U.S. DEPARTMENT
OF AGRICULTURE,
FOREST SERVICE

Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Idaho

Water-Resources Investigations Report 01–4093

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

This page intentionally left blank

Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Idaho

By Jon E. Hortness *and* Charles Berenbrock

Water-Resources Investigations Report 01–4093

Prepared in cooperation with
U.S. Department of Agriculture,
Forest Service

Boise, Idaho
2001

U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

Any use of firm, trade, and brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Government.

Additional information can be obtained from:

District Chief
U.S. Geological Survey
230 Collins Road
Boise, ID 83702-4520
http://idaho.usgs.gov

Copies of this report can be purchased from:

U.S. Geological Survey
Information Services
Box 25286
Federal Center
Denver, CO 80225
e-mail: infoservices@usgs.gov

Copies of this report also are available in PDF format, which can be viewed using Adobe Acrobat Reader, at URL:

http://idaho.usgs.gov/public/reports.html

CONTENTS

Abstract 1
Introduction 1
Purpose and scope 1
Description of study area 1
Previous investigations 4
Estimating streamflow statistics using basin characteristics 4
Streamflow data 4
Basin characteristics 5
Determination of regions 6
Estimation method 6
Reliability and limitations 8
Application of method 9
Example 1 9
Example 2 10
Example 3 10
Summary 10
References cited 11
Appendices
A. Selected streamflow-gaging stations and periods of record used in regression analysis 25
B. Monthly and annual streamflow statistics for selected streamflow-gaging stations 28
C. Basin characteristics for selected streamflow-gaging stations 34

FIGURES

1. Map showing location of streamflow-gaging stations used in regional regression analysis, Idaho 2
2. Map showing location of regions defined for use in regional regression analysis, Idaho 7
3. Graph showing joint distribution of mean basin elevation and mean precipitation for gaged sites in region 2, Idaho 9

TABLES

1. Selected data sources used to obtain basin characteristics for regional regression analysis 5
2. Description of selected basin characteristics used in final estimating equations 5
3. Results of regional regression analysis based on data from 13 gaging stations for region 1 15
4. Results of regional regression analysis based on data from 26 gaging stations for region 2 16
5. Results of regional regression analysis based on data from 9 gaging stations for region 3 17
6. Results of regional regression analysis based on data from 43 gaging stations for region 4 18
7. Results of regional regression analysis based on data from 30 gaging stations for region 5 19
8. Results of regional regression analysis based on data from 23 gaging stations for region 6 20
9. Results of regional regression analysis based on data from 25 gaging stations for region 7 21
10. Results of regional regression analysis based on data from 31 gaging stations for region 8 22
11. Maximum and minimum values of basin characteristics used in regional regression analysis 8

CONVERSION FACTORS, VERTICAL DATUM, AND WATER YEAR

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
foot per mile (ft/mi)	0.1894	meter per kilometer
inch (in.)	25.4	millimeter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer

Sea level: In this report, sea level refers to the North American Vertical Datum of 1988 (NAVD of 1988) a vertical control datum established by the minimum-constraint adjustment of Canadian-Mexican-United States leveling observations and held fixed at Father Point/Rimouski, Quebec, Canada.

Water year: In U.S. Geological Survey reports dealing with surface-water supply, a water year is the 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends; thus, the water year ending September 30, 1999, is called the 1999 water year.

Estimating Monthly and Annual Streamflow Statistics at Ungaged Sites in Idaho

By Jon E. Hortness *and* Charles Berenbrock

ABSTRACT

Updated monthly and annual streamflow information for the many ungaged streams throughout Idaho is needed to assist planners and managers with issues regarding fish and wildlife, water rights, and other land and water uses. To provide this information, the U.S. Geological Survey used a multiple-regression analysis to develop equations for estimating daily mean discharge exceeded 80, 50, and 20 percent of the time each month (80-, 50-, and 20-percent monthly exceedances) and mean annual discharge values at ungaged sites. The analysis produced estimating equations that relate specific streamflow statistics to basin characteristics. The standard errors of estimate, in $\log_{10}$, of the final estimating equations ranged from a minimum of 0.072 (+18.1 to -15.3 percent) to a maximum of 0.498 (+214.8 to -68.2 percent).

The estimating equations might not yield reliable results for sites with basin characteristic values outside of the range of values used to develop the equations. The equations also are not applicable for regulated streams or those that exhibit significant gains and (or) losses as a result of spring flow, seepage through permeable streambeds, or irrigation diversions.

The equations generally were more reliable for estimating the high monthly streamflow statistics (20-percent exceedances) than for estimating the low streamflow statistics (80-percent exceedances) in each region and all streamflow statistics in regions where annual streamflow is relatively low.

INTRODUCTION

Extreme variability in streamflow across the State of Idaho can complicate decision-making processes for planners and managers who frequently deal with issues regarding fish and wildlife, water rights, and other land and water uses. Monthly and annual streamflow information is needed to assist these planners and managers in making informed decisions. This information is available at sites where long-term gaging stations are located; however, many streams in Idaho are ungaged.

Kjelstrom (1998) outlined methods for estimating monthly exceedance discharge values at ungaged sites in the Salmon and Clearwater River Basins in central Idaho, and Horn (1988) developed estimates for mean annual discharge at ungaged sites across Idaho. However, estimates of monthly exceedance values are needed throughout the State, and Horn s mean annual estimates were based on data only through 1977. Because of the need for updated monthly and annual discharge information at ungaged sites throughout Idaho, the U.S. Geological Survey (USGS), in cooperation with the U.S. Forest Service, began a study to develop techniques for estimating long-term daily mean discharge exceeded 80, 50, and 20 percent of the time each month (80-, 50-, and 20-percent exceedance values) and mean annual discharge.

Purpose and Scope

This report summarizes the techniques used to estimate various monthly and annual streamflow statistics using regional regression equations and describes the associated reliability and limitations. Equations were developed to estimate the 80-, 50-, and 20-percent monthly exceedance discharges and the mean annual discharge at ungaged, unregulated sites. Standard errors of estimate were calculated to help predict the reliability and accuracy of each equation.

Description of Study Area

The study area (fig. 1) includes the entire State of Idaho and areas of adjacent States where particular drainage basins cross over State boundaries. The adja-

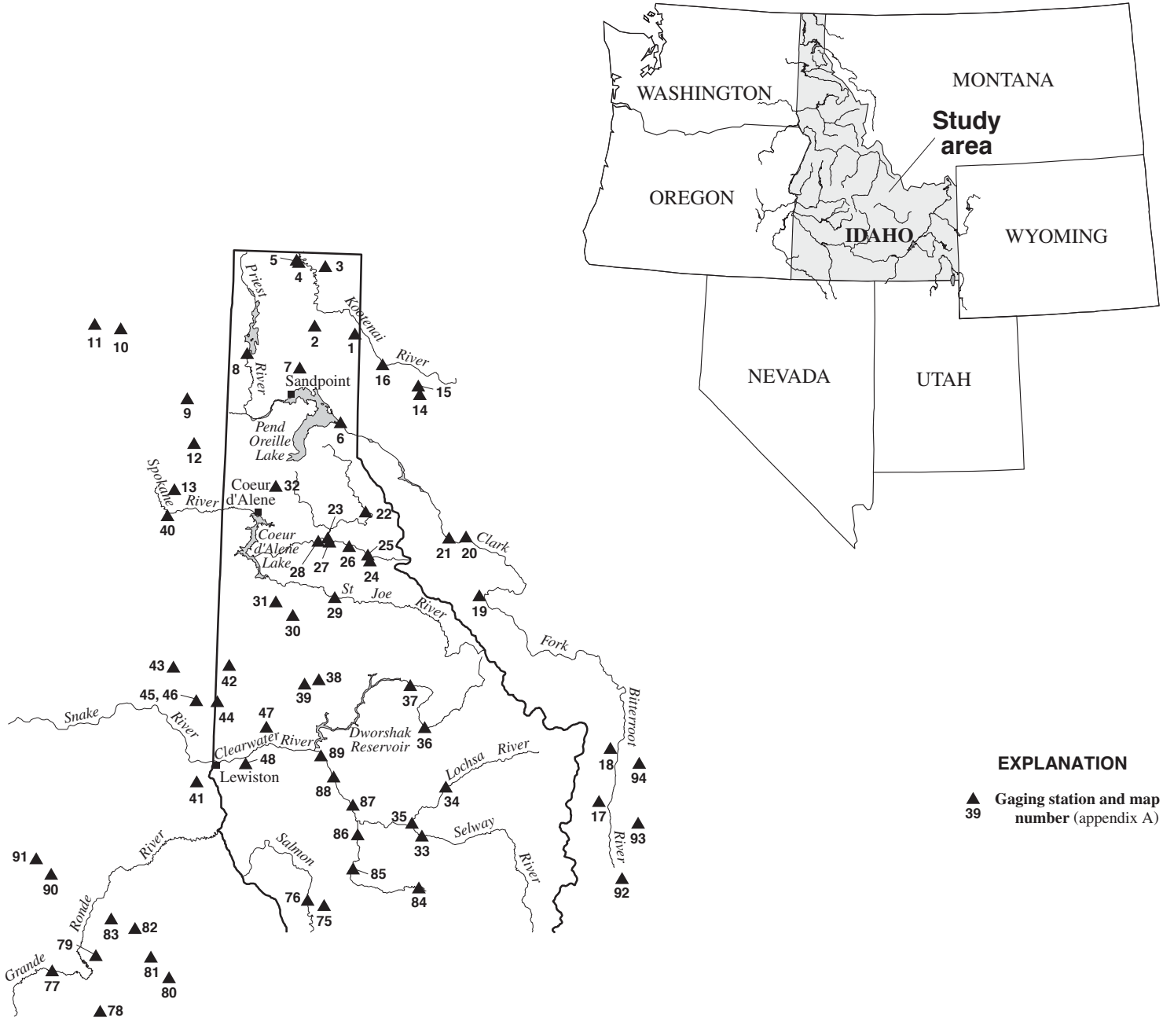
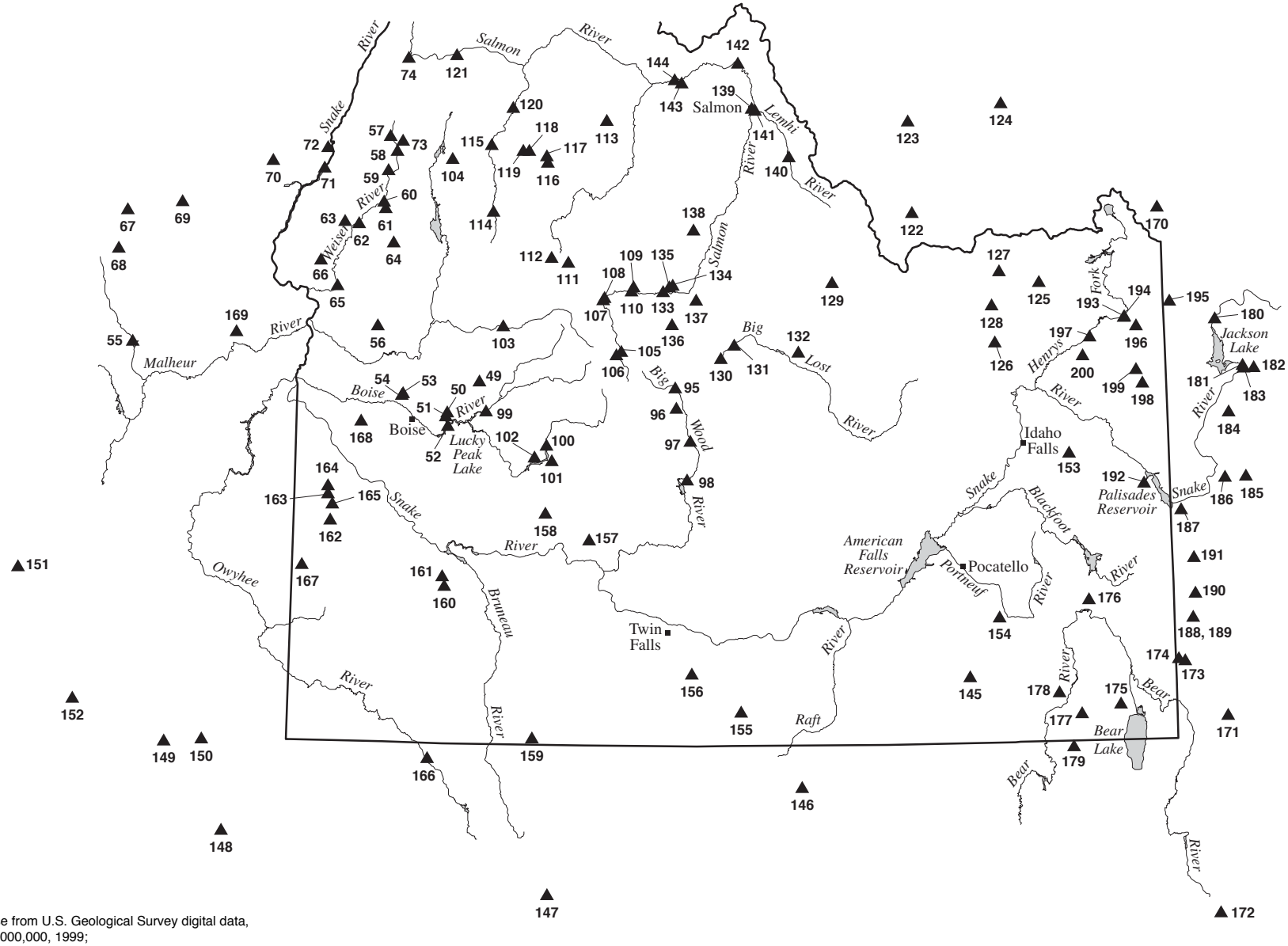


Figure 1. Location of streamflow-gaging stations used in regional regression analysis, Idaho.



Base from U.S. Geological Survey digital data,
1:2,000,000, 1999;
Transverse Mercator projection
Factor at central meridian: 0.99960
Longitude of central meridian: -114° 00'
Latitude of origin: 42° 00'
False easting (meters): 500,000.0
False northing (meters): 100,000.0

0 20 40 60 80 100 MILES

0 20 40 60 80 100 KILOMETERS

cent States partially included in the study area are Washington, Oregon, Nevada, Utah, Wyoming, and Montana. The northern and central parts of the area are composed mainly of rugged, mountainous terrain; broad plains and mildly sloping valleys and hills predominate in the south. Geologic features across the study area consist of sedimentary, igneous, and metamorphic rocks ranging in age from Precambrian to Holocene (Bond, 1978). The granitic Idaho batholith is the major structural feature in the central part of the study area, and basalt covers much of the southern and western parts (Ross and Savage, 1967).

Most precipitation in the study area results from storms moving inland from the Pacific Ocean. The amount of precipitation varies widely throughout the area and is greatly affected by topography. Precipitation ranges from less than 10 in. per year on the Snake River Plain in south-central Idaho to 60 to 70 in. per year in the central mountains of Idaho (Molnau, 1995). The most significant amounts of precipitation are a direct result of orographic effects and occur mainly in the winter months. Spring and summer thunderstorms in the southern part of the study area sometimes produce large amounts of precipitation. Resulting streamflow varies geographically and seasonally and can be affected by land use and vegetation. During much of the year, streamflow in most unregulated streams in the study area is minimal base flow; during April, May, June, and July, streamflow is significantly higher, primarily as a result of snowmelt. Occasionally during the winter months, large frontal systems carrying warmer air release moisture as rain on the snowpack and frozen ground, which results in rapid snowmelt and high runoff rates, particularly at elevations less than 6,000 ft above sea level (National Oceanic and Atmospheric Administration, 1971).

PREVIOUS INVESTIGATIONS

Two previous studies dealt with developing regional regression equations for use in estimating mean annual discharges at ungaged sites in Idaho. Quillian and Harenberg (1982) divided the State into nine regions and developed separate regression equations for each. The following basin characteristics were used in one or more of their equations: basin area, mean annual precipitation, percent forest cover, longitude of the gaging station, and mean basin elevation. Using streamflow data through 1977, Horn (1988) developed a method for estimating mean annual discharges in an effort to define the drought characteristics of streams across Idaho. He divided the State into two regions and used basin area, mean annual precipitation, and percent forest cover to estimate streamflow statistics.

Kjelstrom (1998) developed a method for estimating the 20-, 50-, and 80-percent monthly exceedance discharge values for the Salmon and Clearwater River Basins in central Idaho, using the mean monthly discharge and a multiplication factor. This method pertains only to the approximately 1,050 subbasins identified by Lipscomb (1998), who estimated the mean monthly discharges for each subbasin by apportioning mean annual discharges into monthly increments on the basis of records from gaging stations selected as being characteristic of the subbasin. Lipscomb estimated the mean annual discharges by using the regional regression equations developed by Quillian and Harenberg (1982).

