP}$	68.4	
February		
$Q_{P80} = 3.6762E-03 \text{ DRNAREA}^{1.1135} 10^{0.0452} \text{ PRECIP}$	86.3	34
$Q_{P50} = 1.0495E-02 \text{ DRNAREA}^{1.0741} 10^{0.0360} \text{ PRECIP}$	72.2	
$Q_{P20} = 2.0783E-02 \text{ DRNAREA}^{1.0246} 10^{0.0323} \text{ PRECIP}$	63.9	
March		
$Q_{P80} = 5.3951E-03 \text{ DRNAREA}^{1.1469} 10^{0.0382} \text{ PRECIP}$	89.1	33
$Q_{P50} = 2.0012E-02 \text{ DRNAREA}^{1.0420} 10^{0.0295} \text{ PRECIP}$	68.8	
$Q_{P20} = 3.8860E-02 \text{ DRNAREA}^{1.0051} 10^{0.0256} \text{ PRECIP}$	61.5	
April		
$Q_{P80} = 7.6208E-03 \text{ DRNAREA}^{1.0257} 10^{0.0433} \text{ PRECIP}$	131	35
$Q_{P50} = 4.6806E-02 \text{ DRNAREA}^{0.9222} 10^{0.0300} \text{ PRECIP}$	107	
$Q_{P20} = 1.3868E-01 \text{ DRNAREA}^{0.8427} 10^{0.0281} \text{ PRECIP}$	111	
May		
$Q_{P80} = 1.2630E-02 \text{ DRNAREA}^{0.9145} 10^{0.0587} \text{ PRECIP}$	222	35
$Q_{P50} = 6.5569E-02 \text{ DRNAREA}^{0.8816} 10^{0.0544} \text{ PRECIP}$	82.4	
$Q_{P20} = 2.3736E-01 \text{ DRNAREA}^{0.9055} 10^{0.0466} \text{ PRECIP}$	53.0	
June		
$Q_{P80} = 1.4421E-03 \text{ DRNAREA}^{1.0768} 10^{0.0924} \text{ PRECIP}$	60.7	33
$Q_{P50} = 6.7671E-03 \text{ DRNAREA}^{1.0596} 10^{0.0825} \text{ PRECIP}$	54.9	
$Q_{P20} = 3.5424E-02 \text{ DRNAREA}^{1.0181} 10^{0.0700} \text{ PRECIP}$	49.8	
July		
$Q_{P80} = 8.4859E-04 \text{ DRNAREA}^{0.9355} 10^{0.0927} \text{ PRECIP}$	222	34
$Q_{P50} = 3.6711E-03 \text{ DRNAREA}^{1.0177} 10^{0.0773} \text{ PRECIP}$	56.4	
$Q_{P20} = 8.6000E-03 \text{ DRNAREA}^{1.0270} 10^{0.0733} \text{ PRECIP}$	34.0	
August		
$Q_{P80} = 9.6383E-04 \text{ DRNAREA}^{1.0576} 10^{0.0787} \text{ PRECIP}$	128	33
$Q_{P50} = 3.0634E-03 \text{ DRNAREA}^{1.0576} 10^{0.0693} \text{ PRECIP}$	81.0	
$Q_{P20} = 6.2388E-03 \text{ DRNAREA}^{1.0594} 10^{0.0661} \text{ PRECIP}$	53.9	
September		
$Q_{P80} = 1.9351E-03 \text{ DRNAREA}^{1.0834} 10^{0.0634} \text{ PRECIP}$	114	34
$Q_{P50} = 4.9363E-03 \text{ DRNAREA}^{1.0684} 10^{0.0568} \text{ PRECIP}$	82.0	
$Q_{P20} = 7.3181E-03 \text{ DRNAREA}^{1.0621} 10^{0.0576} \text{ PRECIP}$	67.6	
Annual Mean		
$Q_{ANNMEAN} = 1.1954E-02 \text{ DRNAREA}^{1.0011} 10^{0.0612} \text{ PRECIP}$	42.9	34

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Table 6. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in region 6 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; PRECIP, mean annual precipitation, in inches; PRC11, mean November precipitation, in inches; PRC12, mean December precipitation, in inches; PRC1, mean January precipitation, in inches; PRC2, mean February precipitation, in inches; PRC3, mean March precipitation, in inches; PRC7, mean July precipitation, in inches; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 1.1708E-03 \text{ DRNAREA}^{0.9941} 10^{0.0662} \text{ PRECIP}$	292	46
$Q_{P50} = 3.5514E-03 \text{ DRNAREA}^{1.0099} 10^{0.0549} \text{ PRECIP}$	211	
$Q_{P20} = 8.0686E-03 \text{ DRNAREA}^{1.0283} 10^{0.0487} \text{ PRECIP}$	172	
November		
$Q_{P80} = 1.0508E-04 \text{ DRNAREA}^{1.4673} 10^{0.7772} \text{ PRC11}$	224	38
$Q_{P50} = 4.9808E-04 \text{ DRNAREA}^{1.3511} 10^{0.6665} \text{ PRC11}$	158	
$Q_{P20} = 3.0641E-03 \text{ DRNAREA}^{1.2155} 10^{0.5145} \text{ PRC11}$	120	
December		
$Q_{P80} = 3.2984E-24 \text{ DRNAREA}^{1.1941} \text{ ELEV}^{5.5024}$	320	44
$Q_{P50} = 3.6299E-21 \text{ DRNAREA}^{1.1740} \text{ ELEV}^{4.7986}$	183	
$Q_{P20} = 5.0073E-19 \text{ DRNAREA}^{1.1158} \text{ ELEV}^{4.3337}$	140	
January		
$Q_{P80} = 5.3765E-24 \text{ DRNAREA}^{1.1670} \text{ ELEV}^{5.4604}$	305	44
$Q_{P50} = 1.5191E-21 \text{ DRNAREA}^{1.1481} \text{ ELEV}^{4.9070}$	173	
$Q_{P20} = 3.2734E-18 \text{ DRNAREA}^{1.0843} \text{ ELEV}^{4.1362}$	132	
February		
$Q_{P80} = 2.9424E-20 \text{ DRNAREA}^{1.1077} \text{ ELEV}^{4.5472}$	242	46
$Q_{P50} = 1.1264E-17 \text{ DRNAREA}^{1.0214} \text{ ELEV}^{3.9928}$	151	
$Q_{P20} = 1.2067E-14 \text{ DRNAREA}^{0.9839} \text{ ELEV}^{3.2896}$	109	
March		
$Q_{P80} = 9.2087E-05 \text{ DRNAREA}^{1.4806} 10^{0.6759} \text{ PRC3}$	182	42
$Q_{P50} = 8.4898E-04 \text{ DRNAREA}^{1.2650} 10^{0.5613} \text{ PRC3}$	143	
$Q_{P20} = 9.1685E-03 \text{ DRNAREA}^{1.0687} 10^{0.4046} \text{ PRC3}$	129	
April		
$Q_{P80} = 6.0730E-03 \text{ DRNAREA}^{0.8519} 10^{0.0574} \text{ PRECIP}$	243	50
$Q_{P50} = 2.0328E-02 \text{ DRNAREA}^{0.7809} 10^{0.0589} \text{ PRECIP}$	156	
$Q_{P20} = 5.4563E-02 \text{ DRNAREA}^{0.7689} 10^{0.0578} \text{ PRECIP}$	149	
May		
$Q_{P80} = 1.4421E-26 \text{ DRNAREA}^{0.9596} \text{ ELEV}^{6.3486}$	379	50
$Q_{P50} = 2.9874E-22 \text{ DRNAREA}^{0.7411} \text{ ELEV}^{5.4577}$	258	
$Q_{P20} = 3.3861E-23 \text{ DRNAREA}^{0.7185} \text{ ELEV}^{5.8287}$	179	
June		
$Q_{P80} = 9.9243E-03 \text{ DRNAREA}^{0.8338} 10^{0.0499} \text{ PRECIP}$	353	47
$Q_{P50} = 2.4609E-02 \text{ DRNAREA}^{0.7826} 10^{0.0536} \text{ PRECIP}$	247	
$Q_{P20} = 3.2802E-02 \text{ DRNAREA}^{0.7863} 10^{0.0680} \text{ PRECIP}$	153	
July		
$Q_{P80} = 2.7139E-01 \text{ DRNAREA}^{0.5124}$	346	43
$Q_{P50} = 6.1944E-01 \text{ DRNAREA}^{0.5096}$	267	
$Q_{P20} = 1.0854E+00 \text{ DRNAREA}^{0.5587}$	223	
August		
$Q_{P80} = 9.4102E-02 \text{ DRNAREA}^{0.7404}$	268	43
$Q_{P50} = 1.4973E-01 \text{ DRNAREA}^{0.8195}$	201	
$Q_{P20} = 2.6835E-01 \text{ DRNAREA}^{0.8425}$	161	
September		
$Q_{P80} = 6.7936E-23 \text{ DRNAREA}^{0.8943} \text{ ELEV}^{5.3288}$	218	42
$Q_{P50} = 5.6689E-22 \text{ DRNAREA}^{0.9777} \text{ ELEV}^{5.1296}$	191	
$Q_{P20} = 4.7304E-20 \text{ DRNAREA}^{0.9777} \text{ ELEV}^{4.7092}$	164	
Annual Mean		
$Q_{ANNMEAN} = 1.2067E-02 \text{ DRNAREA}^{0.8196} 10^{0.0659} \text{ PRECIP}$	122	59

Table 7. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in region 7 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; ELEV, mean elevation, in feet; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 1.8030E-01 \text{ DRNAREA}^{0.8389}$	86.5	20
$Q_{P50} = 2.2600E-01 \text{ DRNAREA}^{0.8823}$	70.7	
$Q_{P20} = 3.4135E-01 \text{ DRNAREA}^{0.8679}$	69.7	
November		
$Q_{P80} = 1.5251E-01 \text{ DRNAREA}^{0.9122}$	73.3	19
$Q_{P50} = 2.0399E-01 \text{ DRNAREA}^{0.9164}$	65.5	
$Q_{P20} = 3.1060E-01 \text{ DRNAREA}^{0.8921}$	63.2	
December		
$Q_{P80} = 1.5150E-01 \text{ DRNAREA}^{0.9154}$	75.4	20
$Q_{P50} = 2.1296E-01 \text{ DRNAREA}^{0.9009}$	61.3	
$Q_{P20} = 2.9710E-01 \text{ DRNAREA}^{0.8916}$	60.7	
January		
$Q_{P80} = 1.3977E-01 \text{ DRNAREA}^{0.9218}$	91.4	20
$Q_{P50} = 2.1523E-01 \text{ DRNAREA}^{0.8900}$	71.5	
$Q_{P20} = 3.3098E-01 \text{ DRNAREA}^{0.8632}$	61.6	
February		
$Q_{P80} = 1.1948E-01 \text{ DRNAREA}^{0.9749}$	85.9	22
$Q_{P50} = 1.9480E-01 \text{ DRNAREA}^{0.9357}$	66.2	
$Q_{P20} = 3.2248E-01 \text{ DRNAREA}^{0.9119}$	57.8	
March		
$Q_{P80} = 1.8201E-01 \text{ DRNAREA}^{0.9120}$	91.5	20
$Q_{P50} = 3.2825E-01 \text{ DRNAREA}^{0.8738}$	64.4	
$Q_{P20} = 6.3870E-01 \text{ DRNAREA}^{0.8396}$	68.5	
April		
$Q_{P80} = 4.5583E-01 \text{ DRNAREA}^{0.7512}$	81.3	20
$Q_{P50} = 7.2778E-01 \text{ DRNAREA}^{0.7658}$	72.8	
$Q_{P20} = 1.4672E+00 \text{ DRNAREA}^{0.7795}$	77.0	
May		
$Q_{P80} = 6.3154E-18 \text{ DRNAREA}^{0.8039} \text{ ELEV}^{4.3323}$	103	20
$Q_{P50} = 8.5645E-19 \text{ DRNAREA}^{0.8333} \text{ ELEV}^{4.6130}$	108	
$Q_{P20} = 9.7163E-15 \text{ DRNAREA}^{0.8572} \text{ ELEV}^{3.6685}$	102	
June		
$Q_{P80} = 8.0835E-17 \text{ DRNAREA}^{0.8091} \text{ ELEV}^{4.0019}$	126	19
$Q_{P50} = 1.1684E-15 \text{ DRNAREA}^{0.7702} \text{ ELEV}^{3.7874}$	125	
$Q_{P20} = 1.2773E-16 \text{ DRNAREA}^{0.7981} \text{ ELEV}^{4.1089}$	129	
July		
$Q_{P80} = 3.7239E-01 \text{ DRNAREA}^{0.6071}$	222	19
$Q_{P50} = 6.6466E-01 \text{ DRNAREA}^{0.6028}$	159	
$Q_{P20} = 1.3868E+00 \text{ DRNAREA}^{0.5776}$	121	
August		
$Q_{P80} = 2.2777E-01 \text{ DRNAREA}^{0.7294}$	223	20
$Q_{P50} = 3.4890E-01 \text{ DRNAREA}^{0.7541}$	135	
$Q_{P20} = 7.5736E-00 \text{ DRNAREA}^{0.6949}$	113	
September		
$Q_{P80} = 1.8205E-01 \text{ DRNAREA}^{0.7938}$	153	20
$Q_{P50} = 2.4283E-01 \text{ DRNAREA}^{0.8283}$	105	
$Q_{P20} = 4.1143E-00 \text{ DRNAREA}^{0.8115}$	85.5	
Annual Mean		
$Q_{ANNMEAN} = 5.3951E-00 \text{ DRNAREA}^{0.8305}$	69.4	21

14 Methods for Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Utah

Table 8. Regression equations and their associated uncertainty for estimating monthly 80-, 50-, and 20-percent exceedance streamflows for natural streams in combined region 3 and region 5 in Utah.

[Regression variables: Q_{P80} , daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; Q_{P50} , daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; Q_{P20} , daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; DRNAREA, drainage area, in square miles; PRC10, mean October precipitation, in inches; PRC11, mean November precipitation, in inches; PRC12, mean December precipitation, in inches; PRC1, mean January precipitation, in inches; PRC2, mean February precipitation, in inches; HERBNAT_NLCD92, area covered by herbaceous upland, in percent; FOREST, area covered by forest, in percent; ELEV, mean basin elevation, in feet; PRECIP, mean annual precipitation, in inches; PRC9, mean September precipitation, in inches; $Q_{ANNMEAN}$, annual mean discharge, in cubic feet per second]

Regression equation for given monthly exceedance (80, 50, and 20 percent exceedance)	Root mean square error (percent)	Number of streamflow-gaging stations used in regression analysis
October		
$Q_{P80} = 1.9875E-02 \text{ DRNAREA}^{0.6634} 10^{0.6068} \text{ PRC10}$	74.6	32
$Q_{P50} = 2.9020E-02 \text{ DRNAREA}^{0.7255} 10^{0.5524} \text{ PRC10}$	70.5	
$Q_{P20} = 4.2717E-02 \text{ DRNAREA}^{0.7650} 10^{0.5013} \text{ PRC10}$	68.9	
November		
$Q_{P80} = 2.9771E-02 \text{ DRNAREA}^{0.6740} 10^{0.4882} \text{ PRC10}$	67.4	31
$Q_{P50} = 4.1591E-02 \text{ DRNAREA}^{0.7510} 10^{0.4300} \text{ PRC10}$	65.9	
$Q_{P20} = 5.9979E-02 \text{ DRNAREA}^{0.8020} 10^{0.3740} \text{ PRC10}$	66.1	
December		
$Q_{P80} = 4.1049E-02 \text{ DRNAREA}^{0.6739} 10^{0.4678} \text{ PRC12}$	67.9	32
$Q_{P50} = 6.3504E-02 \text{ DRNAREA}^{0.7198} 10^{0.3977} \text{ PRC12}$	67.1	
$Q_{P20} = 9.6161E-02 \text{ DRNAREA}^{0.7540} 10^{0.3360} \text{ PRC12}$	66.8	
January		
$Q_{P80} = 2.1553E-02 \text{ DRNAREA}^{0.7728} 10^{0.4439} \text{ PRC1}$	69.2	32
$Q_{P50} = 4.6196E-02 \text{ DRNAREA}^{0.7792} 10^{0.3537} \text{ PRC1}$	67.5	
$Q_{P20} = 7.0307E-02 \text{ DRNAREA}^{0.8020} 10^{0.3070} \text{ PRC1}$	67.2	
February		
$Q_{P80} = 2.5829E-02 \text{ DRNAREA}^{0.8425} 10^{0.3828} \text{ PRC2}$	70.4	32
$Q_{P50} = 4.7643E-02 \text{ DRNAREA}^{0.8504} 10^{0.3168} \text{ PRC2}$	68.7	
$Q_{P20} = 9.5786E-02 \text{ DRNAREA}^{0.8379} 10^{0.2420} \text{ PRC2}$	68.4	
March		
$Q_{P80} = 5.1737E-01 \text{ DRNAREA}^{0.5712} (\text{HERBNAT_NLCD92}+0.001)^{0.2058}$	57.2	31
$Q_{P50} = 7.0681E-01 \text{ DRNAREA}^{0.5629} (\text{HERBNAT_NLCD92}+0.001)^{0.2068}$	47.9	
$Q_{P20} = 9.4297E-01 \text{ DRNAREA}^{0.5826} (\text{HERBNAT_NLCD92}+0.001)^{0.2156}$	41.8	
April		
$Q_{P80} = 8.0947E-01 \text{ DRNAREA}^{0.6539}$	56.2	32
$Q_{P50} = 1.0990E+00 \text{ DRNAREA}^{0.7127}$	56.9	
$Q_{P20} = 1.6761E+00 \text{ DRNAREA}^{0.7777}$	62.4	
May		
$Q_{P80} = 7.9122E-01 \text{ DRNAREA}^{0.6712} 10^{0.0046} \text{ FOREST} +0.001$	79.0	33
$Q_{P50} = 1.5929E+00 \text{ DRNAREA}^{0.6416} 10^{0.0055} \text{ FOREST}+0.001$	68.4	
$Q_{P20} = 2.2977E+00 \text{ DRNAREA}^{0.6579} 10^{0.0070} \text{ FOREST}+0.001$	61.9	
June		
$Q_{P80} = 2.1702E-15 \text{ DRNAREA}^{0.7515} \text{ ELEV}^{3.7427}$	98.2	33
$Q_{P50} = 1.7935E-16 \text{ DRNAREA}^{0.7307} \text{ ELEV}^{4.1047}$	82.6	
$Q_{P20} = 5.4916E-18 \text{ DRNAREA}^{0.7387} \text{ ELEV}^{4.5531}$	71.8	
July		
$Q_{P80} = 1.2712E-02 \text{ DRNAREA}^{0.8789} 10^{0.0539} \text{ PRECIP}$	112	33
$Q_{P50} = 6.8407E-02 \text{ DRNAREA}^{0.7827} 10^{0.0407} \text{ PRECIP}$	78.0	
$Q_{P20} = 1.3684E-01 \text{ DRNAREA}^{0.7376} 10^{0.0395} \text{ PRECIP}$	74.7	
August		
$Q_{P80} = 2.4689E-02 \text{ DRNAREA}^{0.6967} 10^{0.0488} \text{ PRECIP}$	100	32
$Q_{P50} = 5.7517E-02 \text{ DRNAREA}^{0.7091} 10^{0.0409} \text{ PRECIP}$	83.0	
$Q_{P20} = 8.9475E-02 \text{ DRNAREA}^{0.7145} 10^{0.0394} \text{ PRECIP}$	70.8	
September		
$Q_{P80} = 6.2517E-03 \text{ DRNAREA}^{0.7145} 10^{1.0019} \text{ PRC9}$	81.8	32
$Q_{P50} = 8.8044E-03 \text{ DRNAREA}^{0.7537} 10^{0.9681} \text{ PRC9}$	77.4	
$Q_{P20} = 1.7092E-02 \text{ DRNAREA}^{0.7586} 10^{0.8725} \text{ PRC9}$	73.4	
Annual Mean		
$Q_{ANNMEAN} = 1.3032E+00 \text{ DRNAREA}^{0.7025}$	68.6	34

Table 9. Root mean square error percent associated with the monthly exceedance streamflow and annual mean streamflow regression equations for all regions, Utah.[Regression variables: Q_{P80} , 80-percent exceedance streamflow equation; Q_{P50} , 50-percent exceedance streamflow equation; Q_{P20} , 20-percent exceedance streamflow equation; **Annual mean**, Annual mean streamflow equation]

Regression variable	Region						All regions		
	1	2	4	3 and 5 combined	6	7	Minimum	Median	Maximum
October									
Q_{P80}	105.0	106	95.3	74.6	292	86.5	74.6	100.2	292
Q_{P50}	96.9	83	76.6	70.5	211	70.7	70.5	79.8	211
Q_{P20}	83.2	75.9	67.4	68.9	172	69.7	67.4	72.8	172
November									
Q_{P80}	103.0	95.7	82.9	67.4	224	73.3	67.4	89.3	224
Q_{P50}	93.6	79.6	71.6	65.9	158	65.5	65.5	75.6	158
Q_{P20}	85.9	69.9	65.4	66.1	120	63.2	63.2	68.0	120
December									
Q_{P80}	84.7	113	90	67.9	320	75.4	67.9	87.4	320
Q_{P50}	81.2	88.9	74.2	67.1	183	61.3	61.3	77.7	183
Q_{P20}	78.8	73.3	67.4	66.8	140	60.7	60.7	70.4	140
January									
Q_{P80}	83.1	111	89.4	69.2	305	91.4	69.2	90.4	305
Q_{P50}	81.1	93.3	74.1	67.5	173	71.5	67.5	77.6	173
Q_{P20}	78.6	77.3	68.4	67.2	132	61.6	61.6	72.9	132
February									
Q_{P80}	85.1	114	86.3	70.4	242	85.9	70.4	86.1	242
Q_{P50}	82.2	90.2	72.2	68.7	151	66.2	66.2	77.2	151
Q_{P20}	81.2	84	63.9	68.4	109	57.8	57.8	74.8	109
March									
Q_{P80}	97.7	76.9	89.1	57.2	182	91.5	57.2	90.3	182
Q_{P50}	91.7	62.1	68.8	47.9	143	64.4	47.9	66.6	143
Q_{P20}	92.5	63.1	61.5	41.8	129	68.5	41.8	65.8	129
April									
Q_{P80}	93.8	102	131	56.2	243	81.3	56.2	97.9	243
Q_{P50}	73.8	71.9	107	56.9	156	72.8	56.9	73.3	156
Q_{P20}	62.7	54.3	111	62.4	149	77	54.3	69.9	149
May									
Q_{P80}	77.4	92.7	222	79	379	103	77.4	97.9	379
Q_{P50}	62.8	71.9	82.4	68.4	258	108	62.8	77.2	258
Q_{P20}	57.9	59.5	53	61.9	179	102	53.0	60.7	179
June									
Q_{P80}	149.0	104	60.7	98.2	353	126	60.7	115	353
Q_{P50}	140.0	84.7	54.9	82.6	247	125	54.9	104.9	247
Q_{P20}	141.0	70.3	49.8	71.8	153	129	49.8	100.4	153
July									
Q_{P80}	119.0	104	222	112	346	222	104.0	171	346
Q_{P50}	105.0	91.1	56.4	78	267	159	56.4	98.1	267
Q_{P20}	102.0	85.6	34	74.7	223	121	34.0	93.8	223
August									
Q_{P80}	94.4	163.0	128	100	268	223	94.4	146	268
Q_{P50}	93.2	142.0	81	83	201	135	81.0	114.1	201
Q_{P20}	91.6	131.0	53.9	70.8	161	113	53.9	102.3	161
September									
Q_{P80}	95.1	105	114	81.8	218	153	81.8	110	218
Q_{P50}	95.4	91.4	82	77.4	191	105	77.4	93.4	191
Q_{P20}	96.6	88.1	67.6	73.4	164	85.5	67.6	86.8	164
— minimum	57.9	54.3	34.0	41.8	109	57.8			
— median	92.1	88.5	74.2	68.8	187	85.7			
— maximum	149.0	163	222	112	379	223			
Annual mean									
Annual mean	44.2	63.1	42.9	68.6	122	69.4			