ESTIMATING STREAMFLOW STATISTICS USING BASIN CHARACTERISTICS

Using multiple-regression equations to relate streamflow statistics to various basin and climatic variables (basin characteristics) is a common method for estimating streamflow at ungaged sites. Once the equations have been developed, streamflow statistics at ungaged sites can be estimated by determining the necessary basin characteristics and inserting that information into the regression equations. In this study, regression equations were developed for use in estimating 80-, 50-, and 20-percent monthly exceedance discharges (Q.80, Q.50, and Q.20) and the mean annual discharge (Qa). These statistics are commonly used for analyzing streamflow.

Streamflow Data

Daily mean discharge values from 200 continuous-record gaging stations were used to develop the regression equations (U.S. Geological Survey, 1955-2000). Each gaging station had at least 10 years of record through water year 1999. Gaging stations located on streams where flows are regulated, where diversions significantly affect flows, or where significant dis-

charge from springs augments streamflow were not included in the analysis. The locations of all gaging stations used in the analysis are shown in figure 1. The map numbers that correspond to the gaging stations shown in figure 1, the station identification number, station name, and period of record for each are listed in appendix A. Monthly and annual streamflow statistics computed for each station are listed in appendix B.

Basin Characteristics

More than 50 separate basin characteristics were obtained for each of the 200 gaging stations included in the study. All basin characteristics were obtained using Arc Macro Language programs written for Arc/Info (Environmental Systems Research Institute, Inc., 1999). These programs generated the basin characteristic values from the datasets listed in table 1. Several basin characteristics were removed from consideration after correlation plots of the data were reviewed. Generally, if two basin characteristics correlated well, the one that was the least difficult to obtain was kept and the other was removed. Other characteristics were removed because of missing data or difficulty in obtaining the data. By following this process, nine standard basin characteristics were retained for use in the multiple-regression analysis. Of the nine characteristics used in the analysis, eight were included in at least one of the final equations. These eight standard characteristics were: drainage area (A), mean basin elevation (E), basin relief (BR), slopes greater than 30 percent (S30), mean annual precipitation (P), forested area (F), basin slope (BS), and main channel slope (MCS). Basin azimuth also was included in the analysis but was not used in any of the final equations. Detailed information on the eight basin characteristics used in the equations is listed in table 2, and basin characteristic values obtained for each gaging station are listed in appendix C. One percent was added to the measured values for S30

Table 1. Selected data sources used to obtain basin characteristics for regional regression analysis

[Multiply meter by 3.281 to obtain foot; multiply kilometer (km) by 0.6214 to obtain mile]

Dataset name	Source description
National Elevation Dataset (NED)	Basin characteristics were calculated using 30-meter resolution digital elevation data (*http://gisdata.usgs.gov/ned/*)
National Elevation Dataset Hydrologic Derivatives (NED-H)	Hydrologic derivatives of NED data were developed using procedures similar to those in Stage 1 processing, using a custom projection for Idaho (*http://edcnts12.cr.usgs.gov/ned-h/about/Stage1.html*)
National Land Cover Dataset (NLCD)	Vogelmann, J.E., Sohl, T.L., Campbell, P.V., and Shaw, D.M., 1998, Regional land cover characterization using Landsat Thematic Mapper data and ancillary data sources: Environmental Monitoring and Assessment v. 51, p. 415–428 (*http://edcwww.cr.usgs.gov/programs/lccp*)
Idaho map of mean annual precipitation	Molnau, M., 1995, Mean annual precipitation, 1961–1990, Idaho: Moscow, University of Idaho, Agricultural Engineering Department, State Climate Program, scale 1:1,000,000 (*http://snow.ag.uidaho.edu/Climate/reports.html*)
Western United States average monthly or annual precipitation	Daly, C., and Taylor, G., 1998, Western United States average monthly or annual precipitation, 1961–90, Oregon: Portland, Water and Climate Center of the Natural Resources Conservation Service, grid-cell resolution 4 km (*http://www.ocs.orst.edu/prism/prism_new.html*)

Table 2. Description of selected basin characteristics used in final estimating equations

[Multiply meter by 3.281 to obtain foot; multiply kilometer (km) by 0.6214 to obtain mile]

Basin characteristic and symbol	Description and estimating technique
Drainage area (A)	Area of the basin that contributes surface runoff, in square miles; estimated using Arc/Info Grid with 30-meter resolution digital elevation models (DEMs)
Mean basin elevation (E)	Mean elevation of the basin, in feet above sea level; estimated using Arc/Info Grid and averaging elevations using 30-meter resolution DEMs
Basin relief (BR)	Maximum relief of the basin, in feet; estimated using Arc/Info Grid by subtracting the lowest elevation in the basin from the highest using 30-meter resolution DEMs
Slopes greater than 30 percent (S30)	Area of the basin with slopes greater than 30 percent, in percent of drainage area; estimated using the "average maximum technique" in Arc/Info Grid with 30-meter resolution DEMs
Mean annual precipitation (P)	Mean annual precipitation over the entire drainage area, in inches; estimated using Arc/Info Grid with a combination of 500-meter (within Idaho) and 4-km (outside of Idaho) resolution precipitation grids
Forested area (F)	Area of the basin containing forest, in percent of drainage area; estimated using Arc/Info Grid with a 37-meter resolution land cover grid
Basin slope (BS)	Average slope of the basin, in percent; estimated using the "average maximum technique" in Arc/Info Grid with 30-meter resolution DEMs
Main channel slope (MCS)	Slope of the main channel from basin outlet to basin divide, in feet per mile; estimated by determining the difference in elevations at points 85 and 10 percent of the main channel upstream from the outlet, then dividing by 0.75 times the main channel length

and F to ensure that zero values, which cannot be transformed, would not result at any site. Measured values for E and BR were divided by 1,000 to allow for more convenient coefficients in the final equations. The variables that represent the adjusted values are denoted with an asterisk in the estimating equations (S30*, F*, E*, and BR*).

Determination of Regions

In regional streamflow frequency analyses, attempts are made to define regions that are hydrologically homogeneous in terms of the characteristics being studied (Haan, 1977). Thus, a graphical cluster analysis was performed using the basin characteristics obtained for the 200 gaging stations included in the study. This analysis revealed several unique groupings of basin characteristics across the State. The final groupings were based on mean basin elevation, basin slope, percentage of basin covered by forest, and mean annual precipitation. On the basis of the cluster analysis and the resulting final groupings of basin characteristics, the State was divided into eight regions (fig. 2) and separate equations were developed for each. The region boundaries were determined on the basis of the following factors: (1) grouping of similar basin characteristics that were revealed in the cluster analysis; (2) geographic features, such as large mountain ranges or breaks between mountains and plains; and (3) engineering judgment based on general knowledge of the area. A part of the area commonly referred to as the eastern Snake River Plain was excluded from the analysis for several reasons: (1) Most of the streams in this region either are regulated or are significantly affected by irrigation diversions, (2) several springs with extremely large discharges add significant flow to streams in the region, and (3) the lithology of the area consists mainly of layered basalts that exhibit extremely high rates of infiltration. The effects of these features on the hydrology of the area cannot be characterized by a regional regression approach.

Estimation Method

For use in the multiple-regression analysis, all streamflow and basin characteristic data were transformed to base-10 logarithms. This transformation was performed to obtain a linear regression model and to achieve equal variance about the regression line. The linear regression model makes it possible to perform an ordinary least-squares (OLS) analysis from which the regression constants can be computed. Equal variance about the regression line satisfies a basic assumption of regression methods, which states that the distribution of errors about the regression line is normal and constant throughout the range (Riggs, 1968).

A statistical computer software program, Statit (Statware, Inc., 1992), was used to derive the estimating equations in the following linear form:

$$\log Q = \log a + b1 \log B + b2 \log C + \ldots + bn1 , \quad (1)$$

where Q (dependent variable) is the desired monthly or annual streamflow statistic, in cubic feet per second (80-, 50-, or 20-percent exceedance or mean annual discharge); a is the multiple-regression constant; $b1$, $b2$, ... bn are the regression coefficients; and B, C, ... N are the values of the required basin characteristics (independent variables).

The antilogarithms of all values in equation 1 resulted in the following nonlinear form of the estimating equation:

$$Q = aB^{b1}C^{b2}\ldots N^{bn} . \quad (2)$$

Statit uses OLS regression techniques to determine the best variables for use in the regression equations. All possible combinations of variables were analyzed and the best combinations were chosen on the basis of the standard error of estimate (SEE). The SEE is a measure of the fit of the regression equation to the observed data. The equation with the smallest SEE results in the narrowest confidence limits and thus, generally, the most reliable estimating equation (Haan, 1977).

For any given month, the basin characteristics that resulted in the best overall fit (smallest average SEE) for all of the equations were used as the independent variables in all three estimating equations. This ensures that the correlation structure between the streamflow statistics for each month is preserved, which results in stable and consistent estimates of the statistics (Haan, 1977). Estimating equations were developed for each region and are listed in tables 3 through 10 (back of report), along with the associated errors for each. The SEEs presented in $\log_{10}$ represent the error of the transformed equations. The SEEs presented in a percentage range represent the error of the

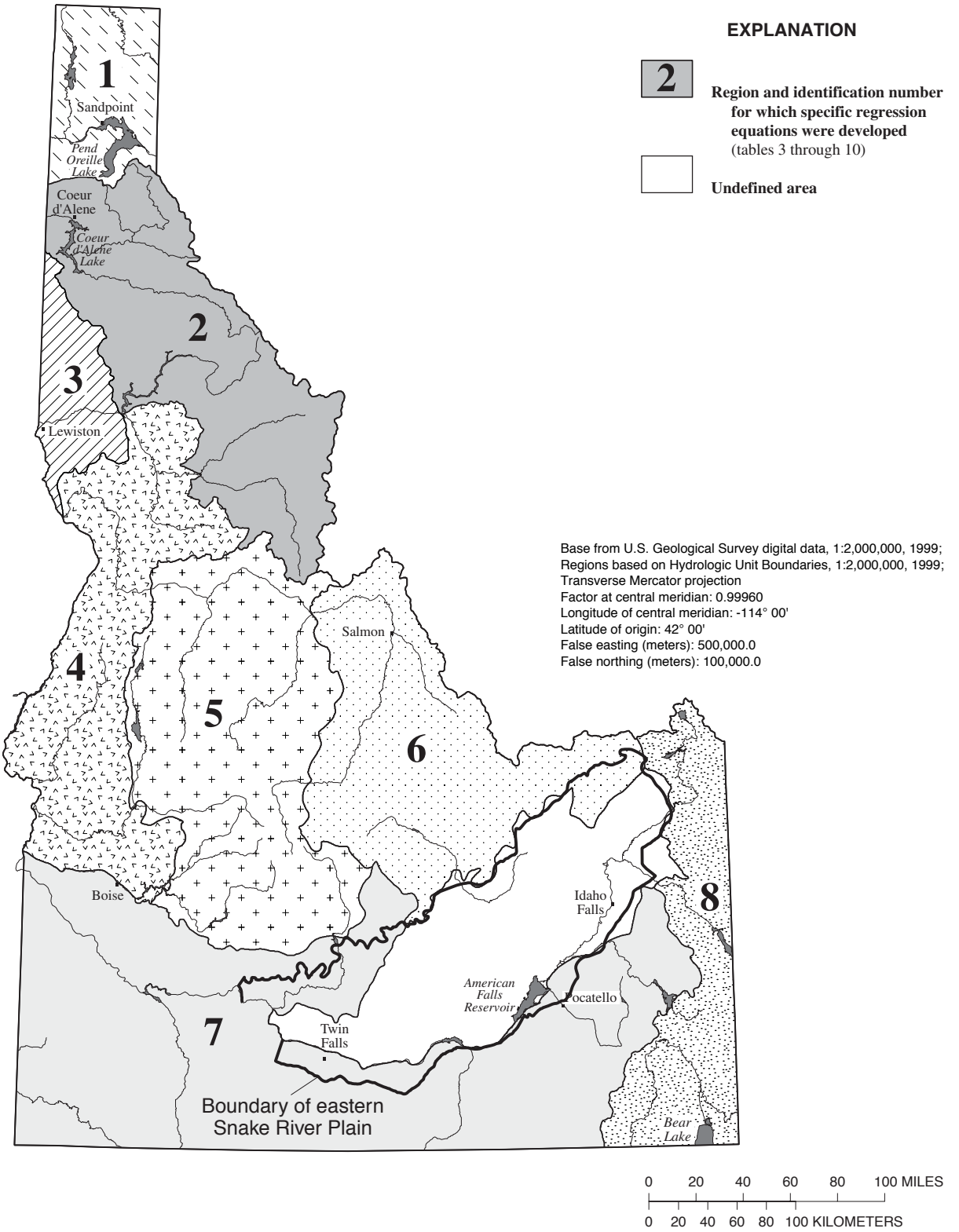


Figure 2. Location of regions defined for use in regional regression analysis, Idaho.

final, untransformed equations based on equations presented by Riggs (1968).

RELIABILITY AND LIMITATIONS

The SEEs for the equations, in $\log_{10}$, over all eight regions ranged from a minimum of 0.072 for Qa in region 3 to a maximum of 0.498 for August (Q.80) in region 7. The standard errors of estimate for these streamflow statistics exhibited a minimum range of +18.1 to -15.3 percent and a maximum range of +214.8 to -68.2 percent. These error values represent the general reliability of the estimating equations; however, other factors could limit the applicability of the equations.

Because this method is based on a regression analysis, the equations might not be reliable for sites where the basin characteristics are outside of the range of characteristics that were used to develop the equations (table 11). In addition, using basin characteristic values near their extremes (maximum or minimum, table 11) might result in unreliable and erroneous estimates. Figure 3 shows a "cloud of common values" for two of the four basin characteristics used in equations for February in region 2. If the minimum value for mean annual precipitation and the maximum value for mean basin elevation were used, this combination would plot outside of the "cloud of common values" and, thus, the equations might result in unreliable estimates. Generating basin characteristic values by using datasets or algorithms other than those described in this study will also result in estimates of unknown reliability. The standard errors of estimate for each equation are applicable only if the datasets presented in table 1 are used to obtain the required basin characteristics and the specific algorithms described in table 2

Table 11. Maximum and minimum values of basin characteristics used in regional regression analysis

[A, drainage area, in square miles; E, mean basin elevation, in feet above sea level; BR, basin relief, in feet; S30, slopes greater than 30 percent, in percent of drainage area; P, mean annual precipitation, in inches; F, forested area, in percent of drainage area; BS, basin slope, in percent; MCS, main channel slope, in feet per mile]

	A	E	BR	S30	P	F	BS	MCS
Region 1								
maximum	1,011.0	5,347.3	5,866.9	81.4	54.3	94.5	46.4	265.6
minimum.	12.5	2,397.7	2,230.6	9.4	25.1	54.6	12.2	11.1
Region 2								
maximum	1,913.1	6,649.7	7,789.6	89.6	60.9	95.1	58.8	466.2
minimum.	3.0	3,465.5	1,643.9	31.7	29.6	50.3	23.8	18.5
Region 3								
maximum	674.9	3,752.2	5,098.9	57.5	30.1	63.4	35.4	139.3
minimum.	17.6	2,647.1	1,442.8	0.1	19.3	0.6	10.0	11.8
Region 4								
maximum	13,418.3	7,461.3	11,152.1	87.0	64.6	93.0	57.2	328.9
minimum.	4.0	3,528.6	1,821.4	17.7	15.9	4.8	18.7	17.2
Region 5								
maximum	12,228.0	8,204.0	10,701.3	77.8	44.5	88.7	46.7	213.0
minimum.	19.3	6,171.1	2,743.5	24.7	22.4	22.4	20.2	19.9
Region 6								
maximum	6,236.7	9,461.0	9,419.7	94.2	32.0	80.2	66.2	869.9
minimum.	6.4	6,258.1	3,015.2	7.5	15.3	14.5	8.6	18.0
Region 7								
maximum	535.3	7,603.0	5,683.3	55.2	29.1	38.9	35.3	372.8
minimum.	12.5	2,984.4	1,178.3	0.0	8.2	0.0	1.7	18.4
Region 8								
maximum	874.8	8,951.0	6,232.1	86.6	56.0	93.9	49.7	413.0
minimum.	16.3	5,691.9	1,100.5	1.2	14.2	2.3	6.1	24.7

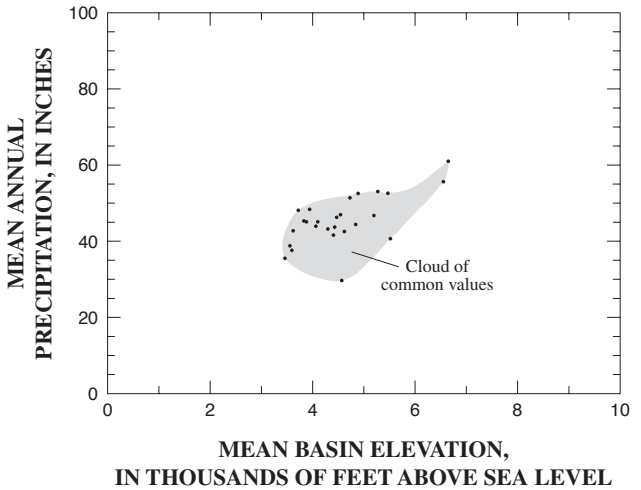


Figure 3. Joint distribution of mean basin elevation and mean precipitation for gaged sites in region 2, Idaho.

are used; however, software programs other than Arc/Info can be used.

The estimating equations are not applicable for streams that exhibit significant gains and (or) losses as a result of spring flow or seepage through highly permeable streambeds. The equations also are not applicable for streams affected by irrigation diversions or large dams that regulate streamflow. The Boise River downstream from Lucky Peak Lake, the Clearwater River downstream from Dworshak Reservoir, and the entire Snake River are examples of stream reaches within the study area for which the estimating equations are not applicable.

In general, the equations are more reliable (lower standard errors of estimate) for estimating the high streamflow statistics (20-percent exceedance) than for estimating the low streamflow statistics (80-percent exceedance) in any given month. This finding is consistent with that of Riggs (1972), who stated that low streamflows are largely affected by localized geology that cannot be quantified easily. Parrett and Cartier (1990) also determined that equations developed for western Montana were generally more reliable for estimating high streamflow statistics.

Although the SEEs of the estimating equations for regions 6 and 7 generally were significantly larger than those for other regions, the natural variability of streamflows in regions 6 and 7 is also significantly greater than in the other regions as a result of more sporadic and generally less precipitation (Molnau, 1995). Prediction of streamflow statistics that have a high degree of variability will always have more uncertainty than prediction of statistics that are more stable.

APPLICATION OF METHOD

Examples of how to use the equations for estimating monthly or annual streamflow statistics are given in the following paragraphs. The third example addresses the situation where the drainage area of a specific site encompasses parts of two separate regions.

Example 1

Estimates of Q.80, Q.50, and Q.20 for the month of June and Qa are required for a stream location in region 5. The required basin characteristics for region 5 equations were determined to be the following: A, 480.5 mi^2; BS, 30.2 percent; S30, 42.8 percent; and F, 71.0 percent. For use in the equations, 1 percent is added to the values for S30 and F.

$$Q.80 = 2.22\text{x}10^{-4}\ A^{0.810}\ BS^{10.7}\ S30^{*\,-7.89}\ F^{*\,0.993} \quad (3)$$

$$Q.80 = 2.22\text{x}10^{-4}\ (480.5)^{0.810}\ (30.2)^{10.7}\ (43.8)^{-7.89}\ (72.0)^{0.993}$$

$$Q.80 = 1{,}770\ \text{ft}^3/\text{s}$$

$$Q.50 = 5.12\text{x}10^{-4}\ A^{0.832}\ BS^{9.84}\ S30^{*\,-7.28}\ F^{*\,1.04} \quad (4)$$

$$Q.50 = 5.12\text{x}10^{-4}\ (480.5)^{0.832}\ (30.2)^{9.84}\ (43.8)^{-7.28}\ (72.0)^{1.04}$$

$$Q.50 = 3{,}060\ \text{ft}^3/\text{s}$$

$$Q.20 = 1.27\text{x}10^{-3}\ A^{0.824}\ BS^{9.37}\ S30^{*\,-6.88}\ F^{*\,0.942} \quad (5)$$

$$Q.20 = 1.27\text{x}10^{-3}\ (480.5)^{0.824}\ (30.2)^{9.37}\ (43.8)^{-6.88}\ (72.0)^{0.942}$$

$$Q.20 = 4{,}340\ \text{ft}^3/\text{s}$$

$$Qa = 1.07\text{x}10^{-2}\ A^{0.831}\ BS^{7.25}\ S30^{*\,-5.42}\ F^{*\,0.448} \quad (6)$$

$$Qa = 1.07\text{x}10^{-2}\ (480.5)^{0.831}\ (30.2)^{7.25}\ (43.8)^{-5.42}\ (72.0)^{0.448}$$

$$Qa = 838\ \text{ft}^3/\text{s}$$

The predicted range of the actual values for each streamflow statistic, based on the range of the standard errors of estimate given in table 7, is as follows:

Q.80--2,620 to 1,200 ft^3/s (+48.0 to -32.4 percent)
Q.50--4,160 to 2,250 ft^3/s (+36.1 to -26.5 percent)
Q.20--5,880 to 3,200 ft^3/s (+35.5 to -26.2 percent)
Qa--1,150 to 608 ft^3/s (+37.7 to -27.4 percent)

Example 2

Estimates of Q.80, Q.50, and Q.20 for the month of April and Qa are required for a stream location in region 2. The required basin characteristics for region 2 equations were determined to be the following: A, 923.0 mi^2; E, 6,220 ft; F, 82.1 percent; and P, 46.5 in. For use in the equations, the value for E is divided by 1,000, and 1 percent is added to the value for F.

$$Q.80 = 1.21x10^{-8}\ A^{0.999}\ E^{*\ -0.783}\ F^{*\ 2.45}\ P^{\ 2.46} \quad (7)$$

$$Q.80 = 1.21x10^{-8}\ (923.0)^{0.999}\ (6.22)^{-0.783}\ (83.1)^{2.45}\ (46.5)^{2.46}$$

$$Q.80 = 1,690\ ft^3/s$$

$$Q.50 = 1.11x10^{-7}\ A^{0.993}\ E^{*\ -0.696}\ F^{*\ 2.17}\ P^{\ 2.30} \quad (8)$$

$$Q.50 = 1.11x10^{-7}\ (923.0)^{0.993}\ (6.22)^{-0.696}\ (83.1)^{2.17}\ (46.5)^{2.30}$$

$$Q.50 = 2,740\ ft^3/s$$

$$Q.20 = 1.26x10^{-6}\ A^{0.978}\ E^{*\ -0.480}\ F^{*\ 1.87}\ P^{\ 2.10} \quad (9)$$

$$Q.20 = 1.26x10^{-6}\ (923.0)^{0.978}\ (6.22)^{-0.480}\ (83.1)^{1.87}\ (46.5)^{2.10}$$

$$Q.20 = 5,140\ ft^3/s$$

$$Qa = 5.14x10^{-6}\ A^{0.986}\ F^{*\ 0.942}\ P^{\ 2.33} \quad (10)$$

$$Qa = 5.14x10^{-6}\ (923.0)^{0.986}\ (83.1)^{0.942}\ (46.5)^{2.33}$$

$$Qa = 2,130\ ft^3/s$$

The predicted range of the actual values for each streamflow statistic, based on the range of the standard errors of estimate given in table 4, is as follows:

Q.80--2,750 to 1,040 ft^3/s (+62.9 to -38.6 percent)
Q.50--4,450 to 1,690 ft^3/s (+62.4 to -38.4 percent)
Q.20--8,130 to 3,250 ft^3/s (+58.2 to -36.8 percent)
Qa--3,330 to 1,360 ft^3/s (+56.5 to -36.1 percent)

Example 3

An estimate of Q.50 for the month of August is required for a stream location in region 4 with a drainage basin encompassing parts of regions 4 and 5. The method for handling sites with parts of the drainage area in two regions is as follows: (1) Calculate values for the entire basin by using equations from the first region, (2) calculate values for the entire basin by using equations from the second region, and (3) average the two values on the basis of the proportion of drainage area in each region (Sando, 1998). The required basin characteristics for region 4 and 5 equations were determined to be the following: A, 853.0 mi^2; BS, 38.5 percent; P, 39.4 in.; S30, 61.2 percent; and F, 42.2 percent. The part of the drainage area located in region 4 covers 622.0 mi^2 and the part in region 5 covers 231.0 mi^2. For use in the equations, 1 percent is added to the values for S30 and F.

(1) REGION 4 EQUATIONS

$$Q.50 = 2.92x10^{-6}\ A^{1.09}\ BS^{\ 1.14}\ P^{\ 1.95} \quad (11)$$

$$Q.50 = 2.92x10^{-6}\ (853.0)^{1.09}\ (38.5)^{1.14}\ (39.4)^{1.95}$$

$$Q.50 = 379\ ft^3/s$$

(2) REGION 5 EQUATIONS

$$Q.50 = 2.52x10^{-4}\ A^{\ 0.865}\ BS^{\ 8.06}\ S30^{*\ -5.89}\ F^{*\ 0.848} \quad (12)$$

$$Q.50 = 2.52x10^{-4}\ (853.0)^{0.865}\ (38.5)^{8.06}\ (62.2)^{-5.89}\ (43.2)^{0.848}$$

$$Q.50 = 344\ ft^3/s$$

(3) AREA-WEIGHTED AVERAGE OF THE VALUES

$$Q.50 = 379\ ft^3/s\ (622.0 / 853.0) + 344\ ft^3/s\ (231.0 / 853.0) \quad (13)$$

$$Q.50 = 370\ ft^3/s$$

SUMMARY

Equations for estimating monthly exceedance (80-, 50-, and 20-percent) and mean annual discharge values at ungaged sites were developed using a multiple-regression analysis. The analysis related streamflow to various basin characteristics. Nine basin characteristics were tested in the final analysis, and eight of these characteristics were used in one or more of the final estimating equations. The standard errors of estimate for these equations, in log_{10}, ranged from a minimum of 0.072 for mean annual discharge in region 3 to a maximum of 0.498 for August (Q.80) in region 7. The standard errors of estimate for these streamflow statistics exhibited a minimum range of +18.1 to -15.3

percent and a maximum range of +214.8 to -68.2 percent. The estimating equations might not yield reliable results for sites with basin characteristic values outside of the range of values used to develop the equations. The equations also are not applicable for regulated streams or those affected by significant gains and (or) losses due to spring flow, seepage through highly permeable streambeds, or irrigation diversions.

The equations were generally more reliable for estimating the high streamflow statistics (20-percent exceedance) than for estimating the low streamflow statistics (80-percent exceedance) in any given month. This is likely because lower streamflow statistics are more difficult to estimate, owing to effects of localized geology. The standard errors of estimate of equations for regions 6 and 7 generally were significantly larger than those for other regions. This could be a result of the natural variability of streamflows in regions 6 and 7, which is also significantly greater than in other regions because precipitation is generally minimal and sporadic.

REFERENCES CITED

Bond, J.G., 1978, Geologic map of Idaho: Moscow, Idaho Bureau of Mines and Geology, 1 sheet, scale 1:500,000.

Environmental Systems Research Institute, Inc., 1999, Getting started with Arc/Info: Redlands, Calif., Environmental Systems Research Institute, Inc., 230 p.

Haan, C.T., 1977, Statistical methods in hydrology: Ames, Iowa State University Press, 378 p.

Horn, D.R., 1988, Annual flow statistics for ungaged streams in Idaho: American Society of Civil Engineers, Journal of Irrigation and Drainage Engineering, v. 114, no. 3, p. 463-474.

Kjelstrom, L.C., 1998, Methods for estimating selected flow-duration and flood-frequency characteristics at ungaged sites in central Idaho: U.S. Geological Survey Water-Resources Investigations Report 94-4120, 10 p.

Lipscomb, S.W., 1998, Hydrologic classification and estimation of basin and hydrologic characteristics of subbasins in central Idaho: U.S. Geological Survey Professional Paper 1604, 49 p.

Molnau, M., 1995, Mean annual precipitation, 1961-1990, Idaho: Moscow, University of Idaho, Agricultural Engineering Department, State Climate Program, scale 1:1,000,000. Also available at URL *http://snow.ag.uidaho.edu/Climate/reports.html*

National Oceanic and Atmospheric Administration, 1971, Climates of the states, climate of Idaho, *in* Climatography of the United States: Silver Spring, Md., no. 60-10, 18 p.

Parrett, Charles, and Cartier, K.D., 1990, Methods for estimating monthly streamflow characteristics at ungaged sites in western Montana: U.S. Geological Survey Water-Supply Paper 2365, 30 p.

Quillian, E.W., and Harenberg, W.A., 1982, An evaluation of Idaho stream-gaging networks: U.S. Geological Survey Open-File Report 82-865, 57 p.

Riggs, H.C., 1968, Some statistical tools in hydrology: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 4, Chap. A1, 39 p.

-----1972, Low-flow investigations: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 4, Chap. B1, 18 p.

Ross, S.H., and Savage, C.N., 1967, Idaho earth science: Moscow, Idaho Bureau of Mines and Geology, 285 p.

Sando, S.K., 1998, Techniques for estimating peak-flow magnitude and frequency relations for South Dakota streams: U.S. Geological Survey Water-Resources Investigations Report 98-4055, 48 p.

Statware, Inc., 1992, Statit user's guide, release 3.0: Corvallis, Oreg., Statware, Inc., 76 p.

U.S. Geological Survey, 1955, Compilation of records of surface waters of the United States through September 1950 -- Part 12, Pacific Slope Basins in Washington and Upper Columbia River Basin: U.S. Geological Survey Water-Supply Paper 1316, 592 p.

-----1956, Compilation of records of surface waters of the United States through September 1950 -- Part 13, Snake River Basin: U.S. Geological Survey Water-Supply Paper 1317, 566 p.

-----1960, Compilation of records of surface waters of the United States through September 1950 -- Part 10, The Great Basin: U.S. Geological Survey Water-Supply Paper 1314, 485 p.

-----1963, Compilation of records of surface waters of the United States, October 1950 through September 1960 -- Part 10, The Great Basin: U.S. Geological Survey Water-Supply Paper 1734, 318 p.

-----1963, Compilation of records of surface waters of the United States, October 1950 through September 1960 -- Part 13, Snake River Basin: U.S.

Geological Survey Water-Supply Paper 1737, 282 p.

-----1964, Compilation of records of surface waters of the United States, October 1950 through September 1960 -- Part 12, Pacific Slope Basins in Washington and Upper Columbia River Basin: U.S. Geological Survey Water-Supply Paper 1736, 415 p.

-----1962-2000, Water resources data, Idaho, water years 1961-1999: U.S. Geological Survey Water-Data Reports ID-61 to ID-99 (published annually).

TABLES 3 -10

Table 3. Results of regional regression analysis based on data from 13 gaging stations for region 1

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; E*, mean basin elevation, in thousands of feet above sea level; BR*, basin relief, in thousands of feet; F*, forested area, in percent of drainage area plus 1 percent; Qa, mean annual discharge, in cubic feet per second]

Region 1													
Month	**Equation**								**Standard error of estimate (log_{10})**	**Standard error of estimate (percent)**			
October	Q.80	=	9.76E-01	A	$^{0.792}$	E*	$^{-0.435}$		0.223	67.1	to	-40.2
	Q.50	=	4.29E-01	A	$^{0.858}$	E*	$^{0.225}$		0.203	59.4	to	-37.3
	Q.20	=	5.25E-02	A	$^{0.975}$	E*	$^{1.87}$		0.236	72.3	to	-42.0
November	Q.80	=	4.16E-01	A	$^{0.879}$	E*	$^{0.086}$		0.205	60.1	to	-37.6
	Q.50	=	9.55E-02	A	$^{0.966}$	E*	$^{1.28}$		0.245	75.9	to	-43.1
	Q.20	=	2.85E-02	A	$^{1.00}$	E*	$^{2.54}$		0.270	86.1	to	-46.3
December	Q.80	=	2.32E-01	A	$^{0.954}$	E*	$^{0.324}$		0.230	69.7	to	-41.1
	Q.50	=	1.12E-01	A	$^{0.989}$	E*	$^{1.13}$		0.243	74.8	to	-42.8
	Q.20	=	6.40E-02	A	$^{1.01}$	E*	$^{1.94}$		0.257	80.8	to	-44.7
January	Q.80	=	2.16E-01	A	$^{0.967}$	E*	$^{0.367}$		0.245	75.6	to	-43.0
	Q.50	=	1.45E-01	A	$^{1.00}$	E*	$^{0.856}$		0.242	74.7	to	-42.8
	Q.20	=	1.25E-01	A	$^{1.03}$	E*	$^{1.28}$		0.244	75.2	to	-42.9
February	Q.80	=	9.27E+02	A	$^{0.838}$	F*	$^{-1.65}$		0.198	57.9	to	-36.7
	Q.50	=	8.09E+02	A	$^{0.854}$	F*	$^{-1.53}$		0.207	61.0	to	-37.9
	Q.20	=	5.79E+02	A	$^{0.852}$	F*	$^{-1.33}$		0.221	66.3	to	-39.9
March	Q.80	=	6.97E+02	A	$^{0.875}$	F*	$^{-1.54}$		0.208	61.5	to	-38.1
	Q.50	=	1.69E+02	A	$^{0.918}$	F*	$^{-1.15}$		0.223	67.2	to	-40.2
	Q.20	=	4.92E+01	A	$^{0.869}$	F*	$^{-0.681}$		0.223	67.2	to	-40.2
April	Q.80	=	8.60E-01	A	$^{0.852}$	E*	$^{0.769}$		0.238	73.1	to	-42.2
	Q.50	=	6.89E-01	A	$^{0.862}$	E*	$^{1.34}$		0.222	66.7	to	-40.0
	Q.20	=	4.58E-01	A	$^{0.903}$	E*	$^{1.95}$		0.199	58.1	to	-36.8
May	Q.80	=	8.51E-02	A	$^{0.778}$	E*	$^{3.33}$		0.248	77.0	to	-43.5
	Q.50	=	7.18E-02	A	$^{0.836}$	E*	$^{3.60}$		0.219	65.6	to	-39.6
	Q.20	=	7.59E-02	A	$^{0.860}$	E*	$^{3.75}$		0.204	60.0	to	-37.5
June	Q.80	=	3.25E-02	A	$^{0.861}$	E*	$^{3.23}$		0.278	89.6	to	-47.3
	Q.50	=	1.52E-02	A	$^{0.924}$	E*	$^{4.03}$		0.275	88.2	to	-46.9
	Q.20	=	1.50E-02	A	$^{0.925}$	E*	$^{4.40}$		0.267	85.1	to	-46.0
July	Q.80	=	1.37E-01	A	$^{0.842}$	E*	$^{1.32}$		0.314	106.1	to	-51.5
	Q.50	=	7.35E-02	A	$^{0.901}$	E*	$^{1.99}$		0.277	89.0	to	-47.1
	Q.20	=	2.97E-02	A	$^{0.954}$	E*	$^{2.92}$		0.260	82.0	to	-45.0
August	Q.80	=	1.20E+00	A	$^{0.844}$	BR*	$^{-0.745}$		0.310	104.2	to	-51.0
	Q.50	=	1.11E+00	A	$^{0.831}$	BR*	$^{-0.386}$		0.275	88.5	to	-46.9
	Q.20	=	1.00E+00	A	$^{0.807}$	BR*	$^{0.009}$		0.270	86.4	to	-46.3
September	Q.80	=	1.02E+00	A	$^{0.914}$	BR*	$^{-0.934}$		0.249	77.6	to	-43.7
	Q.50	=	9.77E-01	A	$^{0.904}$	BR*	$^{-0.646}$		0.231	70.2	to	-41.2
	Q.20	=	8.81E-01	A	$^{0.827}$	BR*	$^{-0.073}$		0.237	72.7	to	-42.1
	Qa	=	1.11E-01	A	$^{0.884}$	E*	$^{2.30}$		0.197	57.4	to	-36.5