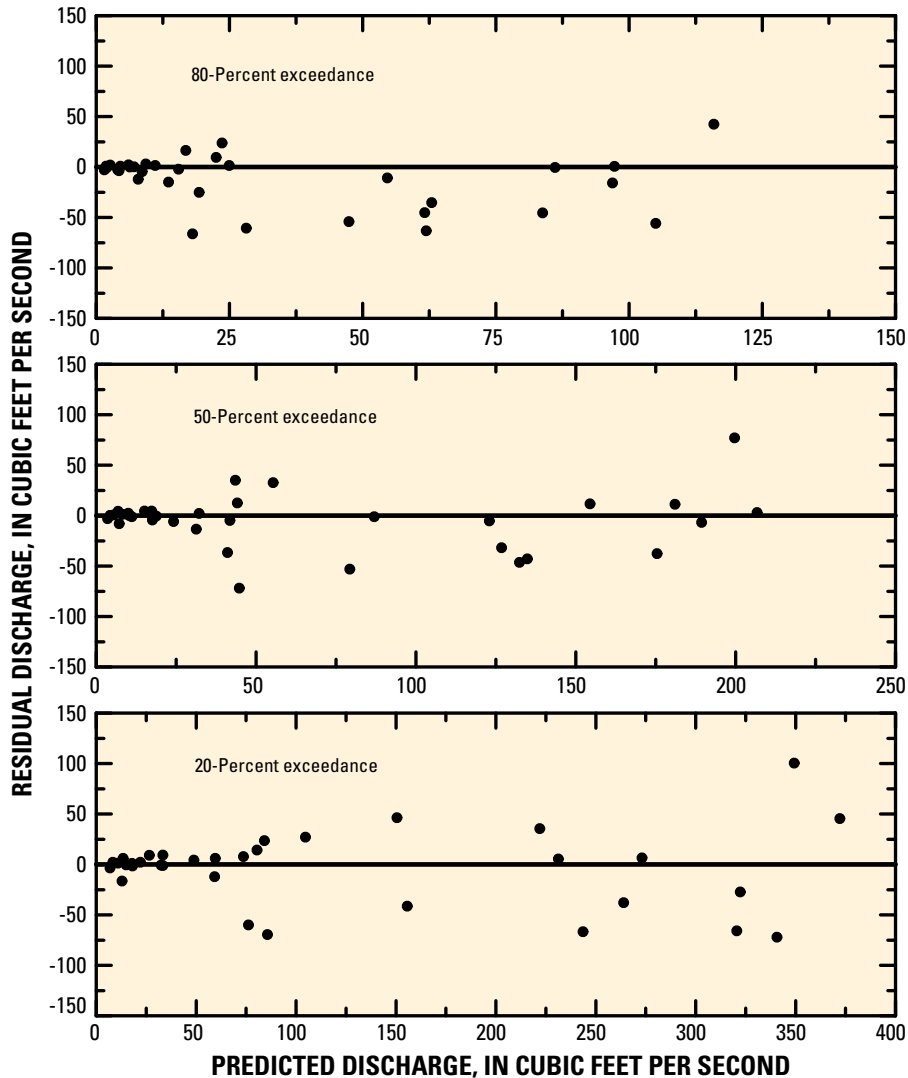


Figure 3. Residuals for the July exceedance equations for region 4 in Utah.

in Utah is driven by total annual precipitation that falls in the winter as snow and runs off into streams as snowmelt in the spring. Mean monthly precipitation was mostly used in region 6 where high streamflows can occur any time of year as a result of rapid runoff over exposed bedrock. Mean basin slope and slope percentage greater than 30 percent were used almost exclusively in region 1. Forest percentage was used for the May equations in region 1 and the June equations in combined regions 3 and 5. Streamflow of most streams in these regions during May and June is attributed to high-elevation snowmelt runoff and may explain why these variables are useful at these times. The percentage of herbaceous upland was used only in the equations for combined regions 3 and 5 for the month of March. Low- to mid-elevation streams in most of Utah often experience peak streamflows in March as lower elevation snow starts to runoff. The percentage of herbaceous upland is likely the basin characteristic most representative of these areas.

Limitations of Regional Regression Equations

The regression equations are not valid for streams that are significantly affected by irrigation diversions or large dams that regulate streamflow. The equations contained in this report were developed using predictor variables derived from the datasets described in tables 1 and 2. The range of these predictor variables is shown in table 11. The regression equations should not be used on streams where the basin characteristics are outside the range of those listed in table 11. In addition, the associated error for the equations in this report, are only valid if the same datasets, scales, and computational methods are used to calculate the predictor variables.

StreamStats uses the National Hydrography Dataset (NHD) for the stream coverage. The NHD in StreamStats does not differentiate between perennial, ephemeral, or intermittent streams. Because intermittent and ephemeral streams were not used in the development of the regression equations in this

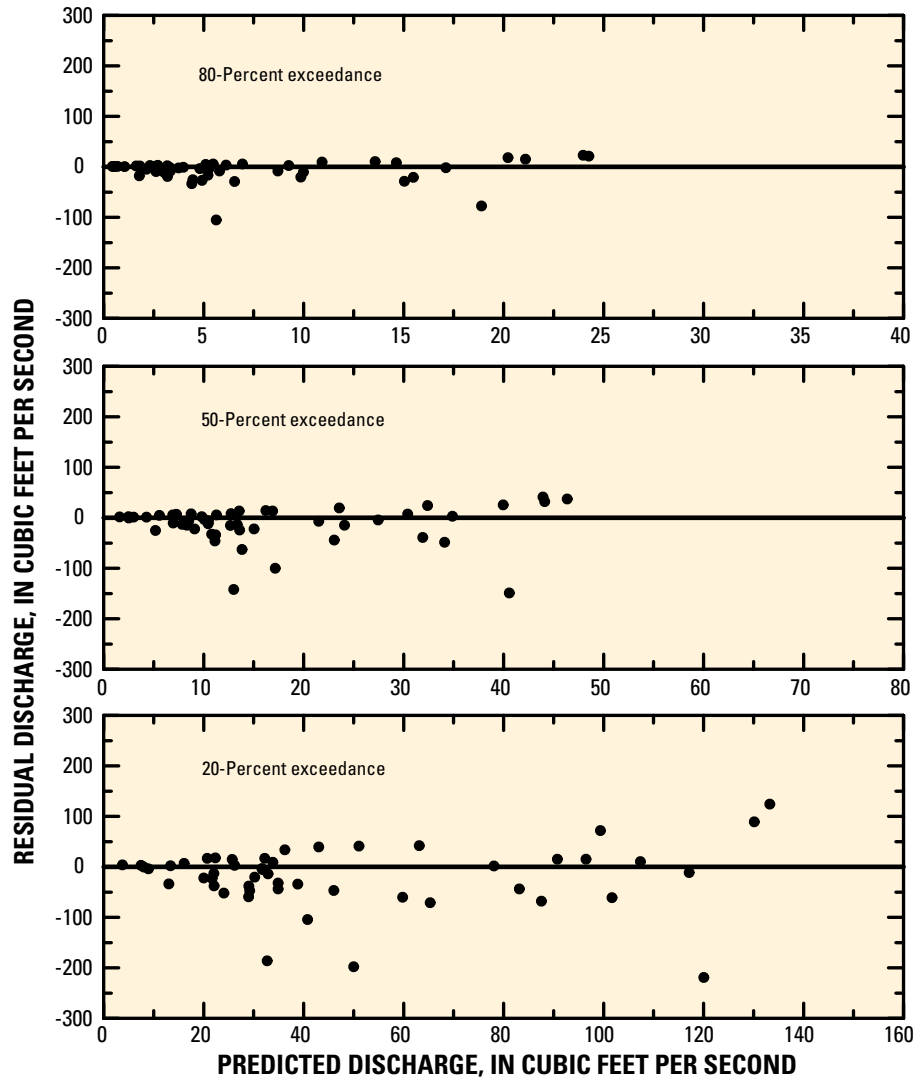


Figure 4. Residuals for the July exceedance equations for region 6 in Utah.

Table 10. Basin physiographic and climatic characteristics used in the monthly exceedance and annual mean regression equations for Utah.

[xx, numeric value of month]

Characteristic	Streamstats characteristic abbreviation	Percentage of equations where characteristic is used
Drainage area	DRNAREA	100
Mean annual precipitation	PRECIP	40
Mean monthly precipitation	PRCxx	22
Mean basin elevation	ELEV	19
Mean basin slope	BSLDEM10M	7
Percentage of basin slope greater than 30 percent	SLOP30	3
Percentage of area covered by forest	FOREST	3
Percentage of area covered by herbaceous upland	HERBNAT_NLCD92	1

Table 11. Minimum, median, and maximum values of basin characteristics used in the regional regression analysis for Utah.

[Regression variables: DRNAREA, drainage area, in square miles; ELEV, mean basin elevation, in feet; BSLDEM10M, average basin slope, in percent; SLOP30, basin slope that exceeds 30 percent, in percent; FOREST, area covered by forest, in percent; HERBNAT_NLCD92, area covered by herbaceous upland, in percent; PRECIP, mean annual precipitation, in inches; PRC1, mean January precipitation, in inches; PRC2, mean February precipitation, in inches; PRC3, mean March precipitation, in inches; PRC4, mean April precipitation, in inches; PRC5, mean May precipitation, in inches; PRC6, mean June precipitation, in inches; PRC7, mean July precipitation, in inches; PRC8, mean August precipitation, in inches; PRC9, mean September precipitation, in inches; PRC10 mean October precipitation, in inches; PRC11, mean November precipitation, in inches; PRC12, mean December precipitation, in inches]

	DRNAREA	ELEV	BSLDEM 10M	SLOP30	FOREST	HERBNAT_ NLCD92	PRECIP	PRC1	PRC2	PRC3	PRC4	PRC5	PRC6	PRC7	PRC8	PRC9	PRC10	PRC11	PRC12	
Region 1																				
Minimum	11.9	6,420	9.17	3.08	14.0	1.35	22.0	1.80	1.74	2.18	1.95	2.31	1.31	0.90	1.10	1.49	1.68	1.93	1.48	
Median	69.1	7,700	25.3	29.7	46.0	13.8	32.7	3.07	2.64	3.38	3.12	3.02	1.69	1.27	1.36	2.04	2.52	2.98	2.60	
Maximum	278	10,700	41.6	74.1	82.3	23.1	40.9	4.70	4.17	4.29	4.16	3.84	2.16	2.10	2.40	2.48	3.07	4.17	4.08	
Region 2																				
Minimum	2.14	6,440	19.1	21.5	12.9	0.02	22.3	2.22	2.22	2.37	1.93	1.87	1.05	0.82	0.92	1.42	1.81	1.74	1.86	
Median	12.4	7,370	41.9	72.2	58.9	6.52	34.6	4.26	3.89	3.95	3.32	3.44	1.63	1.22	1.36	2.24	2.99	3.58	3.55	
Maximum	70.1	8,550	58.8	93.6	80.7	31.6	49.5	5.79	4.92	5.59	4.93	4.25	1.96	2.01	2.00	2.73	3.67	4.63	4.41	
Region 4																				
Minimum	7.44	8,130	9.67	3.34	40.7	0.20	19.9	1.00	1.33	2.05	1.54	1.56	0.94	1.17	1.70	1.54	1.86	1.51	0.89	
Median	56.1	9,700	25.6	31.5	70.5	4.79	30.0	2.55	2.69	3.23	3.10	3.04	1.80	1.90	2.16	2.42	2.56	2.68	2.14	
Maximum	356	10,900	39.9	65.9	89.7	11.5	36.4	4.36	4.30	4.14	4.23	3.62	2.11	2.30	2.63	2.89	3.08	3.72	3.80	
Regions 3 and 5																				
Minimum	1.98	5,990	17.8	18.2	8.26	0.21	19.1	1.65	1.67	2.15	1.77	1.72	0.79	0.95	1.09	1.40	1.71	1.70	1.45	
Median	21.6	8,360	34.5	54.5	65.7	5.10	25.2	2.49	2.49	3.15	2.46	2.29	1.07	1.24	1.68	1.72	2.03	2.27	2.04	
Maximum	450	9,570	54.1	91.7	90.4	19.0	31.7	3.25	3.11	4.72	3.65	3.04	1.58	1.77	2.54	2.11	2.78	3.23	2.83	
Region 6																				
Minimum	3.66	5,220	8.69	2.90	0.38	1.27	9.58	0.84	0.56	0.87	0.68	0.73	0.32	0.86	0.89	0.98	1.23	0.64	0.60	
Median	105	7,640	25.1	31.6	51.8	6.90	18.9	1.50	1.49	2.25	1.71	1.58	.85	1.38	1.63	1.51	2.04	1.92	1.25	
Maximum	900	9,700	40.2	67.4	92.7	37.8	28.9	3.41	2.87	4.38	3.13	2.28	1.17	2.97	3.56	2.35	3.13	3.09	2.97	
Region 7																				
Minimum	5.43	5,900	10.6	5.20	37.7	0.60	16.2	1.21	1.06	1.23	0.75	0.58	0.35	1.00	1.14	0.99	0.94	0.96	0.75	
Median	71.4	7,770	29.9	40.2	68.5	8.29	19.8	2.26	2.44	2.86	1.49	1.31	.63	1.28	1.87	1.57	1.83	1.82	1.65	
Maximum	948	9,640	44.7	64.3	90.8	13.1	27.7	2.88	3.76	4.00	2.53	3.17	1.09	2.15	2.68	1.97	2.35	2.92	2.19	

report, caution should be used if a stream is suspected to be nonperennial. For these cases, the predicted streamflow will most likely be biased high. Limitations to the range of drainage basin area, and the effect of dam regulation, mean that the equations are not valid for some of the major rivers in the state including the Colorado River, the Green River, the San Juan River, and the Bear River below Woodruff Narrows Reservoir.

Summary

Monthly and annual streamflow information is required by those who manage fish and wildlife, water rights, and other land-use areas to assist in their decision-making processes. This type of information is available at sites where streamflow-gaging stations are located; however, there are numerous drainage basins in Utah with no existing streamflow information. Estimates are therefore needed for monthly and annual streamflow statistics in these areas. The monthly 80-, 50-, and 20-percent exceedance streamflow was calculated for 266 streamflow-gaging stations in Utah and surrounding states. Using GIS software, 24 physiographic and climatic basin characteristics were computed for each gaging station location. Using these data, regional regression equations that can be used to predict monthly 80-, 50-, and 20-percent exceedance streamflow and annual mean streamflow at ungaged sites in Utah were created. The state of Utah was divided into seven distinct geohydrologic regions on the basis of a variety of physiographic, climatic, and hydrologic characteristics. Separate regression equations were developed for each region except region 3, which was combined with region 5 because of the small number of gaging stations in region 3. Root mean square error percent for the equations ranged from 34 to 379 percent. Region 6 in Utah had the greatest amount of error associated with its predicting equations, whereas combined regions 3 and 5 had the least amount of error. July was generally the month with the greatest error for all regions. The equations are more reliable for predicting high streamflow statistics (20-percent exceedance) than for predicting the low streamflow statistics (80-percent exceedance). In general, the mean annual streamflow equations had smaller error than the monthly predicting equations. The error associated with the equations in this report is only valid if the equations are used with the same datasets, scales, and computational methods that were used to calculate the predictor variables. The equations and their associated errors should be considered valid only if used over the range of variables listed in [table 11](#). The equations documented in this report will be implemented in StreamStats, a USGS Web-based tool that allows users to delineate drainage basins and calculate various streamflow statistics.

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Appendix A.

Appendix A. Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
1	09217900	Blacks Fork near Robertson, Wyoming	33.3	47.9	65.0	26.9	39.4	50.5	23.4	30.0	40.0	20.0	25.0	33.5
2	09218500	Blacks Fork near Millburne, Wyoming	34.0	45.0	72.6	24.7	34.1	46.3	17.9	30.7	38.9	13.8	27.6	36.9
3	09220000	East Fork of Smiths Fork near Robertson, Wyoming	10.6	15.0	20.6	7.10	10.5	13.8	5.00	7.30	10.1	4.90	6.40	8.60
4	09220500	West Fork of Smith Fork near Robertson, Wyoming	2.10	3.20	5.80	2.30	3.00	4.30	1.70	2.80	4.00	1.60	2.40	3.70
5	09223000	Hams Fork below Pole Creek, near Frontier, Wyoming	15.9	20.7	26.6	14.1	19.2	24.5	12.5	15.8	20.4	10.6	14.5	18.6
6	09223500	Hams Fork near Frontier, Wyoming	'14.1	'22.8	'30.4	'14.6	'24.1	'32.0	'14.9	'21.9	'29.1	'14.3	'18.6	'25.8
7	09224000	Hams Fork at Diamondville, Wyoming	'24.0	'35.2	'41.7	'24.5	'30.6	'39.0	'19.7	'26.3	'30.6	'13.0	'22.0	'27.3
8	09226000	Henrys Fork near Lonetree, Wyoming	7.80	12.5	17.3	6.80	9.70	12.6	5.00	7.30	9.20	4.10	6.00	8.30
9	09226500	Middle Fork Beaver Creek near Lonetree, Wyoming	7.20	8.50	12.8	5.60	6.50	8.60	4.20	5.10	6.00	3.60	4.20	5.00
10	09227500	West Fork Beaver Creek near Lonetree, Wyoming	4.80	6.50	8.70	4.00	5.10	6.60	3.10	4.00	4.10	22.60	23.10	nd
11	09228500	Burnt Fork near Burntfork, Wyoming	7.00	11.3	15.6	5.40	7.00	9.20	4.50	6.00	8.20	4.00	5.10	7.50
12	10010400	East Fork Bear River near Evanston, Wyoming	13.8	18.3	33.1	12.0	15.6	21.4	8.30	11.6	14.2	7.70	9.50	11.8
13	10011500	Bear River near Utah-Wyoming State Line	40.5	55.1	81.1	39.7	51.9	67.7	35.6	44.4	55.4	32.5	40.3	49.7
14	10012000	Mill Creek at Utah-Wyoming State Line	'5.90	'8.20	'12.8	'7.20	'8.70	'11.5	'6.80	'8.00	'10.8	'6.20	'8.00	'9.20
15	10014000	Bear River above Sulphur Creek, near Evanston, Wyoming	25.1	38.5	66.7	35.7	58.0	78.7	49.5	61.7	72.7	50.1	55.5	61.0
16	10015700	Sulphur Creek above Reservoir below La Chappelle Creek near Evanston, Wyoming	0.300	1.10	6.80	0.600	3.50	8.90	1.10	3.80	7.70	1.60	3.90	7.30
17	10016000	Sulphur Creek near Evanston, Wyoming	1.00	1.60	4.20	1.60	3.80	6.20	2.40	3.10	7.20	2.10	3.30	7.70
18	10021000	Woodruff Creek near Woodruff, Utah	7.13	9.89	13.6	7.31	10.1	12.3	6.86	8.92	11.5	6.67	8.49	11.3
19	10023000	Big Creek near Randolph, Utah	4.90	8.60	16.8	5.10	8.00	15.4	4.60	7.70	13.5	4.30	7.30	12.0
20	10032000	Smiths Fork near Border, Wyoming	76.3	88.8	102	68.1	77.0	86.7	61.1	70.0	77.8	56.8	63.9	71.6
21	10040000	Thomas Fork near Geneva, Idaho	3.00	4.50	5.50	2.50	4.10	4.90	2.10	3.50	4.50	2.10	3.00	4.20
22	10040500	Salt Creek near Geneva, Idaho	3.60	5.10	6.60	3.20	4.60	5.90	2.60	3.60	4.80	2.60	3.80	4.60
23	10041000	Thomas Fork near Wyoming-Idaho State Line	13.1	17.8	23.9	12.7	16.6	21.0	11.4	15.3	19.0	11.5	14.8	18.1
24	10042500	Thomas Fork near Raymond, Idaho	9.10	14.1	22.2	9.60	16.3	24.1	8.20	17.5	23.3	9.10	17.2	20.9
25	10069000	Georgetown Creek near Georgetown, Idaho	26.3	31.6	34.7	24.7	29.9	33.2	22.8	27.3	30.8	21.9	25.8	28.8
26	10087500	Mink Creek below Dry Fork near Mink Creek, Idaho	32.4	38.7	44.6	33.1	36.6	40.6	30.4	33.7	36.6	28.1	31.5	35.5
27	10089500	Mink Creek near Mink Creek, Idaho	3.10	5.40	9.80	6.00	39.2	51.6	39.4	43.0	50.5	37.0	41.0	47.1
28	10093000	Cub River near Preston, Idaho	24.7	28.2	31.8	22.1	24.7	28.4	19.4	22.1	26.4	18.2	20.4	24.8
29	10096000	Cub River above Maple Creek near Franklin, Idaho	3.00	4.50	16.5	3.40	4.60	15.7	9.20	15.9	31.2	15.2	26.5	33.4
30	10099000	High Creek near Richmond, Utah	'9.40	'11.4	'14.5	'8.10	'11.3	'14.0	'8.00	'9.20	'13.1	'6.90	'9.00	'12.4
31	10102300	Summit Creek above Divisions near Smithfield, Utah	'5.30	'6.70	'7.70	'5.20	'6.10	'6.90	'4.50	'5.10	'6.90	'3.80	'4.90	'6.50
32	10104700	Little Bear River below Davenport Creek near Avon, Utah	18.6	25.7	34.5	20.5	26.3	34.8	19.2	25.4	34.8	19.3	25.5	35.2