Table 4. Results of regional regression analysis based on data from 26 gaging stations for region 2

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; BR*, basin relief, in thousands of feet; P, mean annual precipitation, in inches; F*, forested area, in percent of drainage area plus 1 percent; E*, mean basin elevation, in thousands of feet above sea level; Qa, mean annual discharge, in cubic feet per second]

| Region 2 | | |

Table 5. Results of regional regression analysis based on data from 9 gaging stations for region 3

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; E*, mean basin elevation, in thousands of feet above sea level; P, mean annual precipitation, in inches; Qa, mean annual discharge, in cubic feet per second]

Region 3														
Month	**Equation**												**Standard error of estimate (log_{10})**	**Standard error of estimate (percent)**
October	Q.80	=	1.56E-04	A	$^{0.659}$	E*	$^{6.54}$						0.156	43.4 to -30.2
	Q.50	=	2.61E-04	A	$^{0.850}$	E*	$^{5.53}$						0.108	28.3 to -22.1
	Q.20	=	2.49E-04	A	$^{1.00}$	E*	$^{5.17}$						0.113	29.7 to -22.9
November	Q.80	=	1.97E-04	A	$^{0.872}$	E*	$^{5.69}$						0.121	32.1 to -24.3
	Q.50	=	1.83E-04	A	$^{1.06}$	E*	$^{5.20}$						0.125	33.2 to -24.9
	Q.20	=	5.61E-04	A	$^{1.09}$	E*	$^{4.61}$						0.271	86.8 to -46.5
December	Q.80	=	2.61E-04	A	$^{1.02}$	E*	$^{5.00}$						0.095	24.5 to -19.7
	Q.50	=	5.93E-04	A	$^{1.12}$	E*	$^{3.96}$						0.178	50.7 to -33.7
	Q.20	=	3.52E-02	A	$^{1.21}$	E*	$^{1.19}$						0.203	59.7 to -37.4
January	Q.80	=	5.07E-04	A	$^{1.09}$	E*	$^{4.29}$						0.090	22.9 to -18.7
	Q.50	=	5.93E-02	A	$^{1.05}$	E*	$^{1.12}$						0.182	52.2 to -34.3
	Q.20	=	1.74E+00	A	$^{1.10}$	E*	$^{-1.07}$						0.192	55.4 to -35.7
February	Q.80	=	2.09E-04	A	$^{1.08}$	P	$^{2.03}$						0.115	30.3 to -23.2
	Q.50	=	1.70E-04	A	$^{1.03}$	P	$^{2.48}$						0.081	20.5 to -17.0
	Q.20	=	8.51E-05	A	$^{1.02}$	P	$^{3.02}$						0.166	46.5 to -31.8
March	Q.80	=	6.12E-06	A	$^{1.20}$	P	$^{3.11}$						0.113	29.6 to -22.9
	Q.50	=	4.10E-05	A	$^{1.10}$	P	$^{2.94}$						0.111	29.2 to -22.6
	Q.20	=	1.15E-04	A	$^{1.10}$	P	$^{2.85}$						0.172	48.5 to -32.7
April	Q.80	=	5.46E-07	A	$^{1.41}$	P	$^{3.49}$						0.253	78.9 to -44.1
	Q.50	=	4.39E-07	A	$^{1.40}$	P	$^{3.80}$						0.193	55.9 to -35.8
	Q.20	=	4.97E-06	A	$^{1.33}$	P	$^{3.36}$						0.183	52.5 to -34.4
May	Q.80	=	4.25E-05	A	$^{1.27}$	E*	$^{6.15}$						0.183	52.5 to -34.4
	Q.50	=	5.51E-05	A	$^{1.39}$	E*	$^{5.99}$						0.214	63.5 to -38.8
	Q.20	=	2.60E-04	A	$^{1.40}$	E*	$^{5.24}$						0.249	77.6 to -43.7
June	Q.80	=	5.52E-05	A	$^{1.02}$	E*	$^{6.47}$						0.154	42.4 to -29.8
	Q.50	=	4.18E-05	A	$^{1.15}$	E*	$^{6.60}$						0.127	33.8 to -25.3
	Q.20	=	3.96E-05	A	$^{1.24}$	E*	$^{6.79}$						0.183	52.4 to -34.4
July	Q.80	=	1.17E-04	A	$^{0.647}$	E*	$^{6.84}$						0.208	61.3 to -38.0
	Q.50	=	1.03E-04	A	$^{0.882}$	E*	$^{6.29}$						0.127	34.0 to -25.4
	Q.20	=	9.48E-05	A	$^{1.04}$	E*	$^{5.99}$						0.092	23.7 to -19.1
August	Q.80	=	1.95E-04	A	$^{0.337}$	E*	$^{7.32}$						0.370	134.4 to -57.3
	Q.50	=	2.37E-04	A	$^{0.640}$	E*	$^{6.24}$						0.185	53.0 to -34.7
	Q.20	=	2.31E-04	A	$^{0.843}$	E*	$^{5.67}$						0.120	31.8 to -24.1
September	Q.80	=	1.36E-04	A	$^{0.413}$	E*	$^{7.41}$						0.258	81.3 to -44.8
	Q.50	=	2.74E-04	A	$^{0.713}$	E*	$^{5.88}$						0.140	38.1 to -27.6
	Q.20	=	2.94E-04	A	$^{0.866}$	E*	$^{5.40}$						0.093	23.9 to -19.3
	Qa	=	7.73E-05	A	$^{1.10}$	P	$^{2.56}$						0.072	18.1 to -15.3

Table 6. Results of regional regression analysis based on data from 43 gaging stations for region 4

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; BS, basin slope, in percent; P, mean annual precipitation, in inches; E*, mean basin elevation, in thousands of feet above sea level; F*, forested area, in percent of drainage area plus 1 percent; Qa, mean annual discharge, in cubic feet per second]

| Region 4 | | |

Table 7. Results of regional regression analysis based on data from 30 gaging stations for region 5

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; BS, basin slope in percent; S30*, slopes greater than 30 percent, in percent of drainage area plus 1 percent; F*, forested area, in percent of drainage area plus 1 percent; E*, mean basin elevation, in thousands of feet above sea level; Qa, mean annual discharge, in cubic feet per second]

Region 5																
Month	**Equation**													**Standard error of estimate (log_{10})**	**Standard error of estimate (percent)**	
October	Q.80	=	4.01E-03	A	$^{0.857}$	BS	$^{5.83}$	S30*	$^{-4.71}$	F*	$^{0.847}$			0.244	75.4 to -43.0	
	Q.50	=	7.87E-03	A	$^{0.873}$	BS	$^{5.89}$	S30*	$^{-4.56}$	F*	$^{0.528}$			0.154	42.5 to -29.8	
	Q.20	=	8.91E-03	A	$^{0.863}$	BS	$^{6.96}$	S30*	$^{-5.33}$	F*	$^{0.413}$			0.132	35.4 to -26.2	
November	Q.80	=	8.83E-03	A	$^{0.839}$	BS	$^{6.07}$	S30*	$^{-4.98}$	F*	$^{0.735}$			0.262	82.7 to -45.3	
	Q.50	=	1.07E-02	A	$^{0.867}$	BS	$^{6.56}$	S30*	$^{-5.08}$	F*	$^{0.400}$			0.144	39.3 to -28.2	
	Q.20	=	1.10E-02	A	$^{0.850}$	BS	$^{7.53}$	S30*	$^{-5.77}$	F*	$^{0.325}$			0.128	34.4 to -25.6	
December	Q.80	=	2.05E-01	A	$^{0.773}$	BS	$^{6.87}$	S30*	$^{-5.64}$					0.306	102.1 to -50.5	
	Q.50	=	5.22E-02	A	$^{0.834}$	BS	$^{6.97}$	S30*	$^{-5.39}$					0.162	45.3 to -31.2	
	Q.20	=	2.96E-02	A	$^{0.832}$	BS	$^{7.81}$	S30*	$^{-5.92}$					0.156	43.1 to -30.1	
January	Q.80	=	2.57E-01	A	$^{0.776}$	BS	$^{6.84}$	S30*	$^{-5.68}$					0.332	114.6 to -53.4	
	Q.50	=	6.03E-02	A	$^{0.839}$	BS	$^{6.68}$	S30*	$^{-5.20}$					0.177	50.2 to -33.4	
	Q.20	=	4.84E-02	A	$^{0.848}$	BS	$^{7.04}$	S30*	$^{-5.41}$					0.172	48.5 to -32.7	
February	Q.80	=	2.65E-01	A	$^{0.777}$	BS	$^{6.71}$	S30*	$^{-5.57}$					0.345	121.5 to -54.8	
	Q.50	=	6.46E-02	A	$^{0.851}$	BS	$^{6.44}$	S30*	$^{-5.02}$					0.178	50.8 to -33.7	
	Q.20	=	5.32E-02	A	$^{0.869}$	BS	$^{6.35}$	S30*	$^{-4.86}$					0.181	51.5 to -34.0	
March	Q.80	=	5.07E+00	A	$^{0.780}$	E*	$^{-2.08}$	BS	$^{7.79}$	S30*	$^{-6.22}$			0.294	96.6 to -49.1	
	Q.50	=	8.06E-01	A	$^{0.871}$	E*	$^{-1.65}$	BS	$^{6.59}$	S30*	$^{-4.97}$			0.178	50.7 to -33.6	
	Q.20	=	2.86E+00	A	$^{0.866}$	E*	$^{-2.57}$	BS	$^{6.81}$	S30*	$^{-4.95}$			0.189	54.4 to -35.2	
April	Q.80	=	1.07E+02	A	$^{0.919}$	E*	$^{-2.45}$	S30*	$^{-0.00410}$					0.221	66.3 to -39.9	
	Q.50	=	3.66E+02	A	$^{0.900}$	E*	$^{-3.07}$	S30*	$^{0.160}$					0.235	71.8 to -41.8	
	Q.20	=	2.67E+02	A	$^{0.890}$	E*	$^{-2.39}$	S30*	$^{0.103}$					0.231	70.1 to -41.2	
May	Q.80	=	2.29E-01	A	$^{0.790}$	BS	$^{7.42}$	S30*	$^{-5.69}$					0.223	67.1 to -40.2	
	Q.50	=	2.77E-01	A	$^{0.798}$	BS	$^{7.36}$	S30*	$^{-5.56}$					0.189	54.7 to -35.3	
	Q.20	=	5.37E-01	A	$^{0.802}$	BS	$^{7.06}$	S30*	$^{-5.35}$					0.163	45.6 to -31.3	
June	Q.80	=	2.22E-04	A	$^{0.810}$	BS	$^{10.7}$	S30*	$^{-7.89}$	F*	$^{0.993}$			0.170	48.0 to -32.4	
	Q.50	=	5.12E-04	A	$^{0.832}$	BS	$^{9.84}$	S30*	$^{-7.28}$	F*	$^{1.04}$			0.134	36.1 to -26.5	
	Q.20	=	1.27E-03	A	$^{0.824}$	BS	$^{9.37}$	S30*	$^{-6.88}$	F*	$^{0.942}$			0.132	35.5 to -26.2	
July	Q.80	=	9.71E-05	A	$^{0.837}$	BS	$^{9.44}$	S30*	$^{-6.88}$	F*	$^{0.965}$			0.189	54.6 to -35.3	
	Q.50	=	1.91E-04	A	$^{0.824}$	BS	$^{10.7}$	S30*	$^{-7.85}$	F*	$^{0.773}$			0.160	44.7 to -30.9	
	Q.20	=	2.14E-04	A	$^{0.831}$	BS	$^{11.5}$	S30*	$^{-8.36}$	F*	$^{0.705}$			0.145	39.5 to -28.3	
August	Q.80	=	1.04E-04	A	$^{0.864}$	BS	$^{7.72}$	S30*	$^{-5.65}$	F*	$^{1.04}$			0.232	70.7 to -41.4	
	Q.50	=	2.52E-04	A	$^{0.865}$	BS	$^{8.06}$	S30*	$^{-5.89}$	F*	$^{0.848}$			0.200	58.5 to -36.9	
	Q.20	=	4.51E-04	A	$^{0.855}$	BS	$^{8.50}$	S30*	$^{-6.21}$	F*	$^{0.736}$			0.175	49.8 to -33.2	
September	Q.80	=	4.59E-04	A	$^{0.872}$	BS	$^{6.50}$	S30*	$^{-4.98}$	F*	$^{1.03}$			0.243	75.0 to -42.9	
	Q.50	=	1.83E-03	A	$^{0.876}$	BS	$^{6.33}$	S30*	$^{-4.77}$	F*	$^{0.710}$			0.162	45.2 to -31.2	
	Q.20	=	3.51E-03	A	$^{0.863}$	BS	$^{6.63}$	S30*	$^{-4.98}$	F*	$^{0.569}$			0.149	41.0 to -29.1	
	Qa	=	1.07E-02	A	$^{0.831}$	BS	$^{7.25}$	S30*	$^{-5.42}$	F*	$^{0.448}$			0.139	37.7 to -27.4	

Table 8. Results of regional regression analysis based on data from 23 gaging stations for region 6

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; BS, basin slope, in percent; F*, forested area, in percent of drainage area plus 1 percent; E*, mean basin elevation, in thousands of feet above sea level; BR*, basin relief, in thousands of feet; Qa, mean annual discharge, in cubic feet per second]

| Region 6 | | |

Table 9. Results of regional regression analysis based on data from 25 gaging stations for region 7

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; MCS, main channel slope, in feet per mile; F*, forested area, in percent of drainage area plus 1 percent; E*, mean basin elevation, in thousands of feet above sea level; S30*, slopes greater than 30 percent, in percent of drainage area plus 1 percent; A, drainage area, in square miles; BS, basin slope, in percent; P, mean annual precipitation, in inches; Qa, mean annual discharge, in cubic feet per second]

Region 7																				
Month	Equation																	Standard error of estimate (log_{10})	Standard error of estimate (percent)	
October	Q.80	=	2.27E+02	MCS	$^{-1.09}$	F*	$^{0.432}$											0.417	161.2 to -61.7	
	Q.50	=	5.77E+02	MCS	$^{-1.27}$	F*	$^{0.523}$											0.376	137.8 to -58.0	
	Q.20	=	1.56E+03	MCS	$^{-1.43}$	F*	$^{0.568}$											0.309	103.6 to -50.9	
November	Q.80	=	5.28E+02	MCS	$^{-1.26}$	F*	$^{0.503}$											0.334	115.9 to -53.7	
	Q.50	=	9.89E+02	MCS	$^{-1.36}$	F*	$^{0.568}$											0.299	99.2 to -49.8	
	Q.20	=	1.71E+03	MCS	$^{-1.42}$	F*	$^{0.594}$											0.278	89.8 to -47.3	
December	Q.80	=	5.97E+02	MCS	$^{-1.26}$	F*	$^{0.507}$											0.283	91.9 to -47.9	
	Q.50	=	1.02E+03	MCS	$^{-1.35}$	F*	$^{0.565}$											0.282	91.2 to -47.7	
	Q.20	=	1.14E+03	MCS	$^{-1.29}$	F*	$^{0.606}$											0.316	107.0 to -51.7	
January	Q.80	=	1.16E+03	E*	$^{-0.526}$	S30*	$^{0.209}$	MCS	$^{-1.33}$	F*	$^{0.485}$							0.281	90.9 to -47.6	
	Q.50	=	5.82E+03	E*	$^{-1.55}$	S30*	$^{0.468}$	MCS	$^{-1.41}$	F*	$^{0.548}$							0.275	88.4 to -46.9	
	Q.20	=	1.27E+05	E*	$^{-3.85}$	S30*	$^{1.02}$	MCS	$^{-1.49}$	F*	$^{0.705}$							0.277	89.2 to -47.2	
February	Q.80	=	3.49E+03	E*	$^{-1.13}$	S30*	$^{0.488}$	MCS	$^{-1.47}$	F*	$^{0.470}$							0.274	88.1 to -46.8	
	Q.50	=	5.18E+04	E*	$^{-3.06}$	S30*	$^{0.939}$	MCS	$^{-1.53}$	F*	$^{0.537}$							0.300	99.7 to -49.9	
	Q.20	=	3.05E+05	E*	$^{-4.06}$	S30*	$^{1.21}$	MCS	$^{-1.56}$	F*	$^{0.515}$							0.353	125.4 to -55.6	
March	Q.80	=	4.10E-01	A	$^{0.922}$	E*	$^{-1.75}$	S30*	$^{0.354}$	F*	$^{0.537}$							0.364	131.0 to -56.7	
	Q.50	=	1.58E+00	A	$^{1.00}$	E*	$^{-2.97}$	S30*	$^{0.684}$	F*	$^{0.546}$							0.379	139.1 to -58.2	
	Q.20	=	6.34E+00	A	$^{1.04}$	E*	$^{-3.59}$	S30*	$^{0.820}$	F*	$^{0.470}$							0.366	132.2 to -56.9	
April	Q.80	=	1.17E+04	BS	$^{-3.34}$	S30*	$^{2.80}$	MCS	$^{-1.52}$	F*	$^{0.795}$							0.323	110.5 to -52.5	
	Q.50	=	9.86E+03	BS	$^{-2.12}$	S30*	$^{2.01}$	MCS	$^{-1.55}$	F*	$^{0.746}$							0.380	139.6 to -58.3	
	Q.20	=	7.66E+03	BS	$^{-0.607}$	S30*	$^{1.02}$	MCS	$^{-1.57}$	F*	$^{0.570}$							0.417	161.5 to -61.8	
May	Q.80	=	1.28E+01	MCS	$^{-1.48}$	F*	$^{0.817}$	P	$^{1.90}$									0.401	151.5 to -60.2	
	Q.50	=	1.38E+01	MCS	$^{-1.49}$	F*	$^{0.862}$	P	$^{2.13}$									0.448	180.3 to -64.3	
	Q.20	=	1.91E+01	MCS	$^{-1.43}$	F*	$^{0.699}$	P	$^{2.26}$									0.422	163.9 to -62.1	
June	Q.80	=	5.47E+01	MCS	$^{-1.46}$	F*	$^{0.775}$	P	$^{1.21}$									0.387	143.7 to -59.0	
	Q.50	=	3.59E+01	MCS	$^{-1.53}$	F*	$^{0.844}$	P	$^{1.65}$									0.424	165.6 to -62.4	
	Q.20	=	4.31E+01	MCS	$^{-1.55}$	F*	$^{0.739}$	P	$^{1.90}$									0.427	167.4 to -62.6	
July	Q.80	=	2.66E+02	MCS	$^{-1.21}$	F*	$^{0.587}$	P	$^{0.0617}$									0.456	185.6 to -65.0	
	Q.50	=	2.43E+02	MCS	$^{-1.36}$	F*	$^{0.698}$	P	$^{0.464}$									0.407	155.3 to -60.8	
	Q.20	=	2.85E+02	MCS	$^{-1.55}$	F*	$^{0.734}$	P	$^{0.876}$									0.380	140.0 to -58.3	
August	Q.80	=	1.34E+02	MCS	$^{-1.03}$	F*	$^{0.465}$											0.498	214.8 to -68.2	
	Q.50	=	4.80E+02	MCS	$^{-1.28}$	F*	$^{0.571}$											0.471	195.7 to -66.2	
	Q.20	=	9.86E+02	MCS	$^{-1.39}$	F*	$^{0.648}$											0.420	163.3 to -62.0	
September	Q.80	=	1.10E+02	MCS	$^{-0.992}$	F*	$^{0.469}$											0.483	204.1 to -67.1	
	Q.50	=	3.98E+02	MCS	$^{-1.23}$	F*	$^{0.503}$											0.466	192.2 to -65.8	
	Q.20	=	9.48E+02	MCS	$^{-1.36}$	F*	$^{0.547}$											0.435	172.3 to -63.3	
	Qa	=	8.37E-01	A	$^{0.963}$	BS	$^{-3.44}$	S30*	$^{2.52}$	F*	$^{0.646}$							0.316	107.2 to -51.7	

Table 10. Results of regional regression analysis based on data from 31 gaging stations for region 8

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; A, drainage area, in square miles; F*, forested area, in percent of drainage area plus 1 percent; P, mean annual precipitation, in inches; E*, mean basin elevation, in thousands of feet above sea level; BS, basin slope, in percent; S30*, slopes greater than 30 percent, in percent of drainage area plus 1 percent; Qa, mean annual discharge, in cubic feet per second]

| Region 8 | | |

APPENDICES

Appendix A. Selected streamflow-gaging stations and periods of record used in regression analysis

Map number (fig. 1)	Gaging station number	Gaging station name	Period of record (in water years)
		Region 1	
1	12305500	Boulder Creek near Leonia, ID	1928-72,1973-77
2	12311000	Deep Creek at Moravia, ID	1928-72
3	12316800	Mission Creek near Copeland, ID	1958-82
4	12320500	Long Canyon Creek near Porthill, ID	1931-59
5	12321000	Smith Creek near Porthill, ID	1928-60
6	12392155	Lightning Creek at Clark Fork, ID	1989-99
7	12392300	Pack River near Colburn, ID	1958-83
8	12393500	Priest River at Outlet of Priest Lake near Coolin, ID	1912-48
9	12396000	Calispell Creek near Dalkena, WA	1950-73
10	12408500	Mill Creek near Colville, WA	1939-72,1977-86
11	12409000	Colville River at Kettle Falls, WA	1923-99
12	12427000	Little Spokane River at Elk, WA	1948-71
13	12431000	Little Spokane River at Dartford, WA	1929-32,1946-99
		Region 2	
14	12302500	Granite Creek near Libby, MT	1933-34,1936-44,1960-69
15	12303100	Flower Creek near Libby, MT	1960-92
16	12303500	Lake Creek at Troy, MT	1945-57,1983-95
17	12347500	Blodgett Creek near Corvallis, MT	1947-69
18	12350500	Kootenai Creek near Stevensville, MT	1949-53,1957-63
19	12354000	St. Regis River near St. Regis, MT	1910-17,1958-75
20	12389500	Thompson River near Thompson Falls, MT	1911-16,1956-99
21	12390700	Prospect Creek at Thompson Falls, MT	1956-99
22	12411000	North Fork Coeur d'Alene River above Shoshone Creek near Prichard, ID	1950-99
23	12413000	North Fork Coeur d'Alene River at Enaville, ID	1911-13,1939-99
24	12413140	Placer Creek at Wallace, ID	1967-97,1999
25	12413150	South Fork Coeur d'Alene River at Silverton, ID	1967-88,1998-99
26	12413210	South Fork Coeur d'Alene at Elizabeth Park near Kellogg, ID	1987-99
27	12413470	South Fork Coeur d'Alene River near Pinehurst, ID	1987-99
28	12413500	Coeur d'Alene River at Cataldo, ID	1911-12,1920-72,1987-99
29	12414500	St. Joe River at Calder, ID	1911-12,1920-99
30	12414900	St. Maries River near Santa, ID	1966-99
31	12415000	St. Maries River at Lotus, ID	1912-13,1920-66
32	12416000	Hayden Creek below North Fork near Hayden Lake, ID	1948-84,1959,1966-97
33	13336500	Selway River near Lowell, ID	1911-12,1930-99
34	13336900	Fish Creek near Lowell, ID	1958-67
35	13337000	Lochsa River near Lowell, ID	1911-12,1930-99
36	13340500	NF Clearwater River at Bungalow Ranger Station, ID	1945-69
37	13340600	NF Clearwater River near Canyon Ranger Station, ID	1967-99
38	13341300	Bloom Creek near Bovill, ID	1959-72
39	13341400	East Fork Potlatch River near Bovill, ID	1959-72
		Region 3	
40	12424000	Hangman Creek at Spokane, WA	1948-99
41	13334700	Asotin Creek below Kearney Gulch near Asotin, WA	1960-82,1992
42	13345000	Palouse River near Potlatch, ID	1915-19,1966-99
43	13346100	Palouse River at Colfax, WA	1964-73,1976-79
44	13346800	Paradise Creek at University of Idaho at Moscow, ID	1979-99
45	13348000	South Fork Palouse River at Pullman, WA	1934-42,1960-81
46	13348500	Missouri Flat Creek at Pullman, WA	1934-40,1960-79
47	13341500	Potlatch River at Kendrick, ID	1946-60
48	13342450	Lapwai Creek near Lapwai, ID	1975-99
		Region 4	
49	13196500	Bannock Creek near Idaho City, ID	1939-42,1951-72
50	13200000	Mores Creek above Robie Creek near Arrowrock Dam, ID	1951-99
51	13200500	Robie Creek near Arrowrock Dam, ID	1951-72
52	13201000	Mores Creek near Arrowrock, ID	1916-54
53	13207000	Spring Valley Creek near Eagle, ID	1955-59,1961-72
54	13207500	Dry Creek near Eagle, ID	1954-68
55	13216500	North Fork Malheur River above Beulah Reservoir near Beulah, OR	1914,1936-94
56	13250600	Big Willow Creek near Emmett, ID	1962-83
57	13251300	West Branch Weiser River near Tamarack, ID	1959-78
58	13251500	Weiser River at Tamarack, ID	1937-72,1974-76
59	13253500	Weiser River at Starkey, ID	1939-49
60	13256000	Weiser River near Council, ID	1937-53
61	13257000	Middle Fork Weiser River near Mesa, ID	1911-13,1919-22,1937-49,1981-83,1985-88
62	13258500	Weiser River near Cambridge, ID	1939-99
63	13260000	Pine Creek near Cambridge, ID	1938-92
64	13261000	Little Weiser River near Indian Valley, ID	1920-21,1923-27,1938-71
65	13266000	Weiser River near Weiser, ID	1890-91,1894-1904,1910-14,1953-99
66	13267000	Mann Creek near Weiser, ID	1911-13,1920-21,1937-62
67	13269300	North Fork Burnt River near Whitney, OR	1965-80
68	13270800	South Fork Burnt River above Barney Creek near Unity, OR	1963-81
69	13275500	Powder River near Baker, OR	1904-14,1929-68
70	13288200	Eagle Creek above Skull Creek near New Bridge, OR	1958-95
71	13289960	Wildhorse River at Brownlee Dam, ID	1979-96
72	13290190	Pine Creek near Pine, OR	1967-96

Appendix A. Selected streamflow-gaging stations and periods of record used in regression analyses--Continued

Map number (fig. 1)	Gaging station number	Gaging station name	Period of record (in water years)
		Region 4 - Continued	
73	13315500	Mud Creek near Tamarack, ID	1937-38,1946-59
74	13316500	Little Salmon River at Riggins, ID	1951-55,1956-99
75	13316800	NF Skookumchuck Creek near White Bird, ID	1961-72
76	13317000	Salmon River at White Bird, ID	1910-17,1920-99
77	13319000	Grande Ronde River at La Grande, OR	1904-15,1918-23,1926-89
78	13320000	Catherine Creek near Union, OR	1926-96
79	13323600	Indian Creek near Imbler, OR	1938-50
80	13329500	Hurricane Creek near Joseph, OR	1915,1924-78
81	13330000	Lostine River near Lostine, OR	1912-15,1925-91,1995-99
82	13330500	Bear Creek near Wallowa, OR	1915,1924-85,1995-99
83	13331500	Minam River at Minam, OR	1912-14,1965-99
84	13337500	South Fork Clearwater River near Elk City, ID	1945-75
85	13338000	South Fork Clearwater River near Grangeville, ID	1911-16,1923-63
86	13338500	South Fork Clearwater River at Stites, ID	1911-12,1965-99
87	13339000	Clearwater River at Kamiah, ID	1910-66
88	13339500	Lolo Creek near Greer, ID	1980-99
89	13340000	Clearwater River at Orofino, ID	1931-38,1965-99
90	14010000	South Fork Walla Walla River near Milton, OR	1903,1906-17,1931-91
91	14011000	NF Walla Walla River near Milton, OR	1930-69
		Region 5	
92	12343400	East Fork Bitterroot River near Conner, MT	1956-72
93	12346500	Skalkaho Creek near Hamilton, MT	1949-53,1957-79
94	12351000	Burnt Fork Bitterroot River near Stevensville, MT	1920,1922-24,1938-62
95	13135500	Big Wood River near Ketchum, ID	1948-72
96	13136500	Warm Springs Creek at Guyer Hot Springs near Ketchum, ID	1941-58
97	13139500	Big Wood River at Hailey, ID	1889,1915-99
98	13141000	Big Wood River near Bellevue, ID	1911-96
99	13185000	Boise River near Twin Springs, ID	1911-99
100	13186000	South Fork Boise River near Featherville, ID	1945-99
101	13186500	Lime Creek near Bennett, ID	1945-56
102	13187000	Fall Creek near Anderson Ranch Dam, ID	1945-56
103	13235000	South Fork Payette River at Lowman, ID	1941-99
104	13240000	Lake Fork Payette River above Jumbo Creek near McCall, ID	1946-99
105	13292500	Salmon River near Obsidian, ID	1941-53
106	13293000	Alturas Lake Creek near Obsidian, ID	1941-52
107	13295000	Valley Creek at Stanley, ID	1911-14,1921-73
108	13295500	Salmon River below Valley Creek at Stanley, ID	1925-61
109	13296000	Yankee Fork Salmon River near Clayton, ID	1921-49
110	13296500	Salmon River below Yankee Fork near Clayton, ID	1922-91
111	13308500	Middle Fork Salmon River near Capehorn, ID	1929-72
112	13309000	Bear Valley Creek near Capehorn, ID	1921-60
113	13310000	Big Creek near Big Creek, ID	1945-59
114	13310500	South Fork Salmon River near Knox, ID	1929-61
115	13310700	South Fork Salmon River near Krassel Ranger Station, ID	1967-82,1985-86,1989-99
116	13311000	East Fork South Fork Salmon River at Stibnite, ID	1928-43,1983-97
117	13311500	East Fork South Fork Salmon River near Stibnite, ID	1928-41
118	13312000	East Fork South Fork Salmon River near Yellow Pine, ID	1928-43
119	13313000	Johnson Creek at Yellow Pine, ID	1928-99
120	13314000	South Fork Salmon River near Warren, ID	1931-43
121	13315000	Salmon River near French Creek, ID	1945-56
		Region 6	
122	06013500	Big Sheep Creek below Muddy Creek near Dell, MT	1936,1946-53,1960-79
123	06015500	Grasshopper Creek near Dillon, MT	1921-33,1946-54,1955-58,1960-61
124	06019500	Ruby River above Reservoir near Alder, MT	1938-99
125	13108500	Camas Creek at 18-mile Shearing Corral near Kilgore, ID	1937-53,1969-73
126	13112000	Camas Creek at Camas, ID	1925-99
127	13113000	Beaver Creek at Spencer, ID	1941-53,1969-82,1985-93
128	13113500	Beaver Creek at Dubois, ID	1921-73,1983,1985-87
129	13117300	Sawmill Creek near Goldburg, ID	1960-73
130	13120000	NF Big Lost River at Wild Horse near Chilly, ID	1944-99
131	13120500	Big Lost River at Howell Ranch near Chilly, ID	1904-14,1920-99
132	13128900	Lower Cedar Creek above Diversions near Mackay, ID	1966-73,1980-84
133	13297330	Thompson Creek near Clayton, ID	1972-99
134	13297350	Bruno Creek near Clayton, ID	1971-99
135	13297355	Squaw Creek below Bruno Creek near Clayton, ID	1973-99
136	13297450	Little Boulder Creek near Clayton, ID	1970-86
137	13298000	East Fork Salmon River near Clayton, ID	1929-39,1973-82
138	13299000	Challis Creek near Challis, ID	1944-63
139	13302500	Salmon River at Salmon, ID	1912-16,1919-99
140	13305000	Lemhi River near Lemhi, ID	1938-39,1955-63,1967-99
141	13305500	Lemhi River at Salmon, ID	1928-43
142	13306000	NF Salmon River at North Fork, ID	1912,1930-40
143	13306500	Panther Creek near Shoup, ID	1945-78
144	13307000	Salmon River near Shoup, ID	1944-82