Appendix A. Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
33	10104900	East Fork Little Bear River above Reservoir near Avon, Utah	7.10	8.90	11.5	6.70	8.40	10.8	6.50	8.10	11.9	6.80	8.30	12.6
34	10105000	East Fork Little Bear River near Avon, Utah	10.4	12.4	15.0	9.60	12.5	14.9	10.0	11.8	14.5	9.40	11.6	12.9
35	10105900	Little Bear River at Paradise, Utah	24.9	36.7	54.6	30.0	39.0	59.4	30.0	39.6	56.9	29.0	41.1	62.2
36	10106000	Little Bear River near Paradise, Utah	29.9	44.4	64.0	39.0	52.5	67.8	39.6	52.0	68.2	40.5	53.5	69.5
37	10109001	Combined Flow Logan River above State Dam and Logan, Hyde Park and Smithfield Canal at Head, near Logan, Utah	² 112	² 147	² 178	² 102	² 129	² 158	² 92.3	² 114	² 138	² 88.0	² 108	² 129
38	10111700	Blacksmith Fork below Mill Creek near Hyrum, Utah	46.2	54.8	73.3	46.1	53.8	68.8	43.2	52.2	65.2	41.2	51.9	61.7
39	10113500	Blacksmith Fork above Utah Power And Light Company's Dam near Hyrum, Utah	63.3	87.4	115	62.5	83.1	105	59.4	78.2	99.7	² 57.8	² 73.8	² 96.6
40	10128200	South Fork Weber River near Oakley, Utah	10.6	12.1	13.4	9.90	11.4	12.6	9.10	10.4	11.7	8.50	10.0	10.9
41	10128500	Weber River near Oakley, Utah	55.7	74.4	101	52.9	67.7	83.6	49.0	60.3	73.6	46.0	54.4	66.4
42	10129350	Crandall Creek near Peoa, Utah	² 0.400	² 0.700	² 1.00	² 0.400	² 0.800	² 1.00	² 0.400	² 0.800	² 1.00	² 0.400	² 0.800	² 1.10
43	10130000	Silver Creek near Wanship, Utah	12.50	16.50	19.80	13.60	16.00	18.80	13.20	14.50	16.50	12.70	13.80	15.50
44	10130700	East Fork Chalk Creek near Coalville, Utah	9.60	12.1	14.5	9.30	11.0	13.9	9.10	10.9	11.9	8.80	10.0	11.2
45	10131000	Chalk Creek at Coalville, Utah	10.3	20.4	31.1	15.8	22.2	31.2	14.1	19.6	27.5	14.6	19.1	26.8
46	10132500	Lost Creek near Croyden, Utah	7.13	9.88	16.2	7.84	10.7	15.4	7.70	10.4	15.7	7.19	9.10	15.0
47	10133000	Lost Creek at Devils Slide, Utah	8.10	14.7	19.6	16.7	23.0	29.2	12.1	18.1	24.4	14.3	17.0	21.5

Appendix A Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
1	09217900	Blacks Fork near Robertson, Wyoming	17.1	22.8	30.2	17.6	24.5	31.2	26.7	39.1	73.2	112	296	681
2	09218500	Blacks Fork near Millburne, Wyoming	13.7	27.5	34.6	12.8	29.5	37.3	12.9	37.0	67.7	47.4	346	696
3	09220000	East Fork of Smiths Fork near Robertson, Wyoming	4.80	6.60	8.60	4.80	7.00	10.4	5.90	11.8	23.3	21.8	76.4	165
4	09220500	West Fork of Smith Fork near Robertson, Wyoming	1.70	2.50	3.80	2.00	3.10	4.40	4.60	11.6	25.6	34.6	83.3	178
5	09223000	Hams Fork below Pole Creek, near Frontier, Wyoming	10.9	15.3	19.8	13.8	18.8	27.2	34.3	69.7	151	167	337	647
6	09223500	Hams Fork near Frontier, Wyoming	'14.8	'21.0	129.8	'17.6	'27.0	'45.3	'55.9	'162	'575	'309	'625	'1,070
7	09224000	Hams Fork at Diamondville, Wyoming	'15.0	'24.0	'25.9	'16.7	'32.4	'58.7	'66.7	'217	'465	'470	'754	'1,250
8	09226000	Herrys Fork near Lonetree, Wyoming	4.10	5.60	7.80	4.70	6.60	8.90	7.30	11.4	22.0	36.0	82.4	174
9	09226500	Middle Fork Beaver Creek near Lonetree, Wyoming	3.50	3.70	4.10	3.10	4.10	4.60	4.50	5.90	9.90	14.4	37.7	89.9
10	09227500	West Fork Beaver Creek near Lonetree, Wyoming	2.50	2.90	3.10	2.60	3.00	3.60	'3.40	'5.20	'9.20	12.9	27.2	53.6
11	09228500	Burnt Fork near Burntfork, Wyoming	3.60	5.20	7.20	3.90	5.60	7.00	5.30	7.40	13.5	16.3	44.7	94.8
12	10010400	East Fork Bear River near Evanston, Wyoming	7.60	9.00	12.6	8.00	11.2	14.7	12.1	19.9	31.2	39.3	81.9	188
13	10011500	Bear River near Utah-Wyoming State line	31.8	39.8	46.4	33.7	42.2	52.3	48.5	76.0	155	247	519	910
14	10012000	Mill Creek at Utah-Wyoming State line	'7.00	'8.10	19.20	'7.70	'8.90	'10.6	'11.7	'21.5	'52.2	'64.8	'117	'193
15	10014000	Bear River above Sulphur Creek, near Evanston, Wyoming	50.4	55.6	60.9	55.4	68.9	80.5	104	182	303	'338	'733	'1,220
16	10015700	Sulphur Creek above Reservoir below La Chapelle Creek near Evanston, Wyoming	2.70	4.40	7.90	4.00	8.60	28.4	15.8	36.7	76.2	19.2	53.0	117
17	10016000	Sulphur Creek near Evanston, Wyoming	2.60	6.10	9.40	4.60	10.1	20.2	24.6	51.1	131	25.4	55.5	117
18	10021000	Woodruff Creek near Woodruff, Utah	7.39	9.47	12.6	8.22	11.6	17.6	19.5	30.8	59.1	44.7	97.2	189
19	10023000	Big Creek near Randolph, Utah	4.10	7.00	12.2	4.70	8.10	14.6	5.70	11.1	20.3	'7.40	'19.5	'47.1
20	10032000	Smiths Fork near Border, Wyoming	55.1	61.5	67.0	54.6	60.8	67.8	75.2	114	219	270	480	787
21	10040000	Thomas Fork near Geneva, Idaho	2.00	2.60	3.70	2.40	3.30	5.10	9.50	23.3	76.1	26.0	52.6	106
22	10040500	Salt Creek near Geneva, Idaho	2.70	3.50	4.30	2.90	3.70	5.00	9.70	21.4	75.0	45.6	73.1	126
23	10041000	Thomas Fork near Wyoming-Idaho State line	12.4	14.8	17.9	13.7	16.6	23.9	28.1	54.8	149	74.5	192	434
24	10042500	Thomas Fork near Raymond, Idaho	10.0	16.0	18.5	9.30	16.2	20.5	28.2	79.7	254	125	233	392
25	10069000	Georgetown Creek near Georgetown, Idaho	21.1	24.7	26.9	20.7	24.7	26.7	22.2	25.4	28.4	27.2	33.5	50.7
26	10087500	Mink Creek below Dry Fork near Mink Creek, Idaho	27.3	30.4	37.4	29.8	35.4	44.1	48.8	76.0	117	134	234	345
27	10089500	Mink Creek near Mink Creek, Idaho	32.6	38.7	46.8	4.00	10.2	37.2	9.00	63.0	144	119	215	284
28	10093000	Cub River near Preston, Idaho	17.7	20.5	24.4	20.3	24.7	35.5	37.8	65.3	111	141	279	436
29	10096000	Cub River above Maple Creek near Franklin, Idaho	22.4	28.8	34.7	23.3	35.5	59.5	68.4	136	216	160	252	409
30	10099000	High Creek near Richmond, Utah	'6.80	'10.5	'14.5	'9.10	'15.6	'24.9	'24.2	'47.2	'65.7	'73.6	'116	'174
31	10102300	Summit Creek above Diversions near Smithfield, Utah	'4.10	'5.90	'8.70	'6.40	'9.40	'13.7	'14.7	'22.4	'41.9	'38.2	'60.4	'96.5
32	10104700	Little Bear River below Davenport Creek near Avon, Utah	21.1	28.4	38.9	29.9	43.3	81.0	53.0	98.6	174	82.3	153	224

Appendix A. Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in [Figure 1](#); P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
33	10104900	East Fork Little Bear River above Reservoir near Avon, Utah	7.30	10.4	16.9	12.4	19.4	40.6	36.1	89.9	204	84.5	157	254
34	10105000	East Fork Little Bear River near Avon, Utah	10.2	12.1	15.8	12.6	18.4	36.2	41.8	92.6	205	62.0	110	186
35	10105900	Little Bear River at Paradise, Utah	26.7	44.6	70.0	56.7	90.4	144	97.2	154	339	96.3	301	492
36	10106000	Little Bear River near Paradise, Utah	44.8	57.8	82.0	55.2	81.3	151	² 118	² 216	² 383	119	266	440
37	10109001	Combined Flow Logan River above State Dam and Logan, Hyde Park and Smithfield Canal at Head, near Logan, Utah	² 87.8	² 104	² 124	² 96.0	¹ 113	² 139	² 141	² 206	² 344	334	547	834
38	10111700	Blacksmith Fork below Mill Creek near Hyrum, Utah	40.9	48.8	62.2	43.6	52.2	67.4	43.9	61.9	79.7	45.2	62.7	79.2
39	10113500	Blacksmith Fork above Utah Power And Light Company's Dam near Hyrum, Utah	² 59.0	² 75.3	² 96.3	67.5	90.0	124	101	164	295	116	252	426
40	10128200	South Fork Weber River near Oakley, Utah	² 7.90	² 9.70	nd	8.30	9.80	11.0	11.0	12.9	20.8	30.4	64.0	107
41	10128500	Weber River near Oakley, Utah	46.6	54.9	65.5	51.0	61.9	77.7	81.8	136	257	332	596	1,010
42	10129350	Crandall Creek near Peoa, Utah	² 0.600	² 0.900	² 1.20	² 0.700	¹ 1.30	² 2.40	² 2.70	² 4.70	² 13.4	12.9	23.4	43.8
43	10130000	Silver Creek near Wanship, Utah	13.20	14.50	16.70	15.60	112.3	123.2	17.70	18.9	137.4	14.60	111.7	123.3
44	10130700	East Fork Chalk Creek near Coalville, Utah	8.00	9.10	10.5	7.70	9.00	12.4	11.8	15.7	28.9	50.0	100	163
45	10131000	Chalk Creek at Coalville, Utah	15.8	20.1	29.1	20.3	30.1	53.1	43.2	82.1	168	104	233	434
46	10132500	Lost Creek near Croyden, Utah	7.92	12.1	18.1	9.74	17.2	25.1	11.4	37.5	95.4	52.1	111	230
47	10133000	Lost Creek at Devils Slide, Utah	18.3	22.6	26.3	25.3	32.0	44.8	31.0	57.9	125	79.4	249	563

Appendix A. Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
1	09217900	Blacks Fork near Robertson, Wyoming	362	656	1060	124	233	435	53.3	83.4	148	41.2	55.3	82.5	139
2	09218500	Blacks Fork near Millburne, Wyoming	442	664	936	2168	2308	2488	68.2	117	188	45.2	75.3	146	161
3	09220000	East Fork of Smiths Fork near Robertson, Wyoming	109	171	283	49.4	88.2	144	19.5	35.3	64.3	12.6	21.9	45.1	45.7
4	09220500	West Fork of Smith Fork near Robertson, Wyoming	24.7	60.6	134	4.60	9.40	20.4	1.80	3.30	6.90	1.30	2.40	3.90	21.5
5	09223000	Hams Fork below Pole Creek, near Frontier, Wyoming	134	315	605	33.4	67.9	132	15.3	25.6	41.9	13.4	19.4	27.2	95.2
6	09223500	Hams Fork near Frontier, Wyoming	216	414	743	30.8	74.4	139	17.8	31.5	63.0	14.4	22.3	37.3	147
7	09224000	Hams Fork at Diamondville, Wyoming	162	414	695	24.9	57.3	125	16.0	29.2	46.9	13.5	23.9	36.8	163
8	09226000	Henrys Fork near Lonetree, Wyoming	90.5	153	258	32.6	55.3	111	15.7	22.6	37.6	9.80	13.6	19.9	40.2
9	09226500	Middle Fork Beaver Creek near Lonetree, Wyoming	43.6	87.0	152	17.7	27.2	50.5	12.9	17.2	25.0	8.70	11.6	16.2	23.0
10	09227500	West Fork Beaver Creek near Lonetree, Wyoming	37.5	60.5	98.6	17.0	26.4	42.0	8.70	14.1	22.3	6.40	8.20	12.0	16.2
11	09228500	Burnt Fork near Burntfork, Wyoming	69.8	113	173	40.9	61.5	94.6	20.5	32.3	54.2	12.8	18.4	27.0	30.3
12	10010400	East Fork Bear River near Evanston, Wyoming	157	265	387	54.9	101	174	21.7	31.2	58.6	15.9	19.4	35.3	58.5
13	10011500	Bear River near Utah-Wyoming State line	391	770	1,240	118	200	411	53.3	79.0	125	38.7	59.0	99.4	192
14	10012000	Mill Creek at Utah-Wyoming State line	31.5	103	205	6.40	14.6	27.9	4.50	6.60	12.2	4.40	5.70	8.70	32.0
15	10014000	Bear River above Sulphur Creek, near Evanston, Wyoming	313	781	1,250	20.1	88.6	258	13.8	30.3	77.0	8.30	18.9	44.2	202
16	10015700	Sulphur Creek above Reservoir below LaChapelle Creek near Evanston, Wyoming	5.10	18.1	49.4	0.500	3.20	11.5	0.100	0.500	2.430	0.00	0.400	2.90	17.9
17	10016000	Sulphur Creek near Evanston, Wyoming	12.6	30.2	69.1	2.20	7.90	25.4	1.10	2.80	6.50	0.600	1.10	1.70	24.2
18	10021000	Woodruff Creek near Woodruff, Utah	17.7	40.1	85.8	9.14	15.4	24.2	6.40	9.95	14.6	6.57	9.18	12.4	27.3
19	10023000	Big Creek near Randolph, Utah	7.00	15.2	33.9	4.70	10.5	25.2	4.50	9.00	20.6	4.70	8.50	18.2	13.3
20	10032000	Smiths Fork near Border, Wyoming	324	571	863	162	247	391	2108	2143	2191	386.3	2105	2127	190
21	10040000	Thomas Fork near Geneva, Idaho	17.8	31.1	44.8	6.70	12.0	17.5	3.60	6.00	8.50	3.20	4.40	5.70	17.2
22	10040500	Salt Creek near Geneva, Idaho	23.8	36.5	53.5	8.90	14.3	20.2	4.60	6.60	9.60	3.40	5.10	6.80	20.2
23	10041000	Thomas Fork near Wyoming-Idaho State line	45.1	87.6	157	22.0	39.9	65.1	14.3	23.0	35.9	11.9	18.4	26.9	54.6
24	10042500	Thomas Fork near Raymond, Idaho	41.1	96.5	161	22.7	34.3	57.7	15.3	23.5	35.3	8.60	15.1	21.9	60.6
25	10069000	Georgetown Creek near Georatown, Idaho	33.1	40.5	50.1	31.5	36.4	42.5	29.8	34.2	37.9	28.4	32.7	35.7	31.1
26	10087500	Mink Creek below Dry Fork near Mink Creek, Idaho	112	192	322	31.7	58.7	90.8	19.1	29.8	48.3	16.3	23.0	39.5	72.8
27	10089500	Mink Creek near Mink Creek, Idaho	35.6	121	249	2.20	4.80	7.30	2.00	3.20	4.60	1.90	3.40	6.00	50.6
28	10093000	Cub River near Preston, Idaho	160	309	490	57.8	83.9	139	37.3	46.5	60.3	29.2	33.7	40.9	91.7
29	10096000	Cub River above Maple Creek near Franklin, Idaho	7.60	122	280	2.40	3.40	5.00	1.90	2.70	4.20	2.20	2.90	5.20	64.8
30	10099000	High Creek near Richmond, Utah	170.9	124	171	25.9	39.1	64.5	14.2	18.0	25.4	10.1	12.4	15.8	33.6
31	10102300	Summit Creek above Diversions near Smithfield, Utah	27.9	53.1	85.5	13.8	19.2	28.4	8.80	11.5	14.1	6.80	8.10	9.70	19.8
32	10104700	Little Bear River below Davenport Creek near Avon, Utah	38.5	80.9	159	21.9	38.8	57.5	18.0	30.1	39.4	17.7	26.6	35.4	57.3

Appendix A. Monthly and annual streamflow statistics for streamflow-gaging stations in region 1 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
33	10104900	East Fork Little Bear River above Reservoir near Avon, Utah	26.9	42.4	75.6	14.0	19.3	27.6	9.50	12.7	15.6	8.40	9.80	11.9	40.1
34	10105000	East Fork Little Bear River near Avon, Utah	26.7	45.8	73.6	14.9	23.3	29.6	10.6	15.8	18.6	10.2	13.2	15.1	36.3
35	10105900	Little Bear River at Paradise, Utah	16.5	71.4	282	15.1	25.5	55.2	16.0	22.1	41.8	18.2	26.5	48.2	89.7
36	10106000	Little Bear River near Paradise, Utah	31.5	75.0	186	19.7	33.2	55.9	15.7	28.5	51.9	15.8	31.5	58.3	98.9
37	10109001	Combined Flow Logan River above State Dam and Logan, Hyde Park and Smithfield Canal at Head, near Logan, Utah	328	594	947	² 190	² 298	² 456	² 144	² 207	² 265	² 123	² 170	² 207	² 245
38	10111700	Blacksmith Fork below Mill Creek near Hyrum, Utah	44.4	61.0	75.9	44.7	58.3	73.9	43.5	56.4	73.7	45.0	53.6	71.1	58.8
39	10113500	Blacksmith Fork above Utah Power And Light Company's Dam near Hyrum, Utah	91.0	150	230	76.4	114	159	67.3	99.6	136	63.7	91.9	125	126
40	10128200	South Fork Weber River near Oakley, Utah	62.6	102	142	18.7	24.2	37.3	13.9	15.6	17.8	12.1	13.2	14.4	25.6
41	10128500	Weber River near Oakley, Utah	² 373	² 822	² 1360	121	178	330	77.2	107	147	57.7	76.4	110	² 218
42	10129350	Crandall Creek near Peoa, Utah	² 4.50	² 7.80	² 14.8	² 1.30	² 2.20	² 3.30	² 0.300	² 0.700	² 1.40	² 0.200	² 0.400	² 0.900	4.66
43	10130000	Silver Creek near Wanship, Utah	² 2.00	² 5.60	² 15.3	² 0.400	² 2.10	² 5.70	² 0.400	² 2.20	² 4.40	² 0.700	² 3.10	² 5.60	² 8.61
44	10130700	East Fork Chalk Creek near Coalville, Utah	82.8	133	165	31.9	44.0	64.7	23.8	28.1	33.4	12.0	20.1	25.8	34.6
45	10131000	Chalk Creek at Coalville, Utah	45.8	124	288	12.7	30.6	71.2	9.20	18.3	34.5	8.50	16.8	32.8	67.8
46	10132500	Lost Creek near Croyden, Utah	17.6	36.4	72.3	7.08	12.7	22.1	5.20	8.05	14.7	5.74	7.69	14.1	32.4
47	10133000	Lost Creek at Devils Slide, Utah	19.4	45.1	105	12.3	18.4	26.9	10.1	11.7	17.5	7.40	10.4	18.6	59.8

¹Basin characteristics determined to be outliers, not used in regression analysis.

²Exceedance discharge determined to be outliers, not used in some regression analyses.

Appendix B.