Appendix A. Selected streamflow-gaging stations and periods of record used in regression analyses--Continued

Map number (fig. 1)	Gaging station number	Gaging station name	Period of record (in water years)
		Region 7	
145	10119000	Little Malad River above Elkhorn Reservoir near Malad City, ID	1911-13,1932,1941-69
146	10172940	Dove Creek near Park Valley, UT	1959-68,1971-73
147	10315500	Marys River above Hot Springs Creek near Deeth, NV	1944-99
148	10329500	Martin Creek near Paradise Valley, NV	1922-99
149	10352500	McDermitt Creek near McDermitt, NV	1949-99
150	10353000	East Fork Quinn River near McDermitt, NV	1949-82
151	10396000	Donner Und Blitzen River near Frenchglen, OR	1911-21,1938-99
152	10406500	Trout Creek near Denio, NV	1911-12,1922-23,1925-91
153	13057940	Willow Creek below Tex Creek near Ririe, ID	1977-79,1986-99
154	13075000	Marsh Creek near McCammon, ID	1954-99
155	13083000	Trapper Creek near Oakley, ID	1911-16,1919-99
156	13092000	Rock Creek near Rock Creek, ID	1909-13,1939,1944-75
157	13154000	Clover Creek below Calf Creek near Bliss, ID	1938-43,1957-62
158	13155300	Little Canyon Creek at Stout Crossing near Glenns Ferry, ID	1966-72
159	13162500	East Fork Jarbidge River near Three Creek, ID	1929-33,1954-72
160	13169500	Big Jacks Creek near Bruneau, ID	1938-49,1965-99
161	13170000	Little Jacks Creek near Bruneau, ID	1939-50
162	13172680	Reynolds Creek at Tollgate near Reynolds, ID	1966-99
163	13172720	Reynolds Creek at Macks near Reynolds, ID	1964-91
164	13172735	Reynolds Creek at Salmon near Reynolds, ID	1964-99
165	13172740	Reynolds Creek at Outlet near Reynolds, ID	1963-99
166	13176000	Owyhee River above China Diversion Dam near Owyhee, NV	1939-84
167	13178000	Jordon Creek above Lone Tree Creek near Jordan Valley, OR	1946-53,1955-72
168	13211309	Indian Creek above Waste Water Plant near Nampa, ID	1982-96
169	13226500	Bully Creek at Warmsprings near Vale, OR	1903-07,1910-17,1922-23,1964-86
		Region 8	
170	06037500	Madison River near West Yellowstone, MT	1913-73,1983-86,1989-99
171	09223000	Hams Fork Below Pole Creek near Frontier, WY	1952-99
172	10015700	Sulphur Creek below La Chapelle Creek near Evanston, WY	1957-97
173	10040000	Thomas Fork near Geneva, ID	1940-51
174	10041000	Thomas Fork near Wyoming-Idaho State Line	1949-92
175	10058600	Bloomington Creek at Bloomington, ID	1960-86
176	10077000	Soda Creek near Soda Springs, ID	1913-29
177	10093000	Cub River near Preston, ID	1940-52,1955-86
178	10096000	Cub River above Maple Creek near Franklin, ID	1940-52
179	10099000	High Creek near Richmond, UT	1947-52,1971-72,1979-84,1986
180	13010065	Snake River above Jackson Lake at Flagg Ranch, WY	1984-99
181	13011500	Pacific Creek at Moran, WY	1944-75,1978-99
182	13011900	Buffalo Fork above Lava Creek near Moran, WY	1965-99
183	13012000	Buffalo Fork near Moran, WY	1917-18,1945-60
184	13014500	Gros Ventre River at Kelly, WY	1918,1945-58
185	13019438	Little Granite Creek at Mouth near Bondurant, WY	1982-93
186	13019500	Hoback River near Jackson, WY	1917-18,1945-58
187	13023000	Greys River above Reservoir near Alpine, WY	1917-18,1937-39,1954-99
188	13024000	Salt River near Smoot, WY	1932-57
189	13024500	Cottonwood Creek near Smoot, WY	1932-57
190	13025000	Swift Creek near Afton, WY	1942-80
191	13027000	Strawberry Creek near Bedford, WY	1932-43
192	13032000	Bear Creek above Reservoir near Irwin, ID	1917-18,1934-36,1953-72
193	13044500	Warm River at Warm River, ID	1912-15,1918-33
194	13045500	Robinson Creek at Warm River, ID	1912-15,1918-33
195	13046680	Boundary Creek near Bechler Ranger Station Y.N.P., WY	1984-99
196	13047500	Falls River near Squirrel, ID	1902-09,1918-99
197	13049500	Falls River near Chester, ID	1920-99
198	13052200	Teton River above South Leigh Creek near Driggs, ID	1962-99
199	13054000	Teton River near Tetonia, ID	1930-33,1934-37,1940-57
200	13055000	Teton River near St Anthony, ID	1890-93,1903-09,1920-99

Appendix B. Monthly and annual streamflow statistics for selected streamflow-gaging stations

[Q.xx, daily mean discharge exceeded xx percent of the time during the specified month, in cubic feet per second; Qa, mean annual discharge, in cubic feet per second]

Gaging station number	Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			June			July			Aug			Sept			Qa
	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	
Region 1																																					
12305500	11.3	17.5	43.3	14.8	30.9	88.8	17.4	35.8	76.2	17.5	29.6	55.7	17.9	30.4	65.3	25.0	42.7	78.7	89.5	182	365	297	512	726	90.2	196	416	19.7	33.7	71.0	8.7	14.5	20.8	8.3	12.7	19.3	120
12311000	18.0	26.1	51.8	27.6	42.3	93.5	35.6	57.5	123	34.9	56.4	111	41.8	76.8	137	70.4	125	216	222	368	607	297	482	660	91.7	176	305	24.2	38.2	71.4	12.0	17.0	24.3	13.3	17.0	25.1	146
12316800	4.4	5.3	6.8	4.5	6.2	11.2	3.7	6.3	13.5	4.0	6.3	11.0	4.6	6.8	13.0	6.4	9.5	23.9	24.3	52.3	93.0	114	169	243	43.2	79.2	148	10.3	17.6	32.6	5.1	7.0	9.4	4.2	5.3	7.3	36.4
12320500	6.9	10.5	26.5	7.6	14.0	42.7	7.2	12.9	30.4	6.9	11.1	22.2	6.9	10.8	19.8	7.9	12.8	21.7	21.1	46.5	106	142	238	358	104	217	339	21.3	41.2	95.8	8.0	13.0	19.8	6.3	8.7	15.2	63.8
12321000	14.0	32.6	128	24.9	59.3	142	25.3	51.5	106	23.1	38.2	63.6	23.1	35.0	52.4	28.1	44.8	77.8	76.1	165	392	439	724	1106	259	543	935	39.8	81.8	203	12.5	21.9	37.6	9.9	16.7	35.3	191
12392155	15.7	28.3	134	30.4	136	409	50.7	128	299	66.9	126	262	66.2	125	195	141	268	424	367	681	1290	841	1370	2160	350	1050	1790	62.1	142	348	21.0	29.8	59.6	13.3	18.8	29.5	426
12392300	44.2	63.7	116	61.2	111	200	71.4	122	234	70.3	111	183	78.1	123	251	112	181	338	312	494	762	777	1110	1630	384	698	1250	76.1	141	277	32.2	47.3	69.4	29.4	43.6	79.5	323
12393500	189	250	450	219	325	690	249	401	813	286	438	722	297	421	670	307	495	716	569	1130	2240	2430	3510	4560	1860	3050	4490	731	1120	1890	339	478	669	214	308	411	1090
12396000	12.3	15.3	22.7	13.6	18.6	30.0	13.8	22.2	40.2	18.1	25.8	44.9	20.1	35.6	63.0	32.2	55.5	113	117	198	330	139	205	303	46.3	67.5	104	16.5	28.9	39.1	11.3	15.6	20.1	9.2	14.1	18.0	69.8
12408500	10.4	14.4	18.2	12.1	15.1	21.5	11.5	15.4	21.7	10.5	14.7	21.9	12.2	17.4	27.8	18.9	32.5	82.2	71.6	131	232	83.2	137	210	38.4	57.3	90.3	15.9	25.5	40.9	8.1	13.9	19.8	7.8	11.9	16.7	48.2
12409000	75.1	112	156	101	142	190	104	154	236	106	164	273	140	228	399	247	415	685	433	707	1237	310	627	1040	163	310	499	63.0	133	246	40.8	82.8	133	56.3	91.0	131	310
12427000	41.4	45.3	50.5	41.6	47.3	52.0	43.4	48.6	54.6	43.4	48.7	58.3	45.9	57.7	71.5	56.6	66.1	80.0	66.7	79.1	102	62.0	71.1	85.8	51.8	59.8	69.3	44.2	49.8	56.7	40.8	45.4	50.6	41.3	44.7	49.3	56.4
12431000	129	157	180	150	180	221	167	207	277	173	222	351	202	329	589	318	510	799	358	560	897	234	382	563	160	242	338	121	160	207	109	134	164	116	140	163	304
Region 2																																					
12302500	8.1	18.7	40	10.3	24.3	45.3	14.6	22	46.4	13.4	19.0	26.6	11.0	14.9	34.9	13.9	21.7	41.5	51.2	85.3	153	135	217	329	125	209	302	35.2	56.0	103	12.3	20.0	29.6	8.6	13.0	22.8	69.5
12303100	5.9	7.7	11.4	6.7	9.4	15.8	5.9	7.8	12.2	5.0	6.9	10.5	5.0	6.6	11.1	5.7	9.0	14.8	13.0	22.9	44.6	41.6	73.5	123	45.7	81.5	125	14.0	22.7	43.8	7.0	9.7	13.6	6.1	7.7	9.9	26.0
12303500	110	141	214	119	191	361	132	207	380	113	189	336	130	200	360	165.0	263	438	321	568	851	726	1120	1590	552	956	1470	238	353	601	152	197	255	123	148	174	428
12347500	6.6	16.7	41.7	9.3	17.6	41.2	9.5	16.5	32.2	7.4	11.7	22.3	7.9	13.3	20.7	9.7	15.5	21.8	27.6	52.0	115	127	245	359	168	255	360	35.1	71.2	144	10.1	20.6	29.8	5.0	11.7	22.5	70.4
12350500	11.5	27.3	62.3	13.6	23.6	52.0	10.3	14.5	32.7	8.6	11.7	18.1	9.1	13.2	26.9	12.6	17.8	22.6	31.0	62.8	130	120	211	360	185	289	410	51.6	101	184	13.2	19.2	32.5	8.1	13.2	20.8	78.9
12354000	101	121	167	108	153	324	96.5	141	315	107	165	345	133	211	410	169	307	563	618	1070	1770	1290	1970	3030	655	1311	2350	218	313	528	120	153	199	103	127	153	580
12389500	150	183	212	150	184	226	136	178	239	129	176	246	144	195	303	185	282	451	387	657	1180	743	1200	1850	517	931	1450	267	380	545	189	245	298	159	200	238	452
12390700	44.3	54.2	62.8	41.7	51.3	86.4	44.1	59.8	156	46.9	73.9	153	53.0	104	206	92.6	177	310	238	414	731	471	733	1150	233	488	786	104	139	210	70.2	85.5	101	52.3	65.6	73.9	243
12411000	85.2	105	159	101	180	477	135	272	664	147	308	667	209	424	878	349	708	1360	1120	1810	2970	977	1910	3090	308	521	978	145	202	293	94.9	123	154	84.0	101	123	708
12413000	224	282	439	276	524	1280	397	852	2050	430	944	1980	646	1310	2610	1100	2110	3830	2880	4690	7610	2510	4530	7130	927	1600	2820	415	585	879	261	340	441	231	274	350	1910
12413140	3.2	4.9	6.7	3.6	7.2	17.7	4.3	10.4	27.4	4.4	14.9	35.4	6.7	20.1	42.3	20.1	33.4	65.0	42.9	67.1	117	61.7	100	179	21.8	42.1	80.1	9.6	15.8	23.2	4.9	7.6	10.0	3.5	5.3	6.6	36.9
12413150	48.7	54.7	65.1	48.5	66.0	113.3	50.6	79.0	139	45.9	92.2	169	60.9	110	169	104	170	318	210	380	615	455	711	1120	246	507	791	92.5	151	239	57.6	80.8	102	51.4	62.9	74.5	247
12413210	63.7	75.5	97.5	73.1	115	208	87.0	134.4	291	82.9	157	316	85.5	216	385	214	344	569	409	576	1060	526	733	1150	238	445	860	120	180	276	75.2	105	130	63.8	77.9	92.0	334
12413470	89	106	152	110	182	370	138	248	497	141	291	573	157	419	872	404	635	969	684	1100	1820	791	1150	1830	332	575	1200	165	252	368	109	154	186	89.5	115	137	546
12413500	316	403	665	378	692	1780	533	1060	2510	554	1200	2590	687	1630	3520	1390	2710	4870	3920	6400	10300	3560	6520	9830	1280	2170	3830	574	802	1210	365	463	595	324	387	483	2540
12414500	348	432	623	369	604	1330	415	740	1730	420	788	1680	534	1070	1960	898	1660	3010	2670	4550	7660	4810	7420	11200	2130	3820	6630	784	1160	1840	458	580	746	370	447	547	2350
12414900	51.9	63.0	86.7	61.4	95.8	179	75.0	123	277	93.3	188	494	140	305	699	298	534	1010	425	728	1280	311	620	1110	152	277	494	75.8	114	177	47.7	67.3	87.6	46.0	59.6	75.1	357
12415000	53.8	75.2	137	67.7	119	296	81.9	191	500	101	193	565	128	376	1010	311	734	1430	849	1500	2470	502	923	1540	191	314	572	75.9	109	167	46.9	63.0	83.4	46.0	57.2	86.9	519
12416000	3.7	4.8	6.4	4.2	6.6	13.8	4.8	9.2	27.4	5.5	13.2	39.7	8.5	25.4	55.0	24.7	40.1	78.6	34.2	61.1	119	22.8	42.9	79.6	11.1	19.1	33.5	6.1	8.9	14.0	4.2	5.7	7.7	3.7	4.9	6.1	28.1
13336500	525	740	1190	630	970	1720	658	983	1750	666	975	1750	761	1190	1990	1190	1870	3000	2970	4800	8910	8010	12300	18100	5920	10600	17200	1340	2320	4480	626	841	1190	494	650	897	3750
13336900	34.2	49.9	77.6	46.8	69.7	198	48.8	79.4	220	46.9	88.4	158	58.2	131.1	233	87.3	170	257	347	529	826	678	938	1250	222	389	752	57.4	84.0	131	30.7	39.1	52.6	28.5	34.8	54.6	254
13337000	385	558	959	486	796	1510	520	814	1540	540	840	1560	610	984	1700	972	1550	2480	2470	4100	698	6340	9370	13700	4080	7390	12000	982	1670	3090	452	610	869	357	481	684	2860
13340500	587	782	1190	693	1010	1800	680	1020	1860	681	1080	1730	821	1190	2060	1000	1510	2300	2640	4400	7250	7200	9710	12700	3870	6490	9980	1210	1720	2570	704	848	1060	569	682	858	2840
13340600	742	873	1230	830	1240	2120	834	1220	2140	860	1370	2440	1030	1690	2800	1770	2740	4400	3600	5440	8900	6820	9840	14700	4010	7400	11800	1460	2190	3600	872	1120	1440	731	890	1090	3510
13341300	0.9	1.3	2.1	1.3	1.8	3.3	1.6	2.3	3.9	1.7	2.7	6.2	2.4	5.2	10.8	2.9	5.6	11.3	8.3	12.9	22.6	3.9	7.5	14.0	2.1	3.3	4.9	1.1	1.6	2.1	0.7	0.9	1.4	0.8	1.0	1.6	5.0
13341400	9.2	12.2	21.1	12.5	17.8	39.4	15.2	27.2	52.7	16.8	35.1	76.4	22.6	63.1	130.2	41.6	77.3	160	114	181	284	47.7	90.4	168	19.8	31.1	51.7	8.6	12.3	17.3	5.9	7.6	10.7	6.4	8.8	13.2	61.7
Region 3																																					
12424000	8.8	17.6	25.6	17.4	27.3	45.6	29.1	60.5	211	41	140	617	120	359	1070	193	448	1110	124	254	522	53.2	111	217	25.4	46.8	87.9	9.6	19.4	33.5	6.0	12.3	20.6	5.4	13.2	20.8	238
13334700	35.4	38.8	42.6	38.2	42.6	48.6	41	49.7	73.9	41.1	53.8	100	48.3	70.3	106	56.5	77.3	110	68.2	100	155	88.2	141	195	58.1	93.3	151	38.6	46.8	61.6	32.6	38.4	43.7	33.3	37.3	41.4	76.1
13345000	9.1	14.0	24.1	15.3	30.6	74.2	26.6	58.4	198	36.7	130	499	94.1	303	800	242	532	1170	224	531	1100	91.5	223	542	37.2	68.3	155	13.4	24.6	41.4	5.2	11.1	17.7	5.0	10.3	16.1	271
13346100	12.4	18.8	30.5	22.2	37.5	64.6	30.2	64.4	255	52.4	188	629	118	349	913	253	518	1040	212	621	1140	90.0	252	614	31.4	70.2	141	8.3	20.0	35.0	1.1	7.4	19.0	2.9	13.1	19.9	299
13346800	0.2	0.3	1.1	0.3	1.0	3.2	0.7	1.7	4.9	1.3	5.1	16.5	3.7	11.0	30.7	5.8	14.2	26.7	3.2	6.3	12.9	1.3	2.6	6.0	0.7	1.5	3.1	0.4	0.6	1.1	0.3	0.5	0.8	0.2	0.3	0.8	7.4
13348000	1.8	3.7	5.4	2.9	4.8	9.5	4.7	11.6	36.8	7.0	25.9	96.1	23.9	58.5	154	32.1	75.3	166	22.1	42.4	82.4	7.8	18.2	32.6	3.4	6.6	14.9	1.6	2.9	5.5	0.7	2.3	3.7	1.0	2.7	4.6	39.0
13348500	0	0.2	0.5	0.1	0.5	1.0	0.2	1.0	5.3	0.8	4.7	21.2	3.1	11.8	37.1	3.8	15.4	41.5	1.7	4.6	13.2	0.3	1.2	2.8	0.2	0.4	0.9	0	0.2	0.4	0	0.2	0.3	0	0.2	0.3	8.5
13341500	14.3	25.6	54.0	27.0	62.5	185	43.3	137	435	49	152	624	150	388	1400	403	891	1830	697	1250	1980	167	365	728	54.9	92.0	196	15.5	26.6	48.2	8.4	11.4	18.3	9.0	13.2	21.9	427
13342450	7.6	14.4	21.8	13.9	20.6	33.5	18.2	30.3	60.4	22	34.7	119	28.9	69.2	162	57.1	144	302	76.8	154	362	34.4	86.9	221	17.6	33.3	75.9	5.5	12.9	22.1	3.6	6.6	11.6	4.6	8.7	15.3	80.1
Region 4																																					
13196500	0.4	0.6	0.8	0.5	0.7	1.0	0.6	0.8	1.1	0.6	0.8	1.4	0.7	1.1	2.0	0.9	1.6	3.1	2.9	4.7	11.6	2.8	5.9	11.1	1.3	2.4	3.9	0.4	0.8	1.4	0.2	0.4	0.7	0.3	0.5	0.6	2.2
13200000	41.5	55.7	78.8	57.4	80.1	115	60.5	91.8	146	67.2	107	188	93.4	155	329	172	323	732	345	805	1430	376	747	1160	172	381	652	43.4	91.8	170	19.7	41	63.2	22.1	39	59.3	293
13200500	1.5	2.0	3.0	2.3	3.0	4.1	2.4	3.5	5.4	2.8	4.1	9.2	4.4	8.0	16.6	6.5	11.6	21.2	10.7	21.6	48.3	5.4	13.1	22.8	2.1	4.3	7.6	0.4	1.2	2.4	0.2	0.6	1.1	0.4	0.9	1.6	8.2
13201000	42.1	56.4	79.4	60.7	83.5	117	59.8	93.7	159	67.7	93.8	163	89.2	155	282	179	337	730	538	986	1610	456	789	1140	172	355	643	41.2	83.7	152	21.0	35.9	55.8	25.4	36.4	49.8	302
13207000	0	0	0	0	0.1	0.1	0	0.1	0.7	0.1	0.8	7.4	0.8	2.7	11.5	0.8	4.5	10.3	0.4	3.5	12.1	0	0.8	4.9	0	0.1	1.7	0	0	0	0	0	0	0	0	0	2.5
13207500	0.3	0.8	1.4	0.8	1.4	2.0	1.0	1.7	3.8	1.3	2.4	7.5	3.9	6.9	20.7	4.0	10.2	29.6	1.3	8.2	40.0	0.2	1.3	17.7	0.2	0.6	3.1	0.1	0.2	0.4	0.1	0.2	0.4	0.1	0.2	0.5	7.4
13216500	43.4	51.4	61.1	45.3	55.6	67.3	41.3	53.4	72.7	41.9	54.7	77.2	51.3	71.0	137	81.2	149	327	159	306	583	147	266	448	75.2	130	232	41.1	56.7	80.1	35.7	43.8	54.7	37.6	45.4	54.8	133
13250600	5.4	5.9	6.6	6.0	7.0	9.8	6.5	12.3	40.9	7.0	19.2	73.5	13.8	31.2	74.9	17.1	40.6	77.0	11.5	25.6	58.6	6.0	7.8	15.0	4.7	5.7	7.5	3.0	3.8	4.8	3.1	3.9	4.5	3.8	4.5	5.4	25.2
13251300	1.0	1.3	1.6	1.1	1.4	2.2	1.0	1.3	2.4	0.9	1.3	2.4	1.1	1.6	3.5	1.5	2.6	6.1	9.3	15.1	25.1	9.3	19.3	31.2	2.0	3.9	9.3	1.1	1.7	2.4	0.9	1.1	1.7	0.9	1.1	1.5	5.2
13251500	5.4	6.8	9.0	6.1	8.0	13.1	6.2	8.6	21.0	6.1	9.9	22.3	6.9	15.4	29.3	13.6	29.5	84.8	109	191	324	50.9	104	200	13.2	22.3	39.6	7.3	9.2	12.9	5.5	6.8	8.4	5.3	6.2	7.7	44.4
13253500	17.8	21	30.7	27.7	34.1	47.9	29.2	38.7	73.6	32.7	46.5	75.3	37.1	49.3	71.2	58.0	112	285	292	426	708	155	262	484	62.8	109	173	19.4	28.5	46.8	13.8	17.6	21.0	15.6	17.8	20.7	128
13256000	51.6	64.9	101	70	95.3	150	74.7	121	304	82.1	169	276	130	249	499	266	618	1110	824	1290	2180	555	911	1480	183	352	595	55.0	71.2	121	58.1	68.6	80.6	49.9	61.9	80.5	423
13257000	12.8	19.7	32	20.4	30.5	53.7	25.4	36.4	93.3	27.1	41.3	58.5	32.5	58.8	105	60.6	108	178	130	218	376	281	405	566	120	233	441	13.2	39.2	86.4	0.4	5.9	24.1	0.9	12.3	22.2	122
13258500	68.9	96.3	140	92.5	133	228	106	177	439	122	226	514	198	413	937	472	932	1680	915	1510	2440	1020	1620	2460	364	802	1450	78.5	138	282	61.5	78.7	108	55.1	79.6	115	651
13260000	6.1	9.1	12.1	9.8	12.8	16.2	10.4	13.3	19.2	10.4	13.9	23.2	12.5	26.1	47.7	28.5	52.2	98.3	51.2	81.6	119	67.7	100	151	33.1	65.2	113	3.6	8.8	20.1	2.4	3.6	6.1	2.6	4.2	8.1	38.6
13261000	10.7	13.5	18.5	13.5	20.1	34.1	15.4	23.8	56.3	17.1	30.9	74.3	27	56.5	104	43.7	75.9	131	118	196	325	219	340	495	109	230	401	23.5	41.0	72.5	10.1	14.7	20.7	8.3	11.1	14.2	105
13266000	115	165	236	146	201	361	163	268	702	203	379	1080	307	788	2120	843	1780	3610	1280	2220	3470	1540	2360	3510	630	1340	2420	242	309	490	106	249	307	84.0	185	259	1130
13267000	2.8	4.0	5.7	4.3	6.0	9.1	4.8	7.1	13.4	6.0	9.5	21.0	8.3	22.2	43.8	25.6	61.0	125	89.2	148	240	46.4	97.4	150	13.0	21.8	42.1	3.7	7.1	12.1	0.8	2.1	4.1	1	2.2	3.3	40.4
13269300	1.5	2.4	3.9	3.0	4.5	7.6	3.2	7.1	15.3	5.7	9.0	21.7	8.0	15.2	52.6	23.3	64.5	164	75.4	186	338	44.7	112	226	16.7	27.5	46.6	1.6	7.2	15.7	0.5	1.4	4.6	0.6	1.3	2.2	49.8
13270800	19.8	22.5	24.7	19.4	22.1	24.1	19.1	20.9	23.8	19.0	21.1	23.2	19.5	21.3	22.8	20.8	22.8	26.4	24.7	31.1	45.3	32.1	48.3	71.7	25.7	32.9	45.5	21.7	26.1	28.9	20.6	23	26.1	20.2	22.2	25	27.2

Appendix B. Monthly and annual streamflow statistics for selected streamflow-gaging stations--Continued

Gaging station number	Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			June			July			Aug			Sept			Qa
	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	
Region 4--Continued																												**Region 4--Continued**									
13275500	7.2	12.5	22.8	12.1	22.3	37.5	16.0	26.7	47.6	17.2	28.4	52.6	24.4	44.7	83.2	54.4	105	212	152	292	541	198	325	506	96.4	192	353	17.3	36.7	71	4.9	10.7	22.5	3.2	7.3	13	109
13288200	77.0	96.1	116	84.6	107	147	78.4	100	136	75.3	98.8	129	81.9	108	150	111	154	254	237	378	557	538	811	1280	561	934	1420	166	309	588	103	136	179	79.5	100	125	312
13289960	16.6	29.5	38.8	24.1	30.3	44.5	24.3	31.9	57.6	25.2	35.3	75.0	32.7	56.2	193	105	205	416	196	316	528	178	324	574	78.3	190	370	27.6	53.4	97.7	14.1	27.7	44.8	13.6	23.9	38.6	134
13290190	40.4	66.0	90.1	69.5	99.0	155	82.3	130	292	84.7	149	299	132	232	522	297	510	859	372	616	935	497	835	1210	284	700	1140	39.6	99.2	300	27.3	39.1	69.8	27.5	47.1	74.3	350
13315500	1.7	2.1	2.8	1.9	2.8	4.2	2.2	2.8	5.9	2.2	3.2	6.8	2.5	4.2	6.4	3.8	8.9	20.2	38.8	85.4	151	28.7	67.5	120	6.2	9.8	16.7	2.5	3.3	4.7	1.6	1.9	2.4	1.4	1.7	2.1	19.2
13316500	169	213	276	178	237	342	172	232	397	168	242	379	195	293	531	315	529	943	778	1200	1820	1410	2200	3370	1270	2330	3490	302	534	1010	173	249	345	155	217	284	799
13316800	1.5	2.6	5.8	2.4	3.9	8.0	2.1	4.8	9.1	2.0	4.3	10.5	3.5	7.0	15.3	5.5	9.1	18.5	20.6	32.5	51.0	46.5	64.0	92.0	14.2	36.3	63.7	3.2	5.2	9.6	0.8	2.1	3.4	0.7	1.7	3.2	17.5
13317000	3740	4680	5670	3900	4720	5830	3380	4220	5280	3280	3940	4940	3520	4190	5070	4000	4940	6580	6340	9420	16600	17600	27900	45700	20300	35700	55800	6520	10800	19200	3720	5210	7030	3460	4400	5370	11200
13319000	25.9	36.3	51.8	34.8	51.8	110	37.4	74.9	234	45.9	102	279	73.2	184	480	254	563	1200	659	1120	1930	516	938	1550	164	346	714	37.6	69.4	140	17.4	26.9	47.4	18.9	26.2	40.2	387
13320000	24.0	28.7	36.8	25.5	33.2	46.9	25.1	34.5	54.5	25.5	37.4	57.9	28.4	45.9	72.9	47.5	76.0	139	121	214	336	247	371	553	149	266	420	45.5	71.4	127	25.5	35.1	46.3	22.8	28.3	35.0	118
13323600	2.9	4.2	7.0	3.7	5.2	9.7	3.8	6.0	14.8	4.0	6.0	10.2	4.0	6.7	11.6	6.6	12.9	20.9	30.5	43.5	108	104	164	281	53.1	115	222	10.8	19.8	41.0	3.9	6.4	8.1	3.0	3.8	5.4	41.5
13329500	23.4	29.1	37.9	21.6	26.9	40.3	18.5	24.3	34.7	15.5	21.4	28.7	14.5	19.7	26.0	14.2	20.1	25.1	21.8	34.1	67.0	83.6	148	244	170	240	353	84.7	145	233	37.7	53.9	77.9	27.0	34.1	43.4	74.3
13330000	31.7	43.0	68.5	32.3	49.1	82.6	28.3	43.5	79.0	28.1	40.9	66.9	27.4	40.9	60.2	33.8	48.4	70.0	64.1	119	239	245	445	752	482	737	1080	146	315	609	48.1	72.0	120	33.4	46.0	64.2	195
13330500	10.4	15.7	32.6	15.3	26.7	52.2	16.4	32.1	70.3	16.6	32.4	62.5	20.5	34.4	65.5	33.1	54.6	93.1	72.0	136	254	209	346	520	226	364	544	31.9	76.6	198	12.2	18.1	27.1	9.1	13.5	19.3	115
13331500	67.8	86.4	120	77.7	120	181	78.6	130	234	88.9	160	285	116	193	331	187	267	437	291	447	744	719	1190	1810	943	1500	2180	224	495	1040	91.8	137	217	67.0	93.5	124	462
13337500	40.0	56.9	81.0	49.4	72.7	114	46.8	71.8	120	46.2	71.8	122	54.8	80.9	145	77.7	135	236	314	583	976	720	1030	1530	277	472	859	76.0	122	205	36.8	49.9	72.1	32.1	42.9	65.7	274
13338000	148	213	333	167	246	395	161	238	417	159	219	379	185	262	432	280	422	736	996	1800	2830	2100	2930	4230	1150	1950	3120	299	517	925	139	198	285	123	164	248	875
13338500	174	247	350	221	298	454	217	288	464	226	350	740	268	441	844	514	798	1430	1190	1830	2860	1850	3010	4570	1250	2200	3570	369	633	1180	184	260	388	151	217	315	1050
13339000	1180	1740	2890	1440	2200	4050	1440	2190	4420	1450	2090	4030	1730	2600	4850	2520	4160	6940	7690	12700	21200	18900	27700	40100	11900	20600	34800	2750	4700	8430	1290	1730	2360	1080	1420	1940	8200
13339500	39.9	60.9	107	64.0	118	215	91.6	125	219	90.5	144	332	129	257	638	328	541	916	541	783	1180	411	646	1010	175	334	595	72.0	112	205	37.8	56.6	79.5	33.3	50.4	76.3	329
13340000	1230	1810	2680	1590	2540	4220	1650	2510	4330	1780	2780	6190	2030	3590	7300	4320	6690	10800	8680	13300	21900	17700	26800	39000	11700	21700	35600	2900	5080	9700	1370	1920	2880	1070	1540	2260	8830
14010000	92.9	107	125	102	124	155	110	138	191	115	144	208	126	161	230	151	195	263	204	259	347	213	286	387	134	178	259	104	118	142	95.1	108	121	93.2	106	119	176
14011000	5.7	7.3	11.7	9.4	16.1	36.8	13.4	31.0	69.9	16.9	33.5	72.7	25.7	45.2	89.0	36.2	62.6	113	71.8	107	163	44.6	84.8	139	11.7	24.9	57.4	2.7	4.7	9.8	2.0	2.9	4.8	2.9	3.9	6.3	47.3
Region 5																												**Region 5**									
12343400	91.1	108	132	82.4	102	125	68.2	87.6	112	69.9	82.7	102	72.1	82.7	109	79.2	96.1	138	133	203	316	478	878	1450	605	1080	1640	179	266	429	95.7	126	165	90.3	110	138	293
12346500	33.7	41.1	47.9	30.0	34.7	41.4	25.0	28.9	35.1	22.2	26	31.5	22.3	25.5	28.9	22.6	25.6	29.4	28.1	39.1	73.0	93.6	191	376	236	398	498	89.1	127	201	50.6	65.7	85.9	38.2	45.8	57.1	93.5
12351000	17.0	20.2	25.2	17.5	20.9	27.2	16.3	19.6	23.9	13.8	17.0	19.7	13.4	16.3	20.1	13.6	16.0	19.7	19.4	31.3	64.0	63.2	105	212	95.7	167	251	36.1	51.7	87.3	21.7	29.3	37.1	18.3	21.7	25.8	48.3
13135500	59.8	72.6	82.3	53.0	64.3	72.8	42.8	53.4	64.4	42.5	50.2	57.8	42.0	48.3	54.4	42.9	47.6	54.5	60.2	99.3	230	235	421	746	347	534	800	129	202	349	76.2	101	131	64.3	78.7	91.1	167
13136500	33.9	37.3	42.3	32.3	35.6	40.0	30.0	33.9	37.7	29.0	33.1	36.1	28.2	31.0	34.3	29.5	33.1	37.9	48.0	87.0	198	166	265	399	146	200	321	57.1	75.5	111	38.3	44.9	54.7	34.0	38.0	42.6	87.4
13139500	20.1	158	246	14.3	147	219	7.7	127	180	5.5	129	176	4.8	128	169	11.3	144	208	181	364	719	577	1050	1820	654	1250	2200	216	481	983	65.6	191	350	29.1	153	262	409
13141000	49.0	88.2	152	48.3	100	163	44.0	74.5	126	37.5	58.4	94.7	36.8	60.6	107	46.1	99.4	164	109	284	619	239	670	1400	229	727	1630	79.0	168	563	59.5	89.4	128	52.8	79.2	119	300
13185000	303	371	459	320	394	519	300	389	547	308	395	527	333	435	607	450	683	1110	1110	1790	3010	2170	3460	5290	1790	3150	4820	519	956	1780	319	437	597	286	360	449	1210
13186000	194	235	290	197	241	298	179	226	284	188	228	285	202	238	307	243	332	486	555	993	1900	1360	2400	3830	1200	2170	3480	339	606	1160	194	276	398	173	226	289	779
13186500	20.6	25.9	31.4	24.3	29.0	38.7	24.4	31.0	40.8	26.5	33.6	42.5	28.2	39.0	50.0	35.2	50.9	77.1	118	246	527	182	271	445	66.5	109	177	24.2	36.1	49.7	14.6	22.3	28.8	15.7	21.0	26.6	89.8
13187000	13.8	16.8	19.2	15.6	18.4	24.1	16.0	19.3	26.6	16.8	21.5	28.4	18.3	22.9	32.2	21.8	30.2	50.8	73.7	196	369	171	255	373	83.4	120	175	25.4	35.5	53.1	15.5	18.0	22.0	13.3	15.3	17.8	72.7
13235000	305	350	420	293	346	424	266	325	411	258	315	386	265	314	396	308	389	536	533	844	1440	1280	2020	3160	1680	2640	3770	633	1040	1760	376	503	671	316	384	463	872
13240000	13.6	20.8	36.1	16.5	28.6	64.8	17.0	28.3	59.1	18.2	27.7	49.1	19.9	30.1	45.8	23.9	33.9	54.5	50.0	98.3	231	251	469	782	318	573	827	49.3	106	255	18.2	28	43.6	13.1	18.9	27.9	144
13292500	32.2	40.2	51.7	31.5	38.1	52.1	25.3	30.4	41.1	22.5	26.3	35.0	21.3	24.4	25.9	21.5	25.3	30.4	28.4	35.9	92.0	131	252	350	189	244	382	21.3	69.0	170	6.2	10.2	21.9	8.3	29.5	47.9	81.1
13293000	14.4	17.9	28.2	17.8	21.9	28.9	18.3	21.4	29.3	17.3	20.5	22.9	16.2	19.0	23.6	15.9	18.3	23.3	20.6	30.2	75.4	109	209	308	200	263	392	56.7	104	185	20.3	27.9	43.1	13.7	16.7	23.7	75.6
13295000	76.0	93.0	117	77.7	91.9	116	69.1	83.7	103	65.8	81.0	98.3	67.2	79.5	94.5	72.8	83.9	95.8	97.4	161	310	340	507	786	402	623	892	138	246	421	77.0	109	156	73.3	91.1	116	204
13295500	281	363	462	290	367	456	259	330	395	256	312	376	255	309	361	270	309	354	332	502	894	967	1430	2180	1280	1820	2630	463	816	1360	280	388	506	259	333	408	664
13296000	51.4	66.1	78.0	46.2	58.7	71.2	42.0	51.9	63.5	39.1	45.4	55.9	40.3	45.2	50.4	41.6	50.5	59.5	63.5	131	346	365	610	1080	306	624	1110	104	167	287	62.3	90.4	116	55.6	71.5	81.9	197
13296500	392	491	613	388	480	592	355	434	513	340	401	471	347	398	458	357	406	469	475	720	1320	1450	2250	3670	1830	2950	4490	642	1140	2010	397	545	776	374	474	614	990