Appendix B. Monthly and annual streamflow statistics for streamflow-gaging stations in region 2 in Utah used in the regional regression analysis.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
48	10133700	Threemile Creek near Park City, Utah	1.00	1.30	1.50	0.900	1.20	1.30	0.900	1.10	1.20	0.800	1.00	1.10
49	10135000	Hardscrabble Creek near Porterville, Utah	6.70	8.10	9.80	7.00	8.10	10.0	6.10	7.40	9.50	5.70	7.00	8.40
50	10137500	South Fork Ogden River near Huntsville, Utah	133.3	141.1	150.3	132.2	139.6	148.3	132.3	139.5	148.1	133.2	140.1	151.2
51	10137680	North Fork Ogden River near Eden, Utah	13.30	13.80	14.20	13.40	13.90	14.80	13.30	13.80	14.60	13.20	13.90	15.30
52	10137780	Middle Fork Ogden River above Diversion near Huntsville, Utah	2.20	2.60	3.60	3.00	3.80	4.80	2.90	4.00	6.20	3.20	4.70	10.6
53	10139300	Wheeler Creek near Huntsville, Utah	0.800	1.40	2.00	0.800	1.30	2.20	0.600	1.00	2.10	0.500	0.900	2.20
54	10141400	Howard Slough at Hooper, Utah	113.8	123.6	131.7	113.2	122.2	128.4	112.5	124.1	134.9	113.0	125.2	134.8
55	10141500	Holmes Creek near Kaysville, Utah	1.60	2.00	2.40	1.70	2.00	2.30	1.60	1.90	2.20	1.50	1.80	2.10
56	10142000	Farmington Creek above Diversions near Farmington, Utah	2.60	3.20	4.50	2.80	3.30	4.40	2.60	3.40	4.40	2.50	3.30	4.40
57	10142500	Ricks Creek above Diversions near Centerville, Utah	0.600	0.900	1.10	0.600	0.800	1.00	0.600	0.700	0.900	0.600	0.700	0.900
58	10143000	Parrish Creek above Diversions near Centerville, Utah	30.400	30.400	30.600	30.400	30.400	30.600	30.300	30.400	30.600	30.400	30.400	30.600
59	10143500	Centerville Creek above Diversions Near Centerville, Utah	1.10	1.40	1.70	1.20	1.40	1.70	1.10	1.40	1.70	1.10	1.40	1.60
60	10144000	Stone Creek above Diversion near Bountiful, Utah	0.600	0.900	1.30	0.800	1.20	1.40	0.800	1.20	1.50	0.800	1.10	1.40
61	10145000	Mill Creek at Mueller Park near Bountiful, Utah	1.00	1.50	1.90	1.20	1.60	1.90	1.10	1.50	1.90	1.10	1.40	2.00
62	10155400	Spring Creek near Heber City, Utah	10.9	17.5	24.6	12.6	18.4	23.7	11.0	15.6	18.6	10.5	14.5	17.7
63	10156000	Snake Creek near Charleston, Utah	338.0	246.7	255.5	241.5	247.8	255.4	338.7	244.0	250.7	338.4	242.3	248.8
64	10158500	Round Valley Creek near Wallsburg, Utah	2.80	4.20	6.80	5.40	7.50	11.1	6.20	8.70	11.1	7.10	8.80	10.6
65	10160000	Deer Creek near Wildwood, Utah	9.90	11.4	13.1	9.90	11.3	12.8	10.2	11.7	12.7	9.90	11.2	12.5
66	10160800	North Fork Provo River at Wildwood, Utah	7.80	8.70	11.5	6.20	7.10	8.50	5.20	6.10	6.90	4.60	5.30	6.10
67	10161500	South Fork Provo River at Vivian Park, Utah	22.4	30.3	37.5	22.4	29.9	36.5	22.0	28.3	34.7	21.2	26.1	32.5
68	10164500	American Fork above Upper Powerplant near American Fork, Utah	17.9	21.9	26.9	15.6	19.2	23.7	13.8	16.6	20.4	12.3	15.6	17.9
69	10166430	West Canyon Creek near Cedar Fort, Utah	0.300	1.10	2.20	0.400	0.900	1.90	0.200	0.700	1.30	0.200	0.500	1.00
70	10168500	Big Cottonwood Creek near Salt Lake City, Utah	22.0	29.2	39.2	21.5	27.0	33.8	19.5	24.2	31.3	17.8	22.3	28.0
71	10172000	Emigration Creek near Salt Lake City, Utah	1.10	2.50	5.30	1.30	2.20	5.00	0.900	1.70	4.20	1.00	1.70	4.00
72	10172200	Red Butte Creek at Fort Douglas near Salt Lake City, Utah	1.20	1.90	2.70	1.40	1.90	2.70	1.40	1.80	2.50	1.40	1.80	2.50
73	10172640	Lee Creek near Magna, Utah	21.20	29.0	7.50	11.00	11.80	14.90	11.20	12.00	16.00	11.10	12.40	15.40
74	10172700	Vernon Creek near Vernon, Utah	1.60	2.50	4.40	1.70	2.50	4.20	1.80	2.50	3.90	1.80	2.40	3.90
75	10172765	Clover Creek above Big Hollow near Clover, Utah	1.70	2.70	4.00	1.50	2.30	3.30	1.10	2.30	3.10	1.10	2.10	2.60
76	10172791	Settlement Creek above Reservoir near Tooele, Utah	0.800	1.20	1.60	0.700	1.10	1.50	0.600	0.700	1.30	0.600	0.700	1.10
77	10172800	South Willow Creek near Grantsville, Utah	2.30	3.30	4.50	2.40	3.20	4.20	2.10	2.90	3.70	2.10	2.90	3.70
78	10172805	North Willow Creek near Grantsville, Utah	1.80	2.40	4.30	1.80	2.40	3.60	1.80	2.20	3.50	1.70	2.20	3.50

Appendix B. Monthly and annual streamflow statistics for streamflow-gaging stations in region 2 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
48	10133700	Threemile Creek near Park City, Utah	0.800	0.900	1.10	0.700	1.00	1.20	1.20	1.80	5.20	4.40	6.50	8.50
49	10135000	Hardscrabble Creek near Porterville, Utah	6.30	7.60	12.3	8.10	12.5	21.1	26.3	51.1	104	72.7	118	187
50	10137500	South Fork Ogden River near Huntsville, Utah	'135.3	'143.3	'59.8	'147.6	'172.6	'127	'103	'210	'409	'164	'377	'675
51	10137680	North Fork Ogden River near Eden, Utah	'3.70	'4.30	'6.30	'5.60	'7.60	'16.4	'15.7	'23.7	'41.7	'27.3	'39.4	'61.2
52	10137780	Middle Fork Ogden River above Diversion near Huntsville, Utah	4.30	6.90	15.8	11.3	18.0	47.7	244.5	279.7	2155	98.6	151	256
53	10139300	Wheeler Creek near Huntsville, Utah	0.400	1.00	3.70	1.80	5.20	18.6	7.70	21.3	41.8	14.2	32.2	52.3
54	10141400	Howard Slough at Hooper, Utah	'19.0	'28.8	'43.3	'18.7	'30.5	'55.1	'10.7	'20.2	'37.6	'16.5	'30.3	'44.9
55	10141500	Holmes Creek near Kaysville, Utah	1.60	1.90	2.30	1.90	2.20	2.90	3.10	4.50	7.90	5.50	9.90	16.7
56	10142000	Farmington Creek above Diversions near Farmington, Utah	2.80	3.90	5.50	3.90	5.00	7.20	8.80	18.5	33.8	29.0	57.8	92.1
57	10142500	Ricks Creek above Diversions near Centerville, Utah	0.600	0.800	0.900	0.800	1.00	1.40	1.60	2.40	4.60	4.20	7.70	15.1
58	10143000	Parrish Creek above Diversions near Centerville, Utah	0.400	0.500	0.700	0.500	0.700	1.00	1.30	1.90	4.00	3.20	6.00	11.8
59	10143500	Centerville Creek above Diversions Near Centerville, Utah	1.20	1.40	1.70	1.40	1.80	2.30	2.40	3.90	7.60	4.90	9.60	16.7
60	10144000	Stone Creek above Diversion near Bountiful, Utah	0.900	1.20	1.70	1.20	1.60	2.50	3.10	4.90	7.80	5.70	12.3	23.0
61	10145000	Mill Creek at Mueller Park near Bountiful, Utah	1.30	1.70	2.20	1.80	2.80	4.00	5.70	9.40	16.2	12.8	23.8	41.4
62	10155400	Spring Creek near Heber City, Utah	13.2	15.7	22.3	13.1	16.9	22.9	9.90	16.8	23.4	28.6	36.9	53.7
63	10156000	Snake Creek near Charleston, Utah	'38.2	'42.1	'46.9	'40.2	'44.1	'51.4	38.2	45.8	51.8	38.5	51.5	64.7
64	10158500	Round Valley Creek near Wallsburg, Utah	8.50	10.4	15.1	10.9	15.3	22.2	15.5	27.6	60.7	7.60	29.4	68.3
65	10160000	Deer Creek near Wildwood, Utah	10.1	11.0	11.9	10.8	12.5	15.2	14.4	22.6	40.3	13.3	23.4	33.0
66	10160800	North Fork Provo River at Wildwood, Utah	4.40	4.80	5.60	4.40	5.40	6.70	6.20	10.5	17.0	21.0	33.7	59.0
67	10161500	South Fork Provo River at Vivian Park, Utah	21.1	25.9	30.5	20.2	25.7	29.9	19.6	27.3	32.9	21.0	31.2	44.0
68	10164500	American Fork above Upper Powerplant near American Fork, Utah	12.5	14.9	17.2	13.5	16.5	22.2	21.7	36.6	83.3	78.3	155	253
69	10166430	West Canyon Creek near Cedar Fort, Utah	0.200	0.500	0.800	'0.200	'0.600	'1.50	0.400	2.10	7.60	5.00	11.1	23.0
70	10168500	Big Cottonwood Creek near Salt Lake City, Utah	18.9	22.8	28.7	23.7	28.5	37.6	41.4	63.7	98.9	115	183	280
71	10172000	Emigration Creek near Salt Lake City, Utah	1.10	2.40	7.30	2.30	5.00	20.6	6.30	19.2	48.8	11.6	26.3	71.9
72	10172200	Red Butte Creek at Fort Douglas near Salt Lake City, Utah	1.50	2.10	3.00	2.20	3.50	6.30	3.60	7.50	14.3	4.00	10.3	19.1
73	10172640	Lee Creek near Magna, Utah	'1.40	'2.50	'9.40	'1.60	'2.60	'7.90	'1.10	'2.30	'5.60	'1.40	'2.20	'4.60
74	10172700	Vernon Creek near Vernon, Utah	1.80	2.50	4.20	2.00	2.80	4.70	2.20	3.30	7.60	2.20	3.90	9.80
75	10172765	Clover Creek above Big Hollow near Clover, Utah	1.20	2.10	2.80	1.80	2.70	5.20	3.00	5.20	8.50	4.50	8.90	17.6
76	10172791	Settlement Creek above Reservoir near Tooele, Utah	0.600	0.800	1.30	0.600	0.900	1.50	'0.800	'1.30	'2.30	1.80	5.00	19.2
77	10172800	South Willow Creek near Grantsville, Utah	2.10	2.90	3.70	2.50	3.30	4.70	3.80	5.50	8.80	8.40	14.6	23.3
78	10172805	North Willow Creek near Grantsville, Utah	1.70	2.40	3.40	2.30	3.30	5.70	3.50	6.70	14.3	6.10	12.6	24.3

Appendix B. Monthly and annual streamflow statistics for streamflow-gaging stations in region 2 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
48	10133700	Threemile Creek near Park City, Utah	3.90	5.00	6.70	2.30	3.00	3.90	1.60	2.00	2.60	1.30	1.60	2.00	2.37
49	10135000	Hardscrabble Creek near Porterville, Utah	30.2	58.2	108	11.4	17.5	25.9	6.70	9.50	13.0	6.00	7.70	9.30	30.3
50	10137500	South Fork Ogden River near Huntsville, Utah	'73.2	'124	'234	'48.4	'74.5	'93.8	'39.2	'55.1	'85.9	'35.8	'44.1	'65.4	'108
51	10137680	North Fork Ogden River near Eden, Utah	'14.6	'22.3	'30.1	'5.70	'7.50	'10.2	'3.50	'4.20	'5.30	'3.00	'3.40	'4.10	'12.1
52	10137780	Middle Fork Ogden River above Diversion near Huntsville, Utah	13.1	26.1	62.5	2.50	4.00	6.60	1.10	1.50	2.20	1.30	1.70	2.20	31.9
53	10139300	Wheeler Creek near Huntsville, Utah	6.00	21.7	41.9	0.900	4.80	10.7	0.600	1.90	3.60	0.700	1.40	2.30	10.0
54	10141400	Howard Slough at Hooper, Utah	'19.3	'28.1	'44.4	'16.1	'22.7	'35.1	'17.8	'25.4	'39.5	'22.8	'33.1	'49.1	'29.2
55	10141500	Holmes Creek near Kaysville, Utah	3.30	6.20	11.8	2.10	3.30	4.50	1.80	2.40	3.10	1.50	2.10	2.60	3.69
56	10142000	Farmington Creek above Diversions near Farmington, Utah	13.5	28.1	54.7	3.70	7.80	13.0	2.10	3.70	5.30	2.00	2.90	3.80	13.4
57	10142500	Ricks Creek above Diversions near Centerville, Utah	2.10	4.00	8.10	1.00	1.80	2.60	0.600	1.10	1.40	0.600	0.800	1.10	2.22
58	10143000	Parrish Creek above Diversions near Centerville, Utah	1.20	2.60	5.60	'0.400	'0.800	'1.40	'0.200	'0.400	'0.700	'0.300	'0.400	'0.500	'1.57
59	10143500	Centerville Creek above Diversions Near Centerville, Utah	2.50	5.00	9.90	1.20	2.20	3.30	0.800	1.50	1.90	0.800	1.30	1.70	2.92
60	10144000	Stone Creek above Diversion near Bountiful, Utah	2.10	5.30	11.3	0.600	1.20	2.70	0.400	0.600	1.20	0.300	0.500	0.800	3.16
61	10145000	Mill Creek at Mueller Park near Bountiful, Utah	5.70	15.4	30.0	2.20	4.70	8.00	1.10	2.10	3.50	0.900	1.40	2.00	6.43
62	10155400	Spring Creek near Heber City, Utah	32.0	46.2	61.4	21.8	30.5	44.4	15.2	21.5	30.4	11.2	20.8	28.0	23.4
63	10156000	Snake Creek near Charleston, Utah	39.3	57.5	72.2	34.4	45.0	52.1	31.7	40.6	46.9	'32.8	'40.8	'50.3	45.0
64	10158500	Round Valley Creek near Wallsburg, Utah	4.30	6.50	14.6	2.30	3.30	4.90	1.60	2.90	4.20	1.80	2.70	4.50	13.3
65	10160000	Deer Creek near Wildwood, Utah	8.50	12.4	16.3	7.50	9.70	11.6	7.70	8.90	10.0	8.10	9.00	10.3	13.3
66	10160800	North Fork Provo River at Wildwood, Utah	33.0	50.3	61.5	19.3	31.2	44.7	11.8	17.7	24.7	8.00	11.6	15.6	16.7
67	10161500	South Fork Provo River at Vivian Park, Utah	19.1	27.8	36.8	16.7	26.2	31.2	17.0	27.0	34.4	19.1	28.0	36.9	27.3
68	10164500	American Fork above Upper Powerplant near American Fork, Utah	101	187	276	41.7	73.1	125	24.5	34.7	50.1	19.7	24.8	32.2	56.4
69	10166430	West Canyon Creek near Cedar Fort, Utah	3.60	10.0	18.8	1.30	3.90	7.90	0.700	2.10	4.10	0.500	1.40	2.30	3.63
70	10168500	Big Cottonwood Creek near Salt Lake City, Utah	'2132	'2217	'304	43.8	72.9	128	27.1	39.1	55.5	23.0	30.2	47.5	'49.1
71	10172000	Emigration Creek near Salt Lake City, Utah	6.30	12.7	21.0	3.10	5.50	11.2	1.50	3.20	6.50	1.20	1.90	4.70	8.44
72	10172200	Red Butte Creek at Fort Douglas near Salt Lake City, Utah	2.40	5.40	9.40	1.40	3.10	4.70	1.00	2.10	2.90	0.900	1.80	2.60	4.17
73	10172640	Lee Creek near Magna, Utah	'0.900	'1.80	'4.10	'1.20	'2.50	'6.10	'1.80	'3.20	'7.40	'1.60	'3.90	'11.7	'3.97
74	10172700	Vernon Creek near Vernon, Utah	1.80	3.00	6.10	1.60	2.50	4.90	1.60	2.30	4.40	1.50	2.30	4.40	3.70
75	10172765	Clover Creek above Big Hollow near Clover, Utah	3.70	7.40	17.4	3.00	4.50	10.3	2.30	3.30	7.00	2.00	2.80	5.20	3.18
76	10172791	Settlement Creek above Reservoir near Tooele, Utah	2.50	8.30	18.4	1.30	3.10	8.60	1.10	1.60	3.90	0.800	1.30	2.10	3.18
77	10172800	South Willow Creek near Grantsville, Utah	8.90	17.8	28.8	4.00	7.60	14.5	2.70	4.50	7.20	2.40	3.90	5.20	6.66
78	10172805	North Willow Creek near Grantsville, Utah	3.60	6.50	22.8	1.90	3.00	6.30	1.60	2.30	3.60	1.50	2.10	3.80	5.51

¹ Basin characteristics determined to be outliers, not used in regression analysis.

² Exceedance discharge determined to be outliers, not used in some regression analyses.

Appendix C.

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station name	October			November			December			January						
		P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20				
		79	09233600	Pot Creek above Diversions near Vernal, Utah	1.00	20.200	30.600	30.00	20.200	30.700	30.00	30.00	30.300	30.00	30.00	30.00	30.00
80	09264000	Ashley Creek below Trout Creek near Vernal, Utah	2.50	4.30	5.30	2.20	3.00	4.10	2.00	2.60	3.40	2.00	2.60	3.40	1.50	2.50	2.60
81	09264500	South Fork Ashley Creek near Vernal, Utah	12.80	14.20	16.10	12.30	12.90	14.10	12.00	12.50	13.30	12.00	12.50	13.30	11.50	12.20	nd
82	09265300	Ashley Creek above Red Pine Creek near Vernal, Utah	8.80	12.5	18.0	6.70	7.90	11.9	6.70	7.90	11.9	5.50	6.50	7.80	5.00	5.60	6.80
83	09266500	Ashley Creek near Vernal, Utah	29.1	45.6	75.6	21.9	33.6	54.5	21.9	33.6	54.5	17.0	26.9	41.5	14.5	22.5	34.0
84	09268000	Dry Fork above Sinks near Dry Fork, Utah	5.10	11.3	20.1	5.30	9.00	15.3	5.30	9.00	15.3	5.00	6.90	9.00	4.10	6.00	7.80
85	09268500	North Fork of Dry Fork near Dry Fork, Utah	1.30	2.30	3.50	0.800	1.50	2.50	0.800	1.50	2.50	0.600	1.00	1.90	0.500	0.700	1.40
86	09268900	Brownie Canyon above Sinks near Dry Fork, Utah	2.80	4.50	7.40	2.10	3.10	4.70	2.10	3.10	4.70	1.60	2.20	3.10	1.10	1.60	2.20
87	09269000	East Fork of Dry Fork near Dry Fork, Utah	21.10	22.00	22.90	20.300	20.900	22.10	20.300	20.900	22.10	20.100	20.300	21.00	20.00	20.100	20.500
88	09270000	Dry Fork below Springs near Dry Fork, Utah	20.100	20.300	20.400	20.200	20.500	20.800	20.200	20.500	20.800	20.00	20.00	20.00	20.00	20.00	20.00
89	09270500	Dry Fork at Mouth near Dry Fork, Utah	1.00	2.10	4.10	1.70	2.50	4.30	1.70	2.50	4.30	1.30	2.30	3.50	1.20	1.90	2.70
90	09271000	Ashley Creek at Sign of the Maine near Vernal, Utah	34.6	50.1	70.5	28.3	37.8	50.6	28.3	37.8	50.6	24.3	31.8	38.9	22.4	28.4	32.5
91	09273000	Duchesne River at Provo River Trail near Hanna, Utah	15.90	10.2	15.1	15.81	18.18	14.3	14.96	17.28	110.7	14.96	17.28	110.7	14.17	16.62	19.57
92	09273500	Hades Creek near Hanna, Utah	10.500	12.10	14.80	12.20	13.30	14.20	12.20	13.30	14.20	12.00	12.90	13.60	11.80	12.50	13.10
93	09274000	Duchesne River (North Fork) near Hanna, Utah	20.5	23.4	27.9	18.9	21.4	23.5	18.9	21.4	23.5	17.3	18.7	22.4	16.2	16.7	20.7
94	09275000	West Fork Duchesne River below Dry Hollow near Hanna, Utah	9.40	11.6	13.7	8.30	10.4	11.9	8.30	10.4	11.9	7.60	9.10	10.6	7.00	8.10	9.00
95	09275500	West Fork Duchesne River near Hanna, Utah	16.3	19.6	24.1	14.9	17.6	20.7	14.9	17.6	20.7	13.6	16.2	19.0	12.1	14.8	18.0
96	09276000	Wolf Creek above Rhoades Canyon near Hanna, Utah	4.00	5.30	6.80	3.60	4.60	5.60	3.60	4.60	5.60	3.20	4.20	5.10	2.90	3.60	4.70
97	09277500	Duchesne River near Tabiona, Utah	281.9	2109	2145	297.8	1116	2137	288.2	2105	2121	288.2	2105	2121	280.0	294.5	2108
98	09277800	Rock Creek above South Fork near Hanna, Utah	30.1	41.8	54.3	24.7	34.8	42.4	24.7	34.8	42.4	22.2	28.0	36.2	19.4	24.4	29.3
99	09278000	South Fork Rock Creek near Hanna, Utah	4.00	5.40	7.70	3.40	4.40	5.90	3.40	4.40	5.90	3.00	3.60	4.40	2.50	3.10	3.60
100	09278500	Rock Creek near Hanna, Utah	37.4	51.5	73.6	30.5	39.8	54.7	30.5	39.8	54.7	26.0	33.0	40.4	23.7	29.2	34.7
101	09279000	Rock Creek near Mountain Home, Utah	56.4	70.3	92.6	49.0	59.2	73.6	49.0	59.2	73.6	42.6	50.5	61.0	40.5	45.9	52.6
102	09279100	Rock Creek near Talmage, Utah	61.2	80.0	111	56.2	71.9	89.2	56.2	71.9	89.2	51.9	60.7	74.6	49.4	53.4	64.8
103	09279500	Duchesne River at Duchesne, Utah	1115	1177	242	1157	1196	231	1157	1196	231	1150	1178	210	141	165	193
104	09280400	Hobble Creek at Daniels Summit near Wallsburg, Utah	10.100	20.200	10.400	10.200	20.300	10.400	10.200	20.300	10.400	10.100	20.200	10.300	10.100	20.200	10.300
105	09286100	Red Creek above Reservoir near Fruitland, Utah	1.40	2.00	3.50	1.70	2.30	3.10	1.70	2.30	3.10	1.70	2.20	2.70	1.50	2.00	2.60
106	09287000	Current Creek below Red Ledge Hollow near Fruitland, Utah	5.00	6.90	9.70	6.70	8.00	9.90	6.70	8.00	9.90	6.10	7.90	10.9	5.90	7.60	10.3
107	09287500	Water Hollow near Fruitland, Utah	2.98	4.39	5.89	3.00	4.06	5.26	3.00	4.06	5.26	2.79	3.72	4.61	2.59	3.09	4.46
108	09288000	Current Creek near Fruitland, Utah	18.1	24.6	30.8	19.6	25.5	31.6	19.6	25.5	31.6	17.4	23.3	30.3	17.5	22.2	28.5
109	09288150	West Fork Avintaquin Creek near Fruitland, Utah	2.20	2.90	4.20	1.70	2.40	3.10	1.70	2.40	3.10	1.40	1.90	2.40	1.30	2.00	2.40
110	09288900	Sowers Creek near Duchesne, Utah	1.10	2.80	4.60	0.800	2.10	3.70	0.800	2.10	3.70	0.500	1.50	2.50	0.500	1.50	2.40

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
111	09289500	Lake Fork River above Moon Lake near Mountain Home, Utah	36.0	44.3	58.5	29.5	36.2	44.9	23.8	29.7	34.1	21.7	26.0	30.4
112	09292500	Yellowstone River near Altonah, Utah	67.1	85.3	108	55.9	68.2	83.7	48.8	57.5	66.3	43.3	51.3	58.8
113	09296000	Uinta River above Clover Creek near Neola, Utah	67.2	87.6	110	52.7	61.3	72.5	44.8	48.4	58.1	37.0	44.1	47.6
114	09296800	Uinta River below Powerplant Diversion near Neola, Utah	38.6	74.1	2109	27.4	43.3	65.2	17.5	30.8	48.8	20.7	30.7	48.2
115	09297000	Uinta River near Neola, Utah	83.4	115	2156	69.2	85.1	2107	58.0	68.5	82.9	50.1	58.2	67.6
116	09298000	Farm Creek near Whiterocks, Utah	2.80	3.30	3.70	2.70	3.10	3.50	2.60	3.00	3.40	2.50	2.90	3.20
117	09298500	Whiterocks River above Paradise Creek near Whiterocks, Utah	40.3	52.7	64.7	32.3	36.9	47.0	25.5	28.9	35.0	21.0	25.6	30.6
118	09299500	Whiterocks River near Whiterocks, Utah	44.2	59.0	87.9	34.0	41.9	58.5	27.3	33.8	43.4	23.8	30.0	36.0
119	09300500	Uintah River at Fort Duchesne, Utah	2.60	5.20	18.4	4.20	19.1	53.4	13.1	59.6	83.8	54.4	73.3	91.5
120	09301500	Uinta River at Randlett, Utah	13.7	30.2	102	16.5	40.8	74.7	15.4	32.3	84.9	13.5	44.1	101
121	10153500	Provo River near Kamas, Utah	4.30	6.50	10.4	4.60	5.90	7.40	3.90	4.90	6.50	3.60	4.40	6.60
122	10153800	North Fork Provo River near Kamas, Utah	4.20	6.40	11.3	4.60	6.10	10.1	4.40	5.80	8.70	4.20	5.60	8.10
123	10154000	Shingle Creek near Kamas, Utah	2.70	3.20	4.20	2.80	3.10	3.60	2.50	3.00	3.40	2.20	2.90	3.40

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
79	09235600	Pot Creek above Diversion near Vernal, Utah	0.00	0.00	0.200	0.00	0.100	1.00	0.500	7.10	19.7	5.40	13.9	30.1
80	09264000	Ashley Creek below Trout Creek near Vernal, Utah	1.40	2.10	2.50	1.10	2.10	2.40	1.90	2.70	9.90	18.3	101	202
81	09264500	South Fork Ashley Creek near Vernal, Utah	¹ 1.20	¹ 2.10	¹ 2.60	¹ 1.20	¹ 2.00	¹ 2.50	¹ 2.00	¹ 2.60	¹ 5.50	¹ 18.1	¹ 65.1	¹ 129
82	09265300	Ashley Creek above Red Pine Creek near Vernal, Utah	4.40	4.90	5.70	3.20	4.60	5.50	4.10	6.40	11.7	30.0	170	434
83	09266500	Ashley Creek near Vernal, Utah	13.2	20.2	30.4	12.6	19.5	28.8	16.4	27.9	63.2	111	286	541
84	09268000	Dry Fork above Sinks near Dry Fork, Utah	3.70	5.10	6.80	3.90	5.10	6.60	4.90	7.30	14.6	21.3	84.2	217
85	09268500	North Fork of Dry Fork near Dry Fork, Utah	0.400	0.600	1.20	0.300	0.600	1.10	0.400	1.00	3.30	4.40	17.2	39.9
86	09268900	Brownie Canyon above Sinks near Dry Fork, Utah	0.700	1.50	2.10	0.600	1.50	2.00	0.900	1.80	4.20	6.50	30.2	77.0
87	09269000	East Fork of Dry Fork near Dry Fork, Utah	⁰ 0.100	⁰ 0.100	nd	⁰ 0.100	⁰ 0.100	⁰ 0.300	⁰ 0.00	⁰ 0.100	¹ 1.80	1.50	18.8	59.4
88	09270000	Dry Fork below Springs near Dry Fork, Utah	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	0.800	2.10	3.40	0.400	51.8	253
89	09270500	Dry Fork at Mouth near Dry Fork, Utah	1.10	1.90	2.90	1.50	2.30	3.40	0.800	1.60	2.90	0.500	10.8	145
90	09271000	Ashley Creek at Sign of the Maine near Vernal, Utah	21.1	25.4	29.9	19.8	24.1	28.5	20.5	27.6	53.0	102	315	720
91	09273000	Duchesne River at Provo River Trail near Hanna, Utah	¹ 5.03	¹ 6.02	¹ 9.46	¹ 4.99	¹ 6.99	¹ 10.5	¹ 9.68	¹ 17.7	¹ 40.2	¹ 61.5	¹ 171	¹ 348
92	09273500	Hades Creek near Hanna, Utah	¹ 1.60	¹ 2.10	¹ 2.70	¹ 1.60	¹ 2.10	¹ 2.70	¹ 2.10	¹ 2.90	¹ 4.80	¹ 4.70	¹ 11.7	¹ 27.1
93	09274000	Duchesne River (North Fork) near Hanna, Utah	15.4	16.5	21.0	17.0	18.9	25.2	28.0	49.6	100	128	345	617
94	09275000	West Fork Duchesne River below Dry Hollow near Hanna, Utah	7.00	8.00	9.10	7.10	8.70	10.7	10.8	17.6	34.6	46.7	114	221
95	09275500	West Fork Duchesne River near Hanna, Utah	12.5	14.5	16.6	13.4	15.8	19.3	19.9	28.0	52.3	70.2	165	284
96	09276000	Wolf Creek above Rhoades Canyon near Hanna, Utah	2.80	3.50	4.30	2.80	3.40	3.90	3.00	3.50	4.50	4.50	12.8	25.1
97	09277500	Duchesne River near Tabiona, Utah	² 79.3	² 90.8	² 103	² 82.6	² 95.5	² 113	² 96.6	² 124	² 188	² 152	² 350	² 765
98	09277800	Rock Creek above South Fork near Hanna, Utah	17.9	21.5	25.9	17.0	20.9	25.8	23.1	34.7	59.3	87.4	216	581
99	09278000	South Fork Rock Creek near Hanna, Utah	2.30	2.70	3.40	2.30	2.70	3.40	3.00	4.40	8.10	8.20	24.1	45.9
100	09278500	Rock Creek near Hanna, Utah	21.6	26.2	31.8	22.0	27.1	32.1	28.2	41.0	82.3	102	260	609
101	09279000	Rock Creek near Mountain Home, Utah	39.1	43.2	49.4	39.1	43.1	50.8	47.2	60.3	102	130	340	690
102	09279100	Rock Creek near Talmage, Utah	45.6	50.9	58.2	47.2	54.4	64.5	56.8	70.9	117	128	300	650
103	09279500	Duchesne River at Duchesne, Utah	¹ 141	¹ 164	¹ 187	¹ 135	¹ 162	¹ 193	¹ 144	¹ 194	¹ 302	¹ 296	¹ 763	¹ 1,540
104	09280400	Hobble Creek at Daniels Summit near Wallsburg, Utah	¹ 0.100	¹ 0.200	¹ 0.300	¹ 0.200	¹ 0.200	¹ 0.400	¹ 0.400	¹ 0.900	¹ 3.30	¹ 5.00	¹ 13.7	¹ 30.6
105	09286100	Red Creek above Reservoir near Fruitland, Utah	1.70	2.40	3.10	2.50	3.50	4.60	5.30	7.70	13.7	7.80	13.5	39.4
106	09287000	Current Creek below Red Ledge Hollow near Fruitland, Utah	5.90	7.50	9.30	7.20	9.00	12.9	15.0	26.9	67.6	50.1	105	193
107	09287500	Water Hollow near Fruitland, Utah	2.52	3.10	4.44	2.58	3.48	4.64	3.50	4.58	6.16	² 2.30	² 6.00	² 12.8
108	09288000	Current Creek near Fruitland, Utah	18.9	24.5	30.5	23.0	28.9	35.9	36.0	53.0	96.4	79.0	136	225
109	09288150	West Fork Avintaquin Creek near Fruitland, Utah	1.60	2.10	2.90	2.10	3.90	7.80	5.00	14.6	36.2	30.9	63.7	134
110	09288900	Sowers Creek near Duchesne, Utah	0.600	1.60	2.70	0.800	2.30	3.50	1.70	2.90	6.20	1.80	6.00	19.3

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
111	09289500	Lake Fork River above Moon Lake near Mountain Home, Utah	20.3	24.7	28.5	20.5	24.2	28.9	25.6	34.8	55.3	67.7	186	415
112	09292500	Yellowstone River near Altonah, Utah	42.1	47.8	55.2	42.4	48.2	54.7	47.3	56.6	74.2	81.9	180	391
113	09296000	Uinta River above Clover Creek near Neola, Utah	35.7	39.8	42.3	33.8	37.6	40.1	36.5	46.0	76.3	86.2	254	496
114	09296800	Uinta River below Powerplant Diversion near Neola, Utah	² 19.1	² 27.7	² 39.7	² 22.5	² 31.0	² 41.4	² 29.6	² 41.6	² 57.0	² 84.7	² 224	² 532
115	09297000	Uinta River near Neola, Utah	47.7	55.8	62.0	49.3	56.6	65.8	57.1	71.6	99.5	113	252	552
116	09298000	Farm Creek near Whiterocks, Utah	2.40	2.80	3.10	2.40	2.80	3.10	2.70	3.10	3.80	3.70	13.1	35.2
117	09298500	Whiterocks River above Paradise Creek near Whiterocks, Utah	21.0	23.0	27.5	21.0	22.7	26.0	23.6	32.2	57.3	70.6	213	477
118	09299500	Whiterocks River near Whiterocks, Utah	22.3	27.5	31.8	23.5	28.2	33.8	28.4	38.4	58.5	84.7	214	459
119	09300500	Uintah River at Fort Duchesne, Utah	36.7	77.8	98.4	² 13.3	² 66.7	² 101	² 4.10	² 10.7	² 54.8	² 5.40	² 18.1	² 250
120	09301500	Uinta River at Randlett, Utah	² 21.9	² 58.2	² 135	² 25.5	² 67.8	² 141	² 13.4	² 32.7	² 72.3	² 17.6	² 57.4	² 187
121	10153500	Provo River near Kamas, Utah	4.00	4.80	6.10	4.10	5.60	7.70	8.00	16.0	42.1	65.3	139	266
122	10153800	North Fork Provo River near Kamas, Utah	4.20	5.70	7.60	5.10	7.20	11.6	12.2	25.7	50.0	56.8	123	211
123	10154000	Shingle Creek near Kamas, Utah	2.20	2.90	3.50	2.50	3.20	3.70	4.20	7.10	18.4	25.5	55.9	105

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
79	092235600	Pot Creek above Diversions near Vernal, Utah	20.500	22.10	28.80	20.00	20.100	20.800	20.00	20.00	20.200	20.00	20.00	20.00	23.78
80	092264000	Ashley Creek below Trout Creek near Vernal, Utah	34.0	77.0	173	13.5	22.1	33.4	5.60	8.50	16.2	3.10	4.90	7.10	24.1
81	092264500	South Fork Ashley Creek near Vernal, Utah	134.6	176.4	137	111.1	21.1	137.9	17.00	113.8	22.2	13.80	16.10	19.30	119.9
82	092265300	Ashley Creek above Red Pine Creek near Vernal, Utah	111	332	517	44.6	77.8	137	17.7	29.9	53.0	12.0	20.0	36.7	67.1
83	092266500	Ashley Creek near Vernal, Utah	123	228	459	84.6	117	156	54.0	79.9	111	37.6	61.8	92.1	98.2
84	092268000	Dry Fork above Sinks near Dry Fork, Utah	48.3	129	255	13.3	31.8	66.5	5.80	16.6	33.5	4.60	12.7	25.0	36.0
85	092268500	North Fork of Dry Fork near Dry Fork, Utah	9.10	22.0	41.9	4.20	8.00	17.1	2.80	4.30	7.30	2.00	3.00	4.40	6.72
86	092268900	Brownie Canyon above Sinks near Dry Fork, Utah	19.6	48.2	83.4	8.10	15.4	29.6	5.00	8.10	14.1	3.80	5.60	8.40	13.1
87	092269000	East Fork of Dry Fork near Dry Fork, Utah	13.1	30.8	62.4	3.90	7.30	15.7	2.00	3.40	6.20	1.60	2.70	4.40	7.97
88	092270000	Dry Fork below Springs near Dry Fork, Utah	50.7	149	391	0.100	22.9	78.0	20.00	20.00	210.3	20.00	20.00	20.00	33.2
89	092270500	Dry Fork at Mouth near Dry Fork, Utah	20.8	107	298	0.600	8.70	60.8	0.300	1.70	10.2	0.400	1.50	3.60	27.3
90	092271000	Ashley Creek at Sign of the Maine near Vernal, Utah	155	349	719	89.0	133	197	51.0	86.3	126	38.7	61.8	93.8	121
91	092273000	Duchesne River at Provo River Trail near Hanna, Utah	1100	251	1441	124.2	141.3	176.7	110.1	116.8	129.9	17.08	110.4	116.4	154.8
92	092273500	Hades Creek near Hanna, Utah	119.8	140.2	62.6	17.50	16.4	32.0	13.40	26.10	112.3	10.900	13.10	16.40	19.04
93	092274000	Duchesne River (North Fork) near Hanna, Utah	360	546	904	73.8	123	249	34.2	57.0	81.2	20.7	29.1	44.1	2122
94	092275000	West Fork Duchesne River below Dry Hollow near Hanna, Utah	47.8	125	260	17.9	30.4	53.9	11.5	17.1	23.6	9.90	12.9	16.1	36.7
95	092275500	West Fork Duchesne River near Hanna, Utah	72.1	153	276	28.7	44.9	71.6	19.4	25.8	35.8	16.4	20.8	27.6	80.2
96	092276000	Wolf Creek above Rhoades Canyon near Hanna, Utah	12.6	21.9	33.9	6.50	10.9	17.9	5.30	7.90	10.7	4.50	6.50	8.30	7.88
97	092277500	Duchesne River near Tabiona, Utah	290	645	985	102	178	302	68.7	103	164	76.1	103	150	2215
98	092277800	Rock Creek above South Fork near Hanna, Utah	357	665	1,090	96.8	170	350	49.8	72.2	114	36.8	47.6	71.0	140
99	092278000	South Fork Rock Creek near Hanna, Utah	24.0	48.2	80.2	9.80	19.4	34.8	6.00	9.20	14.8	4.50	6.10	9.20	12.8
100	092278500	Rock Creek near Hanna, Utah	232.3	271.0	21,140	113	196	413	62.3	93.4	148	44.0	59.6	86.8	155
101	092279000	Rock Creek near Mountain Home, Utah	2392	2727	1,120	129	213	387	79.7	111	159	62.1	79.0	103	164
102	092279100	Rock Creek near Talmage, Utah	176	618	1,050	2154	250	2458	85.8	119	181	64.2	86.4	119	188
103	092279500	Duchesne River at Duchesne, Utah	518	1,210	2,040	158	302	592	197.0	155	278	194.4	144	224	1379
104	092280400	Hobble Creek at Daniels Summit near Wallsburg, Utah	12.40	17.00	25.8	10.200	10.600	11.50	10.100	10.100	10.300	10.100	10.100	10.200	13.04
105	092286100	Red Creek above Reservoir near Fruitland, Utah	3.40	8.00	24.2	0.900	2.70	7.60	0.500	1.60	3.50	0.800	1.50	3.40	5.87
106	092287000	Current Creek below Red Ledge Hollow near Fruitland, Utah	21.2	45.0	104	7.20	13.1	24.5	4.20	7.00	12.3	4.10	6.00	10.0	27.4
107	092287500	Water Hollow near Fruitland, Utah	25.87	29.51	215.2	4.64	6.76	10.6	3.93	5.55	8.24	3.31	4.64	6.56	5.71
108	092288000	Current Creek near Fruitland, Utah	39.5	70.0	119	20.3	30.4	44.9	14.6	21.4	31.5	15.7	21.2	26.7	21.9
109	092288150	West Fork Avintaquin Creek near Fruitland, Utah	17.1	33.9	74.5	6.80	12.4	20.2	3.20	5.60	9.00	2.40	3.50	4.80	16.5
110	092288900	Sowers Creek near Duchesne, Utah	1.50	6.40	15.7	1.30	5.00	9.90	1.20	4.30	7.10	1.10	3.60	5.80	4.26
111	092289500	Lake Fork River above Moon Lake near Mountain Home, Utah	211	408	740	86.7	143	267	52.5	76.7	124	41.0	52.8	78.3	113

Appendix C. Monthly and annual streamflow statistics for streamflow-gaging stations in region 4 in Utah used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second; nd, no data]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
112	09292500	Yellowstone River near Altonah, Utah	224	410	702	125	179	311	96.7	134	189	78.1	105	150	138
113	09296000	Uinta River above Clover Creek near Neola, Utah	217	401	608	161	204	327	¹ 128	² 173	² 228	88.5	105	140	141
114	09296800	Uinta River below Powerplant Diversion near Neola, Utah	² 188	² 373	² 953	² 125	² 208	² 415	² 80.4	² 141	² 245	² 64.2	² 105	² 214	² 157
115	09297000	Uinta River near Neola, Utah	283	505	837	² 187	² 271	² 408	² 139	² 204	² 281	² 103	² 151	² 214	180
116	09298000	Farm Creek near Whiterocks, Utah	5.30	9.70	26.9	3.30	4.30	6.40	3.00	3.40	4.10	2.70	3.20	3.80	6.09
117	09298500	Whiterocks River above Paradise Creek near Whiterocks, Utah	137	269	453	98.4	128	187	66.3	103	160	49.0	64.2	82.8	98.3
118	09299500	Whiterocks River near Whiterocks, Utah	158	298	596	107	159	226	75.8	118	164	58.2	82.8	122	113
119	09300500	Uintah River at Fort Duchesne, Utah	¹ 8.60	¹ 43.9	¹ 552	² 0.00	¹ 7.60	¹ 21.1	² 0.00	¹ 6.70	¹ 18.4	² 2.30	¹ 5.50	¹ 12.6	¹ 72.7
120	09301500	Uinta River at Randlett, Utah	² 25.3	¹ 70.1	¹ 914	¹ 13.1	² 7.1	¹ 94.7	¹ 9.80	² 5.0	¹ 76.0	¹ 15.3	² 8.0	¹ 106	¹ 94.7
121	10153500	Provo River near Kamas, Utah	93.9	198	324	65.7	88.3	105	34.2	47.5	71.1	6.90	17.7	45.6	50.2
122	10153800	North Fork Provo River near Kamas, Utah	63.5	165	270	23.6	46.8	66.2	6.80	16.1	34.8	4.30	6.60	12.9	39.2
123	10154000	Shingle Creek near Kamas, Utah	34.3	73.0	114	6.60	10.4	20.0	3.40	4.40	6.30	2.70	3.20	4.30	15.9

¹Basin characteristics determined to be outliers, not used in regression analysis.

²Exceedance discharge determined to be outliers, not used in some regression analyses.

Appendix D.

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis.

[Map identifier, refers to the map location in *figure 1*; Region, refers to the geohydrologic region of Utah in *figure 2*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	October			November			December			January		
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
124	10119000	Little Malad Creek above Elkhorn Reservoir near Malad City, Idaho	3	11.9	14.5	16.5	12.3	14.5	16.8	12.5	14.3	17.0	12.5	14.6	17.1
125	10122500	Devil Creek above Campbell Creek near Malad City, Idaho	3	5.20	6.80	8.60	6.00	7.10	9.00	6.00	7.80	8.90	6.10	7.70	8.90
126	10126180	Sulphur Creek near Corinne, Utah	3	165.0	179.8	191.1	149.5	164.8	176.6	142.1	155.2	163.1	127.3	150.3	161.2
127	10127100	Black Slough near Brigham City, Utah	3	232.9	247.8	273.5	238.0	248.3	280.0	235.7	250.6	291.6	237.1	252.9	283.8
128	10172870	Trout Creek near Callao, Utah	3	1.60	1.90	2.40	1.60	2.00	2.40	1.30	1.70	2.20	1.20	1.70	2.00
129	10172940	Dove Creek near Park Valley, Utah	3	0.200	0.300	0.700	0.200	0.400	0.600	0.200	0.300	0.500	0.200	0.200	0.700
130	10243240	Baker Creek at Narrows, near Baker, Nevada	3	2.20	2.70	3.40	1.90	2.50	3.10	1.40	1.80	2.40	0.700	1.60	2.10
131	10243260	Lehman Creek near Baker, Nevada	3	2.20	2.60	3.20	1.80	2.10	2.50	1.50	1.70	1.90	1.20	1.50	1.70
132	10145500	Salt Creek near Nephi, Utah	5	8.80	12.3	15.4	8.00	11.6	14.8	7.20	10.3	12.9	7.30	9.20	12.8
133	10146000	Salt Creek at Nephi, Utah	5	7.34	11.1	15.7	8.08	9.98	14.3	7.72	10.2	13.5	7.56	10.6	13.0
134	10146400	Current Creek near Mona, Utah	5	6.70	12.0	24.2	7.40	16.6	38.9	8.40	19.1	37.8	10.1	21.4	44.4
135	10147000	Summit Creek near Santaquin, Utah	5	5.00	6.90	9.00	4.50	6.30	8.20	4.00	6.00	7.10	3.70	5.50	6.50
136	10147500	Payson Creek above diversions near Payson, Utah	5	4.60	5.60	6.90	4.50	5.20	6.30	4.10	5.10	5.90	4.00	5.10	5.60
137	10148200	Tie Fork near Soldier Summit, Utah	5	2.30	3.30	4.50	2.10	3.00	4.00	1.90	2.60	3.60	1.90	2.50	3.30
138	10148400	Nebo Creek near Thistle, Utah	5	5.50	6.90	8.00	5.80	6.90	8.00	5.90	6.70	7.90	5.00	6.30	7.90
139	10148500	Spanish Fork at Thistle, Utah	5	230.7	241.6	255.6	235.4	245.2	257.2	234.2	243.4	255.8	236.5	245.5	257.6
140	10150500	Spanish Fork at Castilla, Utah	5	61.4	85.4	143	60.4	77.8	115	57.3	75.4	115	58.0	76.6	112
141	10152500	Hobble Creek near Springville, Utah	5	14.0	20.5	24.7	15.5	21.8	25.6	16.0	20.8	25.3	15.2	20.3	24.4
142	10187300	Otter Creek near Koosharem, Utah	5	8.50	9.80	11.2	8.20	9.00	9.80	7.80	8.60	9.30	7.70	8.10	8.80
143	10194200	Clear Creek above diversions near Sevier, Utah	5	9.40	13.4	17.6	9.20	12.9	16.1	7.00	10.6	14.7	7.50	10.8	14.8
144	10195000	Clear Creek at Sevier, Utah	5	2.10	4.70	9.20	4.10	9.90	16.1	10.3	13.3	16.6	11.4	14.6	16.7
145	10204200	Mill Creek near Glenwood, Utah	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146	10205030	Salina Creek near Emery, Utah	5	7.10	9.40	12.7	6.10	7.90	10.5	5.20	6.70	8.90	4.90	6.10	8.10
147	10205100	Sheep Creek near Salina, Utah	5	0.00	0.100	0.100	0.00	0.100	0.100	0.00	0.100	0.100	0.00	0.100	0.100
148	10205200	West Fork Sheep Creek near Salina, Utah	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	10205300	Sheep Creek at mouth near Salina, Utah	5	0.00	0.100	0.200	0.00	0.100	0.200	0.00	0.100	0.200	0.00	0.100	0.200
150	10206000	Salina Creek at Salina, Utah	5	1.00	2.90	14.5	2.00	11.2	21.8	2.00	11.5	19.1	2.80	12.9	19.3
151	10208500	Oak Creek near Fairview, Utah	5	2.20	2.80	4.00	2.20	2.80	3.50	2.10	2.60	3.20	2.10	2.60	3.20
152	10210000	Pleasant Creek near Mount Pleasant, Utah	5	8.30	9.30	10.9	7.90	9.40	10.6	7.80	8.70	9.80	7.50	8.40	9.50
153	10211000	Twin Creek near Mount Pleasant, Utah	5	4.00	4.60	5.80	4.00	4.60	5.30	3.90	4.20	4.90	3.90	4.10	4.70
154	10215700	Oak Creek near Sping City, Utah	5	4.10	5.20	6.00	3.70	4.60	5.20	3.40	4.10	4.80	3.20	3.60	4.40
155	10215900	Manti Creek below Dugway Creek near Manti, Utah	5	5.10	7.20	10.2	4.50	6.20	8.00	4.10	4.80	6.20	3.60	4.50	5.70

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; Region, refers to the geohydrologic region of Utah in *figure 2*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	October			November			December			January		
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
156	10216400	Twelvemile Creek near Mayfield, Utah	5	8.70	13.7	17.6	7.50	9.60	14.1	6.50	8.30	12.1	6.70	8.30	10.5
157	10219200	Chicken Creek near Levan, Utah	5	1.20	2.50	3.50	1.00	2.10	3.00	0.800	1.60	2.50	0.900	1.70	2.50
158	10224100	Oak Creek above Little Creek near Oak City, Utah	5	0.400	0.600	0.800	0.500	0.600	0.900	0.500	0.700	1.20	0.500	0.800	1.20
159	10232500	Chalk Creek near Fillmore, Utah	5	8.30	11.1	13.4	7.70	10.5	13.0	7.40	9.70	12.3	8.00	10.0	12.5
160	10233000	Meadow Creek near Meadow, Utah	5	1.80	2.30	2.80	1.70	2.20	2.50	1.80	2.10	2.50	1.60	2.00	2.90
161	10233500	Corn Creek near Kamosh, Utah	5	4.60	6.50	8.70	5.00	6.30	8.40	5.00	5.90	8.20	5.10	6.10	8.00
162	10234500	Beaver River near Beaver, Utah	5	17.7	23.7	29.2	17.2	21.5	26.3	16.0	19.4	23.6	15.3	18.5	22.1
163	10235000	South Creek near Beaver, Utah	5	0.600	0.900	1.20	1.00	1.20	1.40	1.00	1.20	1.40	0.800	1.00	1.30
164	10236000	North Fork North Creek near Beaver, Utah	5	1.30	1.70	2.00	1.40	1.70	2.10	1.30	1.60	1.80	1.20	1.40	1.70
165	10236500	South Fork North Creek near Beaver, Utah	5	3.60	4.20	5.90	2.90	3.60	4.80	2.80	3.50	4.20	2.30	3.10	3.60
166	10237500	Indian Creek near Beaver, Utah	5	1.80	2.30	2.90	1.70	2.10	2.40	1.60	1.90	2.20	1.40	1.70	2.10

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; Region, refers to the geohydrologic region of Utah in *figure 2*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	February			March			April			May		
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
124	10119000	Little Malad Creek above Elkhorn Reservoir near Malad City, Idaho	3	12.8	15.6	19.2	14.2	18.0	24.1	16.6	20.2	27.1	16.1	19.7	23.7
125	10122500	Devil Creek above Campbell Creek near Malad City, Idaho	3	5.90	7.80	9.60	7.00	9.30	13.3	8.50	13.3	24.2	8.70	13.8	19.0
126	10126180	Sulphur Creek near Corinne, Utah	3	¹ 32.9	¹ 51.7	¹ 66.5	¹ 40.8	¹ 60.8	¹ 91.5	¹ 30.1	¹ 40.0	¹ 54.5	¹ 42.8	¹ 57.1	¹ 76.7
127	10127100	Black Slough near Brigham City, Utah	3	² 45.7	² 70.8	² 102	² 57.6	² 97.2	² 145	² 43.9	² 74.2	² 105	² 19.6	² 44.2	² 82.5
128	10172870	Trout Creek near Callao, Utah	3	1.30	1.70	2.00	1.60	2.00	2.70	2.40	4.20	6.90	7.20	13.6	26.2
129	10172940	Dove Creek near Park Valley, Utah	3	⁰ 2.00	⁰ 4.00	⁰ 8.00	⁰ 3.00	⁰ 7.00	¹ 1.40	⁰ 3.00	⁰ 9.00	² 2.50	⁰ 6.00	¹ 1.10	¹ 5.10
130	10243240	Baker Creek at Narrows, near Baker, Nevada	3	0.900	1.40	2.00	1.20	1.80	2.50	2.00	3.20	5.70	6.30	17.0	41.5
131	10243260	Lehman Creek near Baker, Nevada	3	1.10	1.30	1.60	1.20	1.40	1.80	1.50	2.10	3.20	3.30	7.90	16.2
132	10145500	Salt Creek near Nephi, Utah	5	7.20	10.9	13.6	7.90	12.9	20.0	15.5	32.2	86.0	29.2	69.3	122
133	10146000	Salt Creek at Nephi, Utah	5	8.33	11.5	14.2	11.2	13.9	18.5	17.8	27.6	62.2	40.8	66.9	126
134	10146400	Currant Creek near Mona, Utah	5	15.6	29.2	55.8	² 17.5	² 31.9	² 62.7	12.6	22.6	71.3	8.90	19.3	59.2
135	10147000	Summit Creek near Santaquin, Utah	5	3.90	5.50	6.20	4.10	5.70	7.00	7.00	11.3	23.0	20.6	34.8	65.6
136	10147500	Payson Creek above diversions near Payson, Utah	5	4.10	4.90	5.40	4.40	5.30	6.00	7.30	14.2	32.1	19.2	38.2	83.5
137	10148200	Tie Fork near Soldier Summit, Utah	5	1.90	2.60	3.50	2.40	3.20	4.80	3.40	5.20	9.80	4.00	12.1	24.1
138	10148400	Nebo Creek near Thistle, Utah	5	4.90	6.50	8.00	6.20	8.50	14.1	13.3	21.7	44.0	25.0	53.9	82.5
139	10148500	Spanish Fork at Thistle, Utah	5	² 40.8	² 51.8	² 67.1	² 50.9	² 66.3	² 96.5	² 71.0	² 112	² 217	² 124	² 235	² 444
140	10150500	Spanish Fork at Castilla, Utah	5	¹ 67.0	¹ 85.8	¹ 123	¹ 85.3	¹ 114	¹ 176	¹ 122	¹ 190	¹ 370	¹ 283	¹ 455	¹ 743
141	10152500	Hobble Creek near Springville, Utah	5	16.7	21.4	25.3	19.8	24.3	38.9	36.2	76.6	192	61.3	118	203
142	10187300	Otter Creek near Koosharem, Utah	5	7.70	8.30	8.70	7.90	8.60	9.80	9.20	11.6	15.2	15.0	23.7	36.5
143	10194200	Clear Creek above diversions near Sevier, Utah	5	9.50	13.2	16.7	13.2	18.9	30.7	22.8	38.0	68.6	45.1	94.9	199
144	10195000	Clear Creek at Sevier, Utah	5	13.0	15.7	18.6	14.9	18.7	25.3	22.9	41.7	76.0	41.2	84.3	170
145	10204200	Mill Creek near Glenwood, Utah	5	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00
146	10205030	Salina Creek near Emery, Utah	5	4.60	5.80	7.90	5.10	6.50	9.30	6.80	11.4	20.4	20.5	46.8	91.3
147	10205100	Sheep Creek near Salina, Utah	5	⁰ 0.00	⁰ 1.00	⁰ 1.00	⁰ 1.00	⁰ 1.00	⁰ 1.00	⁰ 1.00	⁰ 1.00	⁰ 2.00	⁰ 4.00	⁰ 9.00	¹ 1.70
148	10205200	West Fork Sheep Creek near Salina, Utah	5	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 0.00	⁰ 1.00	⁰ 2.00	⁰ 8.00	² 2.20
149	10205300	Sheep Creek at mouth near Salina, Utah	5	⁰ 0.00	⁰ 1.00	⁰ 2.00	⁰ 1.00	⁰ 1.00	⁰ 2.00	⁰ 3.00	⁰ 7.00	² 1.70	1.40	3.80	7.80
150	10206000	Salina Creek at Salina, Utah	5	² 10.5	² 17.0	² 22.3	² 7.90	² 18.1	² 29.1	² 1.40	² 11.4	² 53.2	² 4.90	² 72.2	² 212
151	10208500	Oak Creek near Fairview, Utah	5	2.10	2.50	3.20	2.30	2.90	4.20	3.80	6.50	15.1	21.2	51.8	107
152	10210000	Pleasant Creek near Mount Pleasant, Utah	5	7.50	8.70	9.50	8.30	9.50	10.5	9.60	11.7	14.9	18.1	31.5	56.5
153	10211000	Twin Creek near Mount Pleasant, Utah	5	3.90	4.10	4.80	4.00	4.50	5.00	4.50	5.20	7.20	7.70	13.2	21.1
154	10215700	Oak Creek near Spring City, Utah	5	3.10	3.60	4.20	3.10	3.60	4.30	3.50	4.30	6.30	8.50	19.5	37.4
155	10215900	Manti Creek below Dugway Creek near Manti, Utah	5	3.60	4.40	5.40	4.30	5.40	8.00	7.70	14.1	24.9	37.5	78.2	154

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; Region, refers to the geohydrologic region of Utah in *figure 2*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	February			March			April			May		
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
156	10216400	Twelvemile Creek near Mayfield, Utah	5	6.60	8.60	10.3	7.80	9.40	13.1	12.2	18.4	37.7	47.6	90.1	151
157	10219200	Chicken Creek near Levan, Utah	5	1.00	1.90	3.20	1.60	3.00	5.90	3.60	7.60	23.3	5.20	21.5	48.9
158	10224100	Oak Creek above Little Creek near Oak City, Utah	5	0.600	0.900	1.60	1.00	2.00	4.60	3.70	6.00	13.0	3.90	9.60	19.1
159	10232500	Chalk Creek near Fillmore, Utah	5	9.00	12.0	15.0	11.4	15.7	22.8	25.1	49.3	89.5	58.4	111	204
160	10233000	Meadow Creek near Meadow, Utah	5	1.70	2.20	3.20	2.40	4.00	6.30	5.30	10.2	17.4	10.2	25.4	43.2
161	10233500	Corn Creek near Kanosh, Utah	5	5.40	6.50	8.40	6.00	8.40	19.0	12.1	32.5	55.7	22.7	57.6	101
162	10234500	Beaver River near Beaver, Utah	5	15.9	18.9	22.5	17.8	21.7	27.2	26.8	41.5	75.5	77.1	130	246
163	10235000	South Creek near Beaver, Utah	5	0.800	1.20	1.40	1.40	2.00	3.30	2.30	4.00	7.80	4.90	10.8	23.6
164	10236000	North Fork North Creek near Beaver, Utah	5	1.30	1.60	2.00	2.20	2.80	4.20	3.60	5.70	11.4	9.60	15.8	31.7
165	10236500	South Fork North Creek near Beaver, Utah	5	2.70	3.30	4.30	3.90	5.00	9.50	7.40	16.8	29.2	27.5	47.0	104
166	10237500	Indian Creek near Beaver, Utah	5	1.50	1.80	2.20	1.90	2.50	3.40	3.30	6.30	14.2	9.60	16.0	34.6

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; Region, refers to the geohydrologic region of Utah in *Figure 2*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	June			July			August			September			Annual mean discharge
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
124	10119000	Little Malad Creek above Elkhorn Reservoir near Malad City, Idaho	3	14.6	17.8	21.3	14.1	15.9	18.5	12.7	14.6	17.1	12.5	14.3	16.0	16.8
125	10122500	Devil Creek above Campbell Creek near Malad City, Idaho	3	6.90	9.90	13.7	5.40	7.30	9.10	5.20	6.40	8.20	5.40	6.40	7.70	10.7
126	10126180	Sulphur Creek near Corinne, Utah	3	149.7	166.0	181.6	153.0	168.2	185.1	153.4	168.2	184.2	163.4	181.3	194.9	162.6
127	10127100	Black Slough near Brigham City, Utah	3	10.2	21.1	46.1	8.10	15.4	28.4	9.30	18.9	31.5	19.0	33.9	59.8	56.5
128	10172870	Trout Creek near Callao, Utah	3	6.10	15.4	34.0	2.40	4.10	7.90	1.50	2.20	3.40	1.40	1.80	2.40	5.71
129	10172940	Dove Creek near Park Valley, Utah	3	0.400	1.00	2.00	0.200	0.400	1.00	0.100	0.200	0.600	0.200	0.300	0.600	0.990
130	10243240	Baker Creek at Narrows, near Baker, Nevada	3	16.4	26.8	52.7	5.20	8.40	17.9	2.70	3.90	6.90	2.20	2.70	3.80	9.08
131	10243260	Lehman Creek near Baker, Nevada	3	11.4	15.4	24.7	6.70	9.00	17.6	4.30	5.40	9.70	3.00	3.80	4.90	5.67
132	10145500	Salt Creek near Nephi, Utah	5	23.3	52.4	73.8	11.3	23.8	38.8	11.5	16.0	20.8	9.10	13.3	16.0	25.3
133	10146000	Salt Creek at Nephi, Utah	5	28.4	58.7	88.0	13.3	25.7	41.9	9.00	15.3	22.4	7.84	12.6	17.3	190
134	10146400	Current Creek near Mona, Utah	5	6.40	10.8	30.7	5.90	9.20	13.9	5.00	8.60	13.9	5.20	8.50	15.6	28.0
135	10147000	Summit Creek near Santaquin, Utah	5	12.0	22.0	46.3	6.60	10.7	14.6	5.70	8.50	10.7	5.40	7.50	9.50	12.4
136	10147500	Payson Creek above diversions near Payson, Utah	5	10.1	16.3	25.4	8.20	10.5	13.1	6.80	8.90	11.2	5.10	7.10	9.00	23.6
137	10148200	Tie Fork near Soldier Summit, Utah	5	3.50	9.10	15.6	2.80	6.40	10.6	2.40	4.50	7.10	2.30	3.60	5.20	5.57
138	10148400	Nebo Creek near Thistle, Utah	5	12.8	19.8	30.0	7.00	10.1	13.0	6.20	7.70	9.40	6.20	7.30	8.30	15.3
139	10148500	Spanish Fork at Thistle, Utah	5	62.7	111	204	33.2	53.9	81.6	28.2	40.4	60.0	28.7	38.0	53.4	89.0
140	10150500	Spanish Fork at Castilla, Utah	5	32.2	45.9	55.4	29.2	41.0	51.9	24.2	33.6	43.6	13.6	19.6	27.6	67.5
141	10152500	Hobble Creek near Springville, Utah	5	32.1	53.3	80.9	15.7	25.0	36.3	12.8	19.2	24.1	12.7	18.4	22.6	45.6
142	10187300	Otter Creek near Koosharem, Utah	5	12.5	18.5	28.6	9.70	13.9	16.1	8.50	11.4	13.0	8.20	10.1	11.8	12.1
143	10194200	Clear Creek above diversions near Sevier, Utah	5	37.3	86.9	161	13.4	27.9	57.5	8.70	15.8	24.3	8.00	12.1	18.7	37.3
144	10195000	Clear Creek at Sevier, Utah	5	34.9	78.0	132	6.00	16.3	38.4	2.20	4.30	9.80	1.90	2.90	5.00	30.0
145	10204200	Mill Creek near Glenwood, Utah	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.140
146	10205030	Salina Creek near Emery, Utah	5	13.6	27.6	60.8	9.80	15.6	21.8	8.80	12.5	17.5	7.60	10.9	14.7	17.4
147	10205100	Sheep Creek near Salina, Utah	5	0.500	1.40	2.20	0.100	0.400	0.800	0.100	0.100	0.200	0.100	0.100	0.100	0.330
148	10205200	West Fork Sheep Creek near Salina, Utah	5	0.00	0.100	0.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.140
149	10205300	Sheep Creek at mouth near Salina, Utah	5	0.900	2.30	3.90	0.100	0.500	1.20	0.00	0.100	0.400	0.00	0.100	0.200	0.860
150	10206000	Salina Creek at Salina, Utah	5	1.20	11.1	29.7	0.500	1.20	3.70	0.400	0.800	2.00	0.400	0.800	1.70	19.3
151	10208500	Oak Creek near Fairview, Utah	5	9.40	21.9	61.7	3.40	5.90	9.80	2.00	3.30	4.60	1.80	2.80	3.80	12.3
152	10210000	Pleasant Creek near Mount Pleasant, Utah	5	33.5	58.5	86.5	12.5	18.6	30.8	9.40	11.8	14.7	8.50	9.60	11.4	17.7
153	10211000	Twin Creek near Mount Pleasant, Utah	5	13.5	24.7	42.0	6.10	8.10	16.2	4.80	5.70	8.50	4.30	4.90	6.20	8.37
154	10215700	Oak Creek near Sping City, Utah	5	19.8	42.0	64.7	7.60	12.1	22.0	5.60	6.90	9.30	4.60	5.70	7.30	10.9
155	10215900	Manti Creek below Dugway Creek near Manti, Utah	5	45.9	106	202	15.9	28.4	49.8	8.20	13.8	21.8	5.90	9.40	13.2	29.2

Appendix D. Monthly and annual streamflow statistics for streamflow-gaging stations in region 3 and region 5 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *figure 1*; Region, refers to the geohydrologic region of Utah in *figure 2*; P80, P50, P20, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, P20, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	Region	June			July			August			September			Annual mean discharge
				P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
156	10216400	Twelvemile Creek near Mayfield, Utah	5	44.1	91.3	155	20.9	40.8	62.5	14.2	24.7	33.7	11.6	17.6	21.3	30.9
157	10219200	Chicken Creek near Levan, Utah	5	3.00	11.2	19.5	1.80	5.30	8.80	1.50	3.40	5.70	1.10	2.60	4.10	7.86
158	10224100	Oak Creek above Little Creek near Oak City, Utah	5	1.20	2.60	6.20	0.400	0.800	1.60	0.300	0.500	0.800	0.300	0.400	0.600	2.97
159	10232500	Chalk Creek near Fillmore, Utah	5	24.5	48.9	89.5	12.4	20.0	28.8	8.80	13.7	17.8	8.00	11.3	13.7	30.3
160	10233000	Meadow Creek near Meadow, Utah	5	6.20	13.7	23.0	2.90	6.20	8.00	2.10	3.30	4.60	1.60	2.30	3.00	6.98
161	10233500	Corn Creek near Kanosh, Utah	5	12.5	22.3	37.3	5.40	12.4	17.7	4.60	8.30	13.4	4.20	6.40	9.40	17.8
162	10234500	Beaver River near Beaver, Utah	5	166.1	115	215	27.9	59.3	92.0	21.5	32.8	51.5	18.0	25.2	32.8	52.1
163	10235000	South Creek near Beaver, Utah	5	1.30	4.70	12.9	0.400	1.40	2.50	0.300	0.700	1.30	0.300	0.500	0.800	3.14
164	10236000	North Fork North Creek near Beaver, Utah	5	5.50	14.6	25.3	1.70	3.50	5.60	1.30	2.00	2.60	1.00	1.30	1.80	5.43
165	10236500	South Fork North Creek near Beaver, Utah	5	20.9	53.9	90.3	17.90	19.6	33.0	13.00	16.80	12.6	13.00	14.50	16.00	118.0
166	10237500	Indian Creek near Beaver, Utah	5	7.20	12.6	20.0	5.00	8.80	11.2	2.40	4.00	5.80	1.60	2.30	3.60	6.59

¹ Basin characteristics determined to be outliers, not used in regression analysis.

² Exceedance discharge determined to be outliers, not used in some regression analyses.

Appendix E.

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
167	09152650	Leach Creek at Durham, Colorado	'37.2	'55.6	'71.2	'11.1	'12.7	'16.3	'8.4	'9.8	'13.5	'6.3	'7.2	'7.8
168	09152900	Adobe Creek near Fruita, Colorado	'27.1	'35.9	'42.6	'4	'4.7	'6.2	'2.9	'3.4	'3.9	'2.1	'2.4	'2.8
169	09153400	West Salt Creek near Mack, Colorado	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0
170	09163310	East Salt Creek near Mack, Colorado	0.4	0.5	1	0.3	0.4	0.6	0.2	0.3	0.5	0.1	0.2	0.4
171	09163490	Salt Creek near Mack, Colorado	'140	'190	'227	19.1	22.4	27.7	13.7	15.7	17.7	9.6	12.1	12.9
172	09168100	Disappointment Creek near Dove Creek, Colorado	0.2	1.9	6	0.7	1.9	4.2	0.4	1.6	3.1	0.6	1.4	2.9
173	09174500	Cottonwood Creek near Nucla, Colorado	0.1	0.2	0.3	0.1	0.1	0.3	0.1	0.1	0.2	'0	'0	'0
174	09175900	Dry Creek near Naturita, Colorado	'0	'0	'0.2	'0	'0	'0.1	'0	'0	'0	'0	'0	'0
175	09182000	Castle Creek above Diversions near Moab, Utah	0.2	0.6	0.8	0.2	0.5	0.7	0.1	0.3	0.6	0.1	0.3	0.5
176	09183000	Courthouse Wash near Moab, Utah	0.1	0.1	0.2	0.1	0.2	0.4	0.1	0.3	0.6	0.1	0.3	0.7
177	09183500	Mill Creek at Shelley Tunnel near Moab, Utah	5.4	7	10.2	5	6.4	9.1	4.8	6.2	7.9	4.7	5.8	6.8
178	09184000	Mill Creek near Moab, Utah	6.1	8.1	13	6.5	8.5	12.4	6.3	8.5	11.4	5.9	8.2	9.9
179	09185500	Hatch Wash near La Sal, Utah	'0	'0	'0.1	'0	'0.1	'0.1	'0	'0.1	'0.1	'0	'0.1	'0.1
180	09304800	White River below Meeker, Colorado	'361	'424	'539	'338	'397	'468	'296	'353	'420	'280	'331	'389
181	09306007	Piceance Creek below Rio Blanco, Colorado	4.6	8.4	15.1	7	10.6	15	6.4	8.6	12.1	5.4	7.6	11.2
182	09306036	Sorghum Gulch at Mouth near Rio Blanco, Colorado	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0
183	09306039	Cottonwood Gulch near Rio Blanco, Colorado	'0	'0.1	'0.4	'0	'0	'0.5	'0	'0	'0.4	'0	'0	'0.4
184	09306042	Piceance Creek Tributary near Rio Blanco, Colorado	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0
185	09306052	Scandard Gulch at mouth near Rio Blanco, Colorado	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0
186	09306058	Willow Creek near Rio Blanco, Colorado	1.1	2.5	4.6	1.4	2.3	4.9	1.3	3	4.5	1.3	2.4	3.5
187	09306061	Piceance Creek above Hunter Creek near Rio Blanco, Colorado	5.4	11	37.4	12.4	20.1	34.5	12.7	20.1	24.4	12.3	16.5	22
188	09306200	Piceance Creek below Ryan Gulch near Rio Blanco, Colorado	7.1	15.5	30.4	12.8	21.8	35.3	14.8	20.4	31	12.3	18.1	27.4
189	09306222	Piceance Creek at White River, Colorado	8.4	22.7	42.1	18.2	28.4	46.3	18.5	25.9	37.9	16.1	23.3	33.6
190	09306235	Corral Gulch below Water Gulch near Rangely, Colorado	0.2	0.4	0.8	0.1	0.3	0.6	'0	'0.2	'0.4	'0	'0.1	'0.4
191	09306240	Box Elder Gulch near Rangely, Colorado	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0	'0
192	09306242	Corral Gulch near Rangely, Colorado	0.4	0.8	1.6	0.3	0.6	1.4	0.3	0.6	1.2	0.3	0.6	1.1
193	09306255	Yellow Creek near White River, Colorado	1.2	1.9	3.6	1.4	2.1	4.2	1.2	2.1	3.8	1.2	2.3	3.6
194	09306800	Bitter Creek near Bonanza, Utah	0.1	1.4	13.3	0.2	2	13.1	0.2	1.5	8.7	0.1	1.5	8.1
195	09307500	Willow Creek above Diversions near Ouray, Utah	11	14.1	18.1	10.3	14.2	18.1	9.3	12.4	15.6	9.3	12.2	15.5
196	09308000	Willow Creek near Ouray, Utah	'5.5	'13.2	'23	'11.8	'16.7	'25.5	'10.5	'13.5	'21	'10.3	'14.1	'19.5
197	09308500	Minnie Maud Creek near Myton, Utah	0.6	1.4	2.7	0.5	1.2	2.1	0.2	0.8	1.6	0.1	0.6	1.4
198	09310500	Fish Creek above Reservoir near Scofield, Utah	7.5	10.6	14.7	8	10.9	14	7.1	9.1	11.6	6.4	8.3	10.5
199	09310700	Mud Creek below Winter Quarters Canyon at Scofield, Utah	5.4	8.3	14	5.2	7.3	13.9	4.8	6.2	12.8	4.6	6.1	11.7
200	09312500	White River near Soldier Summit, Utah	2.8	3.6	4.7	2.8	3.2	4.4	2.4	2.9	4	2.1	2.6	3.5

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in [figure 1](#); P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
233	09378170	South Creek above reservoir near Monticello, Utah	0.1	0.1	0.3	0.1	0.2	0.3	0.1	0.1	0.2	0.1	0.1	0.2
234	09378200	Montezuma Creek at Golf Course at Monticello, Utah	∅	∅0.2	∅0.4	0.1	0.1	0.7	∅	∅0.1	∅0.6	∅	∅0.1	∅0.7
235	09378630	Recapture Creek near Blanding, Utah	∅	∅	∅	∅	∅	∅0.1	∅	∅	∅	∅	∅	∅
236	09378650	Recapture Creek below Johnson Creek near Blanding, Utah	∅	∅	∅0.1	∅	∅	∅0.1	∅	∅	∅	∅	∅	∅0.1
237	09378700	Cottonwood Wash near Blanding, Utah	∅	∅0.2	∅3.4	∅	∅1.7	∅3.8	0.1	1.9	4.9	0.4	2.3	4.1
238	09379000	Comb Wash near Bluff, Utah	∅	∅0.1	∅0.1	∅	∅0.1	∅0.1	∅	∅0.1	∅0.1	∅	∅0.1	∅0.1
239	09381500	Paria River near Cannonville, Utah	1	3.3	8.5	3.8	6.5	12.7	4.5	7.7	13.1	3.5	7.9	13.7
240	09382000	Paria River at Lees Ferry, Arizona	16.3	111.6	20.9	12.8	18	24.5	12.1	18.8	25.9	11.9	19	27.6
241	09403600	Kanab Creek near Kanab, Utah	5.9	8	12.4	7.1	8.6	12.8	6.5	8.6	14.4	7.6	10.9	15.9
242	09403780	Kanab Creek near Fredonia, Arizona	10	10	10.1	10	10	10.6	10	10.4	13.5	10.1	11	15.9

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
167	09152650	Leach Creek at Durham, Colorado	15.7	16.5	17.2	15.2	16.4	18	17.5	125.7	136.2	136.8	145.9	157.2
168	09152900	Adobe Creek near Fruita, Colorado	11.9	12.1	12.3	11.8	12	12.6	12	117.7	130	129.5	135.4	140.8
169	09153400	West Salt Creek near Mack, Colorado	20	20	20	20	20	20.2	20	20	20	20	20	20.6
170	09163310	East Salt Creek near Mack, Colorado	0.1	0.2	1.7	0.4	2	6.9	0.3	3	17.9	1.3	15.1	60.2
171	09163490	Salt Creek near Mack, Colorado	8.9	10.6	14.2	9.6	14	23.3	217.1	285	2198	111	155	220
172	09168100	Disappointment Creek near Dove Creek, Colorado	1.2	2.6	6.7	3.2	10.7	31.2	14.8	34.3	103	30.5	67.6	137
173	09174500	Cottonwood Creek near Nucla, Colorado	20.1	2nd	2nd	0.1	0.1	0.4	1.2	14.8	48.4	7.2	17.7	42.4
174	09175900	Dry Creek near Naturita, Colorado	20	20.1	21	0.3	0.7	3.2	0.1	1.7	4.7	20	22.8	210.8
175	09182000	Castle Creek above Diversions near Moab, Utah	0.1	0.4	0.5	0.1	0.4	0.5	0.1	0.4	0.6	0.5	1.6	5
176	09183000	Courthouse Wash near Moab, Utah	0.3	0.6	1	0.4	0.6	1.2	0.2	0.3	0.8	0.1	0.2	0.3
177	09183500	Mill Creek at Shelley Tunnel near Moab, Utah	4.5	5.5	6.3	4.7	5.7	7.2	6.3	8.5	14.1	11.8	22.6	35.6
178	09184000	Mill Creek near Moab, Utah	6.6	8.5	10.4	6.2	8.5	10.3	7.2	10.5	16.4	11.9	21.4	45.2
179	09185500	Hatch Wash near La Sal, Utah	20	20.1	20.3	0.1	0.1	0.4	20	20.1	20.2	20	20	20.1
180	09304800	White River below Meeker, Colorado	1295	1332	1373	1318	1363	1453	1396	1521	1748	1836	11434	12,291
181	09306007	Piceance Creek below Rio Blanco, Colorado	5.7	8	11.9	6.5	11	24.5	6.5	26	72.8	7.1	28.9	120
182	09306036	Sorghum Gulch at Mouth near Rio Blanco, Colorado	0.1	0.3	0.5	20	20	20	20	20	20	20	20	20
183	09306039	Cottonwood Gulch near Rio Blanco, Colorado	10	10	10	10	10	10	10	10	10	10.1	10.3	10.4
184	09306042	Piceance Creek Tributary near Rio Blanco, Colorado	10	10.1	10.5	10	10	10.2	10	10	10.3	10	10	10.3
185	09306052	Scandard Gulch at mouth near Rio Blanco, Colorado	20	20	20	20	20	20	20	20	20	20	20.1	20.2
186	09306058	Willow Creek near Rio Blanco, Colorado	1.7	2.7	4.5	2	3	4.5	1.3	2.8	4.2	0.2	1	4.1
187	09306061	Piceance Creek above Hunter Creek near Rio Blanco, Colorado	12.7	17.2	26.1	15.8	21.1	34	16	27	62	6.8	23.4	127
188	09306200	Piceance Creek below Ryan Gulch near Rio Blanco, Colorado	15.8	21.2	30	17.8	24.9	40.8	8	22.2	57.8	6.6	14.8	97.4
189	09306222	Piceance Creek at White River, Colorado	19.2	26	37	23.6	35.3	59.6	10.5	31.1	73.8	3.5	12.4	129
190	09306235	Corral Gulch below Water Gulch near Rangely, Colorado	20	20.1	20.4	20	20.1	20.5	20	20.2	22	0.1	0.7	5.1
191	09306240	Box Elder Gulch near Rangely, Colorado	20	20	20	20	20	20	20	20	22	0.2	2	13.5
192	09306242	Corral Gulch near Rangely, Colorado	0.4	0.7	1.1	0.4	0.7	1.4	0.4	0.7	2.8	0.4	1.2	9.5
193	09306255	Yellow Creek near White River, Colorado	1.7	2.7	4.7	2	2.9	5.4	1.8	2.6	4	1.7	2.5	4.3
194	09306800	Bitter Creek near Bonanza, Utah	0.3	2.8	10.3	0.6	4.3	16.6	2.2	4.8	18.3	1.7	4.4	21.5
195	09307500	Willow Creek above Diversions near Ouray, Utah	10.6	14.1	20.4	15.8	22.8	29.5	23.2	30.9	54.1	19.3	32.3	81.8
196	09308000	Willow Creek near Ouray, Utah	11.1	17.6	26.9	120.9	132.8	145.5	130.1	143.8	172.3	18.2	137	1124

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
197	09308500	Minnie Maud Creek near Myton, Utah	0.1	0.8	1.8	0.5	1.6	3.8	2.6	5.2	22.4	4.2	14.2	51
198	09310500	Fish Creek above Reservoir near Scofield, Utah	6.5	8.5	11.5	7.8	10.9	17.1	19	40.2	97	2102	2213	2408
199	09310700	Mud Creek below Winter Quarters Canyon at Scofield, Utah	4.7	6.3	11.7	6.2	8.6	14.4	9.3	15.4	26.3	22	37.7	93.1
200	09312500	White River near Soldier Summit, Utah	2.5	3	3.9	3.1	4.6	7.9	12.5	37.3	77.9	32	77	145
201	09312600	White River below Tabbyune Creek near Soldier Summit, Utah	3	4.3	5.6	5.2	8.4	16.4	21.8	43.3	92.4	35.8	118	248
202	09312700	Beaver Creek near Soldier Summit, Utah	0.1	1	1.7	0.1	1.6	2.7	1.7	3.7	9.3	5.5	16.8	37.8
203	09312800	Willow Creek near Castle Gate, Utah	0.5	1.3	2.5	1.4	3.5	8.4	4.9	11.2	41.7	8.8	27.4	73.4
204	09313500	Price River near Helper, Utah	18.3	31.1	43	29.2	47.4	2113	284.1	2163	2384	2173	2399	21,032
205	09314280	Desert Seep Wash near Wellington, Utah	5.6	9.4	18.6	11.8	20.2	43.4	13	25.4	49.7	19.9	30.8	47.1
206	09315500	Saleratus Wash at Green River, Utah	20	20.1	20.3	20	20.1	20.2	20	20.1	20.2	20	20.1	20.2
207	09316000	Browns Wash near Green River, Utah	20	20.1	20.1	20	20.1	20.1	20	20.1	20.2	20	20.1	20.1
208	09318000	Huntington Creek near Huntington, Utah	223.9	229.1	234	27.2	33.1	41.8	240.1	261.1	2124	2147	2263	2508
209	09324500	Cottonwood Creek near Orangeville, Utah	12.7	18.6	26.5	15.8	22.9	32.3	25.4	42.3	95.6	2101	2246	2480
210	09326500	Ferron Creek (upper station) near Ferron, Utah	7	9.2	12.6	8.8	12.7	19.3	17.3	32.3	64.5	96.8	190	339
211	09329050	Seven Mile Creek near Fish Lake, Utah	5.1	6.5	7.9	5.4	6.7	8.6	6.6	10.3	22.5	17.3	39.3	76.6
212	09329900	Pine Creek near Bicknell, Utah	2.2	3	3.5	2.3	3.1	3.8	2.7	3.2	3.9	2.5	3.3	9.3
213	09330500	Muddy Creek near Emery, Utah	6.1	8	11.4	7.8	11.2	16.7	13.5	23.2	44.3	44	83.1	163
214	09331500	Ivie Creek above Diversions near Emery, Utah	1.8	2.1	3.1	2.4	3	4	2.9	4	5.6	3	4.1	10.6
215	09334000	North Wash near Hanksville (Hite), Utah	0.1	0.3	0.6	0.1	0.2	0.3	20	20	20.2	20	20	20.2
216	09334500	White Canyon near Hanksville, Utah	20	20	20	20	20	20.3	20	20	22	20	20.1	20.1
217	09337000	Pine Creek near Escalante, Utah	0.9	2.1	3.5	1.1	2.7	4.6	2.3	4.8	9.7	3.6	8.7	27.9
218	09337500	Escalante River near Escalante, Utah	3.3	10.3	18.2	4	11.1	21	2	7.4	23.5	1.5	9.7	41.6
219	09338000	East Fork Boulder Creek near Boulder, Utah	15.9	18.3	21	16.2	18.9	21.9	17.3	20.5	23.8	20.7	32.2	76
220	09338900	Deer Creek near Boulder, Utah	9.3	10.7	14.3	7.9	12.3	16.6	6.5	7.3	16.9	5.4	6.3	16
221	09365500	La Plata River at Hesperus, Colorado	15	16.9	19.2	16.7	110.6	120.4	268.8	160.9	1122	177.5	1142	1253
222	09366500	La Plata River at Colorado-New Mexico state line	7.4	14.5	23.1	9.3	22.3	58.1	16.7	57.8	165	36.7	71.5	156
223	09367561	Shumway Arroyo near Waterflow, New Mexico	20	20.4	22.6	20	20.6	22.5	20	20.5	22.2	20	20.5	22
224	09368500	West Mancos River near Mancos, Colorado	14.1	16	17.9	13.4	17	111.1	121.9	134.3	189.9	149.8	120	208
225	09369000	East Mancos River near Mancos, Colorado	0.9	1.4	1.9	2	2.9	5.3	7.9	18.6	41.8	22.6	43.5	79
226	09369500	Middle Mancos River near Mancos, Colorado	0.1	0.2	0.6	0.3	0.5	1.5	4	13.4	35.5	12.2	31.6	67.6
227	09371000	Mancos River near Towaoc, Colorado	110.7	18.2	131	116.4	135.9	192.4	120.1	176.8	204	15.9	114	1307
228	09371420	McElmo Creek above Alkali Canyon near Cortez, Colorado	12	18	28.8	15.8	28.6	61.1	11.8	21.9	50.1	14.1	23.6	35.3

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in [Figure 1](#); P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
229	09371500	McElmo Creek near Cortez, Colorado	² 23.5	² 35.6	² 65.4	² 26.2	² 39.9	² 72.4	22.9	37.9	58.7	38.4	57.4	88.7
230	09371520	McElmo Creek above Trail Canyon near Cortez, Colorado	18.5	28.9	46.4	17.3	25.5	42.8	12.7	23.4	35.9	30.5	45.6	77
231	09371700	McElmo Creek below Cortez, Colorado	² 21.3	² 28.9	² 47.6	² 25.9	² 57.2	² 126	3.6	27.6	87.4	11	28.5	47.4
232	09372000	McElmo Creek near Colorado-Utah state line	² 24.2	² 34.5	² 57.6	22.9	35.2	71.5	14.9	29.6	55.4	14.5	38.3	67.3
233	09378170	South Creek above Reservoir near Monticello, Utah	0.1	0.1	0.3	0.1	0.4	3	0.4	2.6	8.6	0.9	3.3	11.8
234	09378200	Montezuma Creek at Golf Course at Monticello, Utah	² 0	² 0.1	² 0.8	0.1	0.6	2.7	0.1	1.1	8.2	0.1	1.3	23.7
235	09378630	Recapture Creek near Blanding, Utah	² 0	² 0	² 0.1	² 0	² 0.3	² 2.2	0.5	2.2	7.7	0.4	3.2	9
236	09378650	Recapture Creek below Johnson Creek near Blanding, Utah	² 0	² 0.1	² 1.1	² 0	² 3.4	² 17.9	1.6	21.4	62.2	1.9	22.1	76.5
237	09378700	Cottonwood Wash near Blanding, Utah	1.7	3.8	6.8	2.9	6.9	23.7	1.9	9.6	38	0.9	5	25.3
238	09379000	Comb Wash near Bluff, Utah	² 0	² 0.1	² 0.1	² 0	² 0.1	² 0.1	² 0	² 0.1	² 0.1	² 0	² 0.1	² 0.1
239	09381500	Paria River near Cannonville, Utah	6.9	11.4	18	7.6	14.2	25.6	1.5	5.1	17.8	0.3	0.7	2.8
240	09382000	Paria River at Lees Ferry, Arizona	¹ 17.6	¹ 24.5	¹ 40.8	¹ 14.7	¹ 23.3	¹ 42.9	¹ 5.6	¹ 12.8	¹ 28.4	¹ 3.8	¹ 4.9	¹ 12.9
241	09403600	Kanab Creek near Kanab, Utah	8.9	12.4	17.2	11	16	32.8	8.1	12.9	31.7	6.5	8.1	11.6
242	09403780	Kanab Creek near Fredonia, Arizona	¹ 0.1	¹ 2	¹ 11.6	¹ 0.1	¹ 3.2	¹ 20.5	¹ 0	¹ 0.3	¹ 26.7	¹ 0	¹ 0	¹ 0.2

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
167	09152650	Leach Creek at Durham, Colorado	136.7	144.6	154.4	138.6	146.5	158.2	140.1	149.5	159	140.9	152	164.7	131.4
168	09152900	Adobe Creek near Fruita, Colorado	131.1	137.9	142.9	134.1	138.6	144.7	135.1	140.1	145.1	135.4	139.9	145.1	121.9
169	09153400	West Salt Creek near Mack, Colorado	0	0	0	0	0	0	0	0	0	0	0	0	0.9
170	09163310	East Salt Creek near Mack, Colorado	0.7	1.9	10.4	0.3	0.6	1.6	0.4	0.5	1	0.3	0.5	1.5	5.8
171	09163490	Salt Creek near Mack, Colorado	100	138	186	87.3	106	139	97.1	110	153	148	188	226	93.8
172	09168100	Disappointment Creek near Dove Creek, Colorado	7.1	24.1	69.9	0.6	4.1	18	0.2	2.6	11.3	0.2	1.9	7.2	21.6
173	09174500	Colorado Cottonwood Creek near Nucla, Colorado	1.1	2.3	7.4	0.3	0.4	0.7	0.2	0.2	0.4	0.1	0.2	0.3	4.8
174	09175900	Dry Creek near Naturita, Colorado	0	0	0.7	0	0	0.5	0	0	0.1	0	0	1.7	2.6
175	09182000	Castle Creek above Diversions near Moab, Utah	1.5	3.5	6.6	0.8	1.9	3.4	0.4	1	1.5	0.3	0.7	1	1.2
176	09183000	Courthouse Wash near Moab, Utah	0	0.1	0.1	0	0.1	0.1	0	0.1	0.2	0.1	0.1	0.2	1.8
177	09183500	Mill Creek at Shelley Tunnel near Moab, Utah	9.6	18.6	44.4	6.2	10.3	18.4	5.6	8.5	13.8	5.3	7.2	11.3	11.3
178	09184000	Mill Creek near Moab, Utah	9.4	21.1	44.1	8.3	12.1	19.1	8.2	10.6	14.7	7.2	9.2	12.9	13.7
179	09185500	Hatch Wash near La Sal, Utah	0	0	0	0	0	0	0	0	0.1	0	0	0.1	1.6
180	09304800	White River below Meeker, Colorado	1791	1,843	2,658	351	570	1,005	267	393	529	271	377	471	651
181	09306007	Piceance Creek below Rio Blanco, Colorado	6	12.8	42.7	5.2	10.2	28.8	6.4	14.4	23.6	4.9	10.3	15.6	21
182	09306036	Sorghum Gulch at Mouth near Rio Blanco, Colorado	0	0	0	0	0	0	0	0	0	0	0	0	0
183	09306039	Cottonwood Gulch near Rio Blanco, Colorado	0	0	0	0	0	0	0	0	0	0	0	0	0
184	09306042	Piceance Creek Tributary near Rio Blanco, Colorado	0	0	0.3	0	0.2	0.6	0	0.1	0.6	0	0.1	0.4	0.3
185	09306052	Scandard Gulch at mouth near Rio Blanco, Colorado	0.4	1	1.6	0	0	0.1	0	0	0	0.3	0.8	1.2	0
186	09306058	Willow Creek near Rio Blanco, Colorado	0.6	1	6	0.5	1.3	7.5	0.8	1.7	5.9	0.8	1.5	4.8	3.2
187	09306061	Piceance Creek above Hunter Creek near Rio Blanco, Colorado	5.1	11	41.8	5.6	9.3	46.4	9.6	22.7	49.3	7	17.9	36.2	29.6
188	09306200	Piceance Creek below Ryan Gulch near Rio Blanco, Colorado	6.5	10.8	41.6	5.9	10.5	30.6	7.3	23.4	42.3	6.1	16.5	30.9	29.1
189	09306222	Piceance Creek at White River, Colorado	2.3	6.9	55.2	3.2	9.8	44.7	4.9	24.2	52.4	5.4	18.7	38.3	36.1
190	09306235	Corral Gulch below Water Gulch near Rangely, Colorado	0.2	0.5	2.7	0.2	0.5	1.6	0.3	0.5	1.1	0.3	0.4	1.1	1
191	09306240	Box Elder Gulch near Rangely, Colorado	0	0.4	0.3	0	0	0.1	0	0	0	0	0	0	1
192	09306242	Corral Gulch near Rangely, Colorado	0.4	1.4	5.5	0.4	1.2	2.8	0.3	0.9	2.3	0.4	0.8	1.9	1.9
193	09306255	Yellow Creek near White River, Colorado	1.2	1.9	3.5	0.9	1.7	3.2	0.8	1.5	3.2	0.9	1.7	3.5	3
194	09306800	Bitter Creek near Bonanza, Utah	0.4	2.9	17.4	0	1.1	14.8	0	0.4	12.7	0	0.5	12.2	6.1
195	09307500	Willow Creek above Diversions near Ouray, Utah	10.9	18	43.8	5.8	11.8	26.2	6.7	12.3	19.4	7.4	12.1	17	21.4
196	09308000	Willow Creek near Ouray, Utah	1.2	9.6	17.8	0.2	3.7	31.5	0.4	3.1	20	1	3.3	20.5	26.7
197	09308500	Minnie Maud Creek near Myton, Utah	2	6.1	18.9	0.9	2.7	7	0.6	1.8	4.1	0.5	1.3	2.7	5.8
198	09310500	Fish Creek above Reservoir near Scofield, Utah	36.3	78.4	189	14.6	25.1	40.1	8	13.6	20.3	6.9	9.9	14.8	48.2

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
199	09310700	Mud Creek below Winter Quarters Canyon at Scofield, Utah	12.3	30.4	65.8	4.9	12.1	21	5.4	8.2	14	5.6	8.7	13.5	16.6
200	09312500	White River near Soldier Summit, Utah	11.3	21.9	46.7	4.2	8.1	13.9	2.3	4.3	7.2	2.2	3.3	4.9	19.4
201	09312600	White River below Tabbyune Creek near Soldier Summit, Utah	13.8	35.9	76.4	4.8	12.6	23.4	2.4	5.8	10.7	2.2	4.4	7.3	26.8
202	09312700	Beaver Creek near Soldier Summit, Utah	1.8	8	21.5	0.2	1.9	5.6	0.1	0.6	2.2	0	0.5	1.5	4.6
203	09312800	Willow Creek near Castle Gate, Utah	3	11.6	26.1	1.2	4.3	9.8	0.6	2.3	5.1	0.4	1.6	3.7	9.6
204	09313500	Price River near Helper, Utah	² 103	² 202	² 498	² 46.6	² 110	² 179	26	62.7	147	24.8	47.7	95.6	² 11.7
205	09314280	Desert Seep Wash near Wellington, Utah	16.6	34.7	56.5	12.8	26.5	56.7	9.2	25.7	47	10.1	31.9	57.6	30.1
206	09315500	Saleratus Wash at Green River, Utah	0	² 0.1	² 0.3	0	0	² 0.5	0	² 0.1	² 0.5	0	² 0.1	² 0.5	3
207	09316000	Browns Wash near Green River, Utah	0.1	0.3	0.4	0	0	0	0	² 0.1	² 0.1	0	² 0.1	² 0.1	1
208	09318000	Huntington Creek near Huntington, Utah	² 136	² 242	² 443	² 99.8	² 135	² 168	² 46.5	² 82.4	² 120	30.1	43.6	72.6	² 100
209	09324500	Cottonwood Creek near Orangeville, Utah	² 161	² 315	² 659	² 63.1	² 104	² 201	35.3	52.9	119	25.9	34.4	68.4	² 112
210	09326500	Ferron Creek (upper station) near Ferron, Utah	² 111	² 248	² 428	41.9	74.4	130	20.4	35.1	54.7	14.2	20.8	31.7	65.9
211	09329050	Seven Mile Creek near Fish Lake, Utah	11.6	25.3	59	7.1	11.9	18.4	6.3	9.9	14.6	6.3	9.1	13.6	15.2
212	09329900	Pine Creek near Bicknell, Utah	2.1	2.7	3.1	2.1	3	3.7	2.4	3.6	4.8	2.4	3.8	5.1	4
213	09330500	Muddy Creek near Emery, Utah	54.6	117	187	34.6	57.6	95.2	23.2	38.1	53.7	14.9	23.4	35.4	38.9
214	09331500	Ivie Creek above Diversions near Emery, Utah	2.5	4.2	6.9	2.8	4.1	5.9	2.1	3.6	6.1	1.2	2	3.2	3.9
215	09334000	North Wash near Hanksville (Hite), Utah	0	0	0	0	0	0	0	0	0	0	0	0	1.2
216	09334500	White Canyon near Hanksville, Utah	0	0	0	0	0	0	0	0	0	0	0	0	5.1
217	09337000	Pine Creek near Escalante, Utah	2.4	5.1	9.4	0.9	5.1	8.5	1	4.6	8	1.1	3.2	6.3	5.2
218	09337500	Escalante River near Escalante, Utah	0.9	3.1	27.7	0.8	2.4	10.4	1.1	3	12.4	1.1	2.9	8.3	11.7
219	09338000	East Fork Boulder Creek near Boulder, Utah	19.5	25.8	48	18	19.9	24.6	18.4	20.6	24.3	17.4	19.9	24.1	23.7
220	09338900	Deer Creek near Boulder, Utah	4.2	4.6	12	3.9	4.4	7.5	4.2	4.6	12.2	4.6	5.6	12.5	10
221	09365500	La Plata River at Hesperus, Colorado	¹ 36.5	¹ 90.1	¹ 207	¹ 15.1	¹ 24.5	¹ 52.1	¹ 9.9	¹ 16.7	¹ 28.5	¹ 7.2	¹ 13	¹ 25.6	¹ 44
222	09366500	La Plata River at Colorado-New Mexico state line	6.8	46.6	87.6	1.3	7.3	31.8	1.5	4.6	14.1	1.4	4.3	12	35.1
223	09367561	Shumway Arroyo near Waterflow, New Mexico	0	² 0.3	² 2.2	0	² 0.3	² 2.4	0	² 0.2	² 2.3	0	² 0.3	² 2.6	1.5
224	09368500	West Mancos River near Mancos, Colorado	¹ 59.7	¹ 104	¹ 199	¹ 17.6	¹ 38.3	¹ 55.3	¹ 10	¹ 20	¹ 37.3	¹ 6.7	¹ 12.4	¹ 24.9	¹ 38.1
225	09369000	East Mancos River near Mancos, Colorado	8.1	17.7	44.7	2	4.2	8.8	0.9	2	4.2	0.6	1.5	3.5	10.7
226	09369500	Middle Mancos River near Mancos, Colorado	3	6.7	23.7	0.5	1.7	4	0.2	0.7	1.7	0.2	0.3	1.1	7.5
227	09371000	Mancos River near Towaoc, Colorado	0	² 0.2	¹ 145	0	¹ 3.7	¹ 40.2	0	¹ 5.3	¹ 31.6	¹ 0.2	¹ 9.5	¹ 36.6	¹ 50.4
228	09371420	McElmo Creek above Alkali Canyon near Cortez, Colorado	19.2	27.4	41.7	13.3	28.7	51.9	11.5	24	43.4	8.8	24.5	40.8	27.4
229	09371500	McElmo Creek near Cortez, Colorado	51.3	72	96.3	42.9	65.9	107	35.7	68.2	108	² 25.8	² 68.7	² 102	57.4
230	09371520	McElmo Creek above Trail Canyon near Cortez, Colorado	40.6	60.3	86.9	40	70.2	98.8	² 57.2	² 93.5	² 119	² 69.3	² 93.4	² 118	55.2

Appendix E. Monthly and annual streamflow statistics for streamflow-gaging stations in region 6 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
231	09371700	McElmo Creek below Cortez, Colorado	17.3	37.5	57.4	14.9	36.3	74.1	7	31.5	61.6	2.9	23.1	64.1	41.7
232	09372000	McElmo Creek near Colorado-Utah state line	24.9	50	75.8	11.7	42	79.7	13.7	54.2	97.5	12.5	53.5	98.8	50.4
233	09378170	South Creek above Reservoir near Monticello, Utah	0.2	1.4	4.6	0.1	0.2	0.7	0.1	0.2	0.4	0	0.1	0.3	1.8
234	09378200	Montezuma Creek at Golf Course at Monticello, Utah	0.1	0.5	1.1	0	0.2	2.1	0	0.1	0.5	0	0.1	0.3	3.5
235	09378630	Recapture Creek near Blanding, Utah	0.1	0.4	2.8	0	0.1	0.1	0	0	0.1	0	0	0	1.3
236	09378650	Recapture Creek below Johnson Creek near Blanding, Utah	0	0.8	26.4	0	0	0.4	0	0	0	0	0	0	8.6
237	09378700	Cottonwood Wash near Blanding, Utah	0	0.5	5.1	0	0	2.2	0	0	2.7	0	0	0.8	9
238	09379000	Comb Wash near Bluff, Utah	0	0.1	0.1	0.1	0.2	0.3	0	0.1	0.1	0	0.1	0.1	2.8
239	09381500	Paria River near Cannonville, Utah	0	0.1	0.5	0	0.1	2.7	0	1.5	13.5	0	0.6	3.4	12.1
240	09382000	Paria River at Lees Ferry, Arizona	13	13.8	15.7	13.3	14.5	17.2	14.6	11.3	145.8	14.7	18	23.9	28.4
241	09403600	Kanab Creek near Kanab, Utah	5	6.5	8.4	4.5	6	7.9	4.4	6	9.8	5.6	6.9	10.4	12.2
242	09403780	Kanab Creek near Fredonia, Arizona	10	10.1	10.1	10	10	10	10	10.1	10.7	10	10	10.1	16.8

¹ Basin characteristics determined to be outliers, not used in regression analysis.

² Exceedance discharge determined to be outliers, not used in some regression analyses.

Appendix F.

Appendix F. Monthly and annual streamflow statistics for streamflow-gaging stations in region 7 in Utah and bordering states used in the regional regression analysis.

[Map identifier, refers to the map location in [Figure 1](#); P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	October			November			December			January		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
			243	09404450	East Fork Virgin River near Glendale, Utah	9.20	13.4	17.0	11.5	15.2	18.7	11.8	15.3	18.6
244	09404700	East Fork Virgin River near Mount Carmel Junction, Utah	3.80	10.2	19.4	15.7	19.2	24.8	18.1	20.1	23.1	18.7	21.0	24.3
245	09404900	East Fork Virgin River near Springdale, Utah	38.9	45.2	54.4	49.4	54.5	59.6	51.6	55.8	60.0	52.5	58.2	65.4
246	09405420	North Fork Virgin River below Bulloch Canyon near Glendale, Utah	6.60	12.4	19.2	7.80	11.1	19.7	8.00	9.50	18.3	7.40	9.70	19.0
247	09405500	North Fork Virgin River near Springdale, Utah	39.0	49.8	63.1	43.7	52.3	64.3	43.2	50.8	62.7	44.7	52.9	63.8
248	09406000	Virgin River at Virgin, Utah	277.5	2103	2145	2103	2124	2157	2111	2129	2160	2113	2132	2164
249	09406300	Kanarra Creek at Kanarraville, Utah	1.80	2.20	2.70	1.70	2.10	2.60	1.70	2.10	2.70	1.70	2.10	2.70
250	09406700	South Ash Creek below Mill Creek near Pintura, Utah	1.30	1.90	3.60	1.40	2.00	3.30	1.50	2.30	3.30	1.60	2.50	3.50
251	09407200	Ash Creek below West Field Ditch at Toquerville, Utah	6.90	14.3	21.5	7.10	12.7	22.0	6.30	12.1	22.1	8.30	12.0	20.5
252	09408000	Leeds Creek near Leeds, Utah	2.50	3.40	5.70	2.70	3.60	5.50	2.70	3.80	5.20	2.70	4.10	5.40
253	09408150	Virgin River near Hurricane, Utah	166.8	196.8	1145	174.9	1120	1173	182.9	1141	1194	196.4	1158	1205
254	09408400	Santa Clara River near Pine Valley, Utah	1.80	2.80	4.90	1.90	2.80	4.70	1.70	2.50	4.20	1.60	2.40	3.70
255	09409500	Moody Wash near Veyo, Utah	0.00	0.100	0.100	0.00	0.300	0.700	0.300	0.500	1.40	0.400	0.900	1.80
256	09410000	Santa Clara River above Winsor Dam near Santa Clara, Utah	35.70	210.4	217.4	27.40	214.1	220.7	211.3	216.0	223.1	211.4	216.1	221.8
257	09413900	Beaver Dam Wash near Enterprise, Utah	1.60	2.30	3.20	2.70	3.50	4.70	3.10	3.80	4.70	3.40	4.20	6.30
258	10173450	Mammoth Creek above West Hatch Ditch near Hatch, Utah	9.60	19.3	30.7	8.70	17.4	24.8	7.30	12.8	20.7	6.40	11.1	17.9
259	10174500	Sevier River at Hatch, Utah	47.6	71.7	98.7	51.7	69.3	94.2	48.1	62.1	85.3	46.4	57.6	81.2
260	10183900	East Fork Sevier River near Rubys Inn, Utah	6.20	9.00	13.7	7.50	9.70	13.0	5.80	7.60	10.8	5.10	8.00	10.6
261	10185000	Antimony Creek near Antimony, Utah	15.6	16.7	17.9	15.8	16.9	17.9	16.0	17.3	18.5	15.7	16.9	17.8
262	10241400	Little Creek near Paragonah, Utah	0.500	0.800	1.10	0.500	0.700	1.10	0.500	0.800	1.00	0.600	0.800	1.10
263	10241430	Red Creek near Paragonah, Utah	0.900	1.10	1.40	0.900	1.10	1.40	0.900	1.10	1.30	0.800	0.900	1.30
264	10241470	Center Creek above Parowan Creek near Parowan, Utah	4.10	4.90	6.50	4.00	4.80	5.60	3.90	4.70	5.40	3.70	4.60	5.40
265	10241600	Summit Creek near Summit, Utah	1.40	2.00	2.60	1.30	1.90	2.50	1.20	1.70	2.50	1.00	1.60	2.20
266	10242000	Coal Creek near Cedar City, Utah	7.90	11.1	15.7	8.10	10.9	14.5	7.40	10.1	13.2	7.70	10.0	12.7

Appendix F. Monthly and annual streamflow statistics for streamflow-gaging stations in region 7 in Utah and bordering states used in the regional regression analysis—
Continued.

[Map identifier, refers to the map location in [Figure 1](#); P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	February			March			April			May		
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20
243	09404450	East Fork Virgin River near Glendale, Utah	14.3	18.1	22.6	15.7	21.6	28.8	11.9	19.0	39.4	8.50	14.6	38.1
244	09404700	East Fork Virgin River near Mount Carmel Junction, Utah	18.9	23.0	27.3	18.4	25.8	39.7	5.30	15.6	46.7	1.90	4.30	34.7
245	09404900	East Fork Virgin River near Springdale, Utah	55.6	61.0	70.9	54.6	64.7	87.6	45.2	56.2	83.5	37.6	42.6	72.3
246	09405420	North Fork Virgin River below Bulloch Canyon near Glendale, Utah	8.50	12.8	25.1	14.2	20.8	30.1	17.2	26.2	59.7	13.5	23.8	71.7
247	09405500	North Fork Virgin River near Springdale, Utah	50.6	59.6	73.1	59.7	76.4	118	83.9	153	339	81.8	174	500
248	09406000	Virgin River at Virgin, Utah	120	145	204	² 134	² 176	³ 304	² 164	³ 305	⁵ 559	² 132	² 273	² 698
249	09406300	Kanarra Creek at Kanarraville, Utah	1.80	2.20	2.90	2.10	2.80	3.80	3.00	4.90	8.60	3.40	6.70	19.3
250	09406700	South Ash Creek below Mill Creek near Pintura, Utah	2.20	2.80	4.30	2.80	4.30	11.5	3.60	7.50	32.4	4.50	9.00	37.5
251	09407200	Ash Creek below West Field Ditch at Toquerville, Utah	9.00	11.8	21.7	9.60	18.7	52.8	10.5	20.8	85.7	9.30	18.8	111
252	09408000	Leeds Creek near Leeds, Utah	2.90	4.40	6.40	3.50	5.30	10.6	3.80	6.70	15.9	3.80	7.70	20.2
253	09408150	Virgin River near Hurricane, Utah	¹ 108	¹ 172	¹ 239	¹ 114	¹ 205	¹ 408	¹ 102	¹ 255	¹ 607	¹ 93.3	¹ 225	¹ 884
254	09408400	Santa Clara River near Pine Valley, Utah	1.70	2.70	4.20	2.80	4.90	8.40	6.00	12.8	26.7	10.9	21.6	51.1
255	09409500	Moody Wash near Veyo, Utah	0.600	1.60	8.10	0.800	2.60	11.2	³ 0.900	² 1.70	³ 6.70	³ 0.600	² 1.00	² 8.80
256	09410000	Santa Clara River above Winsor Dam near Santa Clara, Utah	² 11.9	² 17.7	² 26.1	² 12.2	² 18.6	² 40.0	² 13.1	² 21.2	² 48.4	² 14.0	² 22.5	² 42.1
257	09413900	Beaver Dam Wash near Enterprise, Utah	3.60	5.40	20.6	3.90	10.0	47.5	3.80	6.60	20.7	2.40	3.70	7.20
258	10173450	Mammoth Creek above West Hatch Ditch near Hatch, Utah	6.20	11.6	16.5	7.40	13.6	17.3	11.7	20.5	41.1	55.0	142	303
259	10174500	Sevier River at Hatch, Utah	48.3	61.1	82.7	52.1	67.5	92.8	60.5	96.0	176	122	279	508
260	10183900	East Fork Sevier River near Rubys Inn, Utah	6.10	9.60	12.7	10.0	14.8	20.5	17.2	29.6	51.7	12.9	27.6	93.2
261	10185000	Antimony Creek near Antimony, Utah	15.9	16.9	17.9	16.2	17.0	18.1	16.6	18.2	22.4	19.6	32.4	95.1
262	10241400	Little Creek near Paragonah, Utah	0.600	1.00	1.30	0.800	1.40	2.00	1.40	2.30	5.30	1.60	3.70	8.70
263	10241430	Red Creek near Paragonah, Utah	0.800	1.00	1.20	³ 0.900	² 1.10	² 1.80	1.50	2.10	3.20	2.10	3.10	7.00
264	10241470	Center Creek above Parowan Creek near Parowan, Utah	3.60	4.50	5.20	4.00	4.80	5.60	4.80	6.10	7.90	6.20	8.10	12.0
265	10241600	Summit Creek near Summit, Utah	1.10	1.60	2.30	1.30	2.00	2.80	2.30	4.10	9.00	8.20	15.2	26.7
266	10242000	Coal Creek near Cedar City, Utah	8.80	12.0	14.4	11.9	16.5	24.3	23.5	43.4	87.6	51.6	111	225

Appendix F. Monthly and annual streamflow statistics for streamflow-gaging stations in region 7 in Utah and bordering states used in the regional regression analysis—Continued.

[Map identifier, refers to the map location in *Figure 1*; P80, daily mean discharge exceeded 80 percent of the time during the specified month, in cubic feet per second; P50, daily mean discharge exceeded 50 percent of the time during the specified month, in cubic feet per second; P20, daily mean discharge exceeded 20 percent of the time during the specified month, in cubic feet per second; Annual mean discharge, in cubic feet per second]

Map identifier	Streamflow-gaging station number	Streamflow-gaging station name	June			July			August			September			Annual mean discharge
			P80	P50	P20	P80	P50	P20	P80	P50	P20	P80	P50	P20	
243	09404450	East Fork Virgin River near Glendale, Utah	6.10	11.2	20.3	5.50	9.00	14.1	5.90	9.00	14.5	6.40	9.60	13.4	18.0
244	09404700	East Fork Virgin River near Mount Carmel Junction, Utah	1.20	2.50	12.8	0.500	1.40	5.80	0.400	1.90	5.20	0.800	2.80	12.6	16.9
245	09404900	East Fork Virgin River near Springdale, Utah	36.7	40.2	48.2	35.8	38.2	42.2	36.4	39.0	44.8	35.9	40.9	46.6	57.7
246	09405420	North Fork Virgin River below Bulloch Canyon near Glendale, Utah	15.1	20.6	33.6	11.4	16.2	21.1	8.80	14.2	21.2	8.50	11.5	17.5	19.7
247	09405500	North Fork Virgin River near Springdale, Utah	47.0	70.8	142	38.5	54.1	77.8	37.6	51.7	71.2	35.3	47.8	63.3	104
248	09406000	Virgin River at Virgin, Utah	72.1	103	212	61.0	84.9	129	266.1	290.3	2139	265.1	287.7	2132	200
249	09406300	Kanarra Creek at Kanarraville, Utah	2.40	4.10	8.00	2.10	2.80	4.20	1.90	2.40	3.40	1.70	2.10	2.80	4.15
250	09406700	South Ash Creek below Mill Creek near Pintura, Utah	3.10	7.50	21.6	2.20	4.40	12.5	1.50	2.90	6.70	1.20	1.90	4.20	6.90
251	09407200	Ash Creek below West Field Ditch at Toquerville, Utah	8.30	17.5	34.0	8.20	16.8	26.6	8.80	15.0	21.4	9.30	15.0	19.0	22.3
252	09408000	Leeds Creek near Leeds, Utah	3.60	9.20	23.4	3.40	6.70	20.2	2.90	4.60	11.4	2.50	3.60	7.20	7.65
253	09408150	Virgin River near Hurricane, Utah	167.3	192.8	261	165.4	183.6	142	163.1	186.8	1138	167.1	186.8	1128	1249
254	09408400	Santa Clara River near Pine Valley, Utah	24.70	10.8	245.1	2.90	5.00	219.0	2.20	3.40	9.90	1.80	2.80	6.10	10.2
255	09409500	Moody Wash near Veyo, Utah	0.200	0.400	0.900	0.00	0.100	0.100	0.00	0.00	0.100	0.00	0.00	0.100	2.84
256	09410000	Santa Clara River above Winsor Dam near Santa Clara, Utah	8.80	17.5	30.7	5.20	11.2	20.9	25.40	29.80	218.3	25.00	28.70	215.5	221.0
257	09413900	Beaver Dam Wash near Enterprise, Utah	0.900	1.70	3.60	0.200	0.600	2.20	0.200	0.700	1.60	0.600	1.20	2.10	10.5
258	10173450	Mammoth Creek above West Hatch Ditch near Hatch, Utah	36.9	95.0	329	18.9	37.5	87.0	13.6	26.3	50.4	10.8	22.2	36.8	49.0
259	10174500	Sevier River at Hatch, Utah	274.5	2155	2451	253.5	292.7	2175	49.4	78.6	127	47.1	70.0	109	121
260	10183900	East Fork Sevier River near Rubys Inn, Utah	6.40	12.2	31.7	4.40	7.30	14.7	4.70	7.80	13.6	5.50	7.90	11.2	17.3
261	10185000	Antimony Creek near Antimony, Utah	116.7	184.4	233.3	216.1	169	179	15.2	16.6	18.0	15.4	16.5	17.8	21.1
262	10241400	Little Creek near Paragonah, Utah	1.30	2.80	5.90	0.700	1.50	2.90	0.400	0.900	1.90	0.300	0.700	1.20	1.90
263	10241430	Red Creek near Paragonah, Utah	1.30	1.80	2.80	0.900	1.30	1.90	0.900	1.20	1.80	0.900	1.10	1.40	21.71
264	10241470	Center Creek above Parowan Creek near Parowan, Utah	6.50	9.20	14.7	6.00	9.30	13.9	4.60	6.20	8.80	4.30	5.10	7.10	6.57
265	10241600	Summit Creek near Summit, Utah	3.50	7.10	14.4	1.70	2.90	4.80	1.20	1.90	3.20	1.20	1.60	2.40	4.71
266	10242000	Coal Creek near Cedar City, Utah	18.6	39.3	108	10.5	17.8	31.8	8.80	13.9	20.9	7.80	11.1	15.4	34.1

¹Basin characteristics determined to be outliers, not used in regression analysis.

²Exceedance discharge determined to be outliers, not used in some regression analyses.