13308500	81.8	94.9	115	72.9	89.5	104	65.5	77.2	91.1	62.0	72.6	84.2	60.9	69.2	79.3	62.6	70.8	77.5	75.9	111	250	411	708	1200	486	852	1330	152	227	380	97.1	122	159	86.4	100	118	241
13309000	91.7	109	140	88.9	106	135	80.1	99.5	114	76.9	90.5	108	76.2	90.0	103	81.8	93.4	107	106	189	408	564	911	1540	420	862	1410	148	224	364	93.6	126	157	89	108	128	290
13310000	153	173	218	133	156	196	120	142	173	114	130	150	111	126	141	114	138	158	173	320	790	918	1570	2430	1230	1690	2360	393	561	936	212	252	302	171	189	214	509
13310500	34.6	42.0	52.7	35	44.9	57.6	33.5	42.4	54.5	34.2	41.0	50.9	34.2	40.5	49.4	36.3	46.8	60.1	63.7	148	310	307	487	747	245	465	701	71.0	104	175	39.5	51.0	64.7	33.8	40.9	47.4	145
13310700	120	143	172	126	153	229	121	157	287	118	165	280	122	167	300	153	233	411	293	530	1010	936	1560	2550	854	1730	2730	230	411	837	135	188	254	113	150	186	556
13311000	7.1	10.1	13.3	7.0	8.9	11.6	6.2	8.0	9.5	6.0	7.0	8.3	6.1	7.0	8.0	6.3	7.5	9.2	8.5	15.9	29.5	34.9	63.1	102	37.3	81.4	146	14.8	23.7	44.8	9.1	13.1	18.2	7.9	10.3	14.1	24.5
13311500	16.3	19.6	22.7	14.7	18.2	19.7	13.4	16.9	20.5	12.4	14.8	17.7	12.7	14.3	16.7	12.8	14.9	20.7	18.2	42.0	69.9	106	160	227	84.9	139	271	32.0	48.3	69.7	20.3	25.4	30.9	17.6	20.9	24.9	50.4
13312000	44.8	53.0	65.0	36.8	46.1	57.9	35.3	44.4	51.8	30.9	40.2	50.8	30.8	37.6	50.2	34.6	40.5	58.1	54.8	120	257	268	414	627	252	423	716	93.7	130	204	58.0	71.4	91.0	49.3	56.8	66.7	137
13313000	65.7	88.6	114	65.7	88.8	120	61.7	80.1	114	63.4	76.9	107	62	75.9	100	67.0	83.0	120	111	203	467	618	1130	1910	660	1300	2040	152	271	544	78.1	115	162	64.8	87.5	113	347
13314000	362	464	594	365	510	652	352	478	679	367	439	615	364	450	617	416	607	790	894	1990	3950	3570	5690	8130	2550	4970	8370	782	1240	2320	396	549	759	354	447	551	1600
13315000	3680	4040	5180	3800	4300	5070	3070	3820	4760	3070	3550	4300	3160	3640	4250	3430	4000	5050	4680	7950	15900	17800	30800	45400	24000	33700	46100	8160	11600	17600	4200	5110	6300	3570	3990	4600	10600
Region 6																												**Region 6**									
06013500	50.0	63.2	74.2	46.0	56.9	66.3	40.6	48.3	54.7	37.9	42.4	49.5	36.8	40.8	47.4	37.5	43.0	50.8	49.0	71.5	115	44.4	73.9	116	49.4	92.1	148	45	65.2	93.8	53.6	66.4	84.9	43.0	53.7	67.9	65.0
06015500	22.2	36.1	48.0	30.7	39.8	49.7	20.2	25.8	38.8	16.0	20.8	30.3	15.7	24.7	32.9	23.9	33.3	54.1	48.0	69.8	96.1	51.3	87.3	169	42.5	107	235	15.5	29.6	60.3	9.0	20.1	41.0	8.3	15.1	29.5	51.5
06019500	103	120	143	108	122	139	97.7	110	124	90.1	103	117	91.0	102	114	93.6	106	122	112	141	206	224	358	598	233	418	706	110	165	267	89.7	117	151	91.1	111	144	183
13108500	19.3	23.6	38.0	21.0	30.4	38.3	16.8	24.2	30.3	13.2	19.0	25.0	13.2	19.6	25.9	12.2	19.6	31.0	34.8	95.8	320	144	266	509	60.2	150	331	22.1	36.0	62.6	14.1	21.7	34.2	13.9	19.6	34.2	86.6
13112000	0	0.6	10.9	0.1	2.8	13.8	0.1	2.1	9.3	0	2.1	7.5	0	1.8	8.0	0.2	3.6	12.5	11.0	46.2	145	40.5	124	336	7.9	60.5	198	0	7.1	25.3	0	0.1	10.7	0	0.1	7.3	37.8
13113000	7.2	17.8	26.8	10.3	16.6	25.0	7.3	13.8	20.7	7.1	13.1	19.1	7.3	13.7	20.4	11.1	19.8	28.9	30.7	69.8	135	43.1	83.3	145	24.7	51.3	109	8.0	19.1	43.9	3.6	11.7	25.2	4.3	10.5	24.2	35.7
13113500	0	0.1	15.0	0	0.1	18.4	0	0.4	13.2	0	0.1	11.5	0	0.8	14.4	0.1	5.9	19.4	9.6	40.5	104	11.5	52.2	143	0.2	30.5	108	0.1	4.2	26.9	0	0	13.3	0	0.1	12.4	21.6
13117300	16.4	21.5	27.9	15.6	18.6	24.0	13.8	16.0	19.3	13.9	16.2	19.4	14.7	17.2	19.7	14.0	16.9	23.2	17.9	24.4	46.3	56.4	117	235	82.5	192	297	33.9	52.0	80.3	19.1	28.3	35.5	16.8	23.5	29.6	50.3
13120000	29.5	37.7	48.6	23.9	30.5	36.9	20.8	24.7	29.6	19.3	23.0	27.5	18.5	21.2	24.5	17.8	20.8	25.5	25.3	43.6	89.6	113	226	417	236	378	592	93.4	170	296	44.8	64.0	97.9	33.3	43.4	59.1	105
13120500	88.1	123	160	76.9	103	127	65.8	83.3	104	64.3	78.9	97.8	63.4	75.6	89.4	64.7	76.3	92.8	80.5	132	258	329	628	1140	629	1130	1780	249	491	900	120	194	302	93.4	136	186	323
13128900	8.6	11.3	15.0	7.1	8.1	11.1	5.5	6.6	7.7	4.5	5.6	7.3	3.8	4.8	6.9	3.1	4.3	5.6	2.8	4.1	7.2	9.6	23.2	58.4	45.5	75.2	121	32.8	48.7	69.3	17.1	20.8	31.4	11.3	14.6	20.0	22.0
13297330	3.6	4.8	6.5	3.4	4.6	6.4	3.3	4.1	5.4	3.1	3.8	5.3	3.2	3.9	5.7	4.1	6.2	11.1	9.0	18.5	39.0	26.6	51.1	94.9	20.2	50.3	95.7	7.1	14.3	27.4	4.2	6.9	9.7	3.5	5.2	6.6	18.0
13297350	0.2	0.3	0.6	0.2	0.3	0.5	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.5	0.2	0.4	0.6	0.4	0.7	1.7	0.6	3.1	7.6	0.4	3.4	9.4	0.3	0.8	2.1	0.2	0.4	0.8	0.2	0.3	0.6	1.2
13297355	7.4	11.6	15.0	7.4	11.2	15.2	7.5	9.6	14.8	7.2	9.0	14.1	7.1	9.5	14.2	9.9	13.8	19.8	18.7	33.1	62.8	46.9	94.1	172	36.4	105	217	12.7	28.1	55.5	7.5	13.8	20.4	6.9	11.8	15.4	35.3
13297450	6.3	9.1	12.3	5.7	7.8	9.9	5.3	6.8	8.2	4.7	5.9	7.4	4.3	5.3	7.1	4.5	5.3	7.0	5.5	6.7	11.3	13.5	27.5	53.8	44.7	76.4	124	28.0	58.3	92.2	11.6	19.2	32.7	7.4	12.1	16.1	22.5
13298000	84.9	108	154	80.3	98.6	129	61.8	82.7	109	60.3	74.7	100	65.3	77.0	93.2	71.0	81.5	102	84.4	112	183	192	344	612	419	753	1260	175	323	675	98.0	148	246	77.0	106	160	231
13299000	19.3	22.4	25.9	16.2	19.6	22.0	12.3	15.3	17.8	9.7	13.2	15.9	9.6	12.6	15.1	9.7	13.4	16.1	14.6	21.5	40.9	50.1	88.4	160	98.4	143	201	48.1	60.7	82.8	29.6	38.5	48.4	21.2	25.7	32.0	43.9
13302500	1000	1270	1540	1100	1310	1510	924	1150	1360	890	1060	1260	921	1090	1230	969	1110	1250	1100	1410	2150	2130	3250	5660	3110	5370	8160	1300	2350	3940	753	1210	1630	783	1070	1360	1960
13305000	196	252	319	227	272	331	200	231	275	188	222	266	199	232	275	214	254	291	199	259	313	162	255	407	288	485	826	143	246	410	90.1	142	201	99.4	154	224	272
13305500	174	229	302	222	266	312	177	218	260	167	202	242	186	210	256	197	233	271	203	246	337	118	251	419	193	480	922	42	126	302	29.4	51.9	98.1	50.2	109	185	246

Appendix B. Monthly and annual streamflow statistics for selected streamflow-gaging stations--Continued

Gaging station number	Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			June			July			Aug			Sept			Qa
	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	Q.80	Q.50	Q.20	
Region 6--Continued																												**Region 6--Continued**									
13306000	30.8	39.8	45.8	35.3	42.1	47.4	29.6	37.5	44.4	30.2	33.8	40.6	30.5	35.2	38.4	35.5	39.9	49.7	48.7	87.6	192	183	279	404	127	216	351	46.4	67.0	111	27.1	38.1	48.2	27.2	35.1	40.7	90.4
13306500	90.8	104	126	81.4	101	116	72.8	87.3	103	68.7	82.4	94.5	72.3	79.0	92.4	73.6	85.2	98.4	102	146	276	313	588	1220	484	880	1520	173	263	427	105	134	173	92.3	106	129	258
13307000	1630	1940	2300	1780	2020	2240	1550	1800	2010	1440	1670	1920	1520	1680	1870	1530	1680	1920	1620	2090	3340	3100	5270	9360	5620	8580	12300	2170	3530	5510	1290	1650	2250	1300	1580	1990	3040
Region 7																												**Region 7**									
10119000	11.9	14.5	16.5	12.3	14.5	16.8	12.5	14.3	17.0	12.5	14.6	17.1	12.8	15.6	19.2	14.2	18.0	24.1	16.6	20.2	27.1	16.1	19.7	23.7	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
10172940	0.2	0.3	0.7	0.2	0.4	0.6	0.2	0.3	0.5	0.2	0.2	0.7	0.2	0.4	0.8	0.3	0.6	1.2	0.3	0.9	2.4	0.6	1.1	4.7	0.4	0.9	1.9	0.2	0.4	1.0	0.1	0.2	0.6	0.2	0.3	0.6	0.99
10315500	1.8	3.0	9.2	4.0	9.6	19.4	8.1	13.0	21.9	8.8	14.4	26.7	14.9	24.1	45.7	31.0	56.9	102	66.8	131	261	95.3	216	376	43.3	126	263	3.8	14.6	44	1.0	1.8	5.4	0.9	1.6	2.5	65.9
10329500	6.3	7.2	8.9	6.8	9.0	11.3	7.2	9.2	12.4	7.4	9.9	14.0	9.2	13.7	30.6	15.6	30.2	83.4	32.1	67.1	131	42.7	93.3	165	16.4	40.8	86.7	5.3	7.9	16.4	4.8	5.2	6.6	5.1	5.8	6.9	35.1
10352500	2.3	3.7	6.4	4.5	6.2	8.7	4.8	7.4	12.4	5.4	8.7	18.7	8.4	18.1	42.4	12.8	36.1	132	15.5	64.2	148	19.0	57.5	116	8.5	24.7	56.1	2.2	6.6	15.6	0.5	1.9	4.7	0.5	2.2	3.5	33.4
10353000	2.4	3.2	4.2	3.4	4.6	6.3	3.6	5.4	9.2	4.0	6.2	19.0	6.8	14.4	29.5	12.6	26.5	72.0	25.4	70.5	133	18.6	53.4	95.0	6.7	15.8	33.2	1.4	3.2	6.7	1.0	1.6	2.7	1.0	1.7	3.0	25.9
10396000	34	43.8	52.4	35.6	46.3	57.5	33.0	45.4	59.6	33.6	45.5	71.9	39.6	53.4	102	53.1	92.9	212	112	191	308	205	339	523	142	250	403	48.8	80.3	136	32.9	46.3	60.9	32.3	42.0	52.0	128
10406500	3.4	5.1	6.1	4.3	5.9	7.7	4.4	5.5	7.7	4.0	5.8	8.5	4.7	6.8	10.9	5.7	9.3	19.4	12.8	25.4	51.7	24.4	52.5	94.0	10.0	25.6	51.8	3	7.7	15.2	1.6	3.0	4.9	1.7	3.1	4.9	16.1
13057940	21.7	38.3	60.6	25.9	43.1	63.0	25.0	42.4	59	26.6	39.9	56.4	31.8	45.8	61.3	49.9	67.4	127	123	238	532	115	403	726	48.4	153	340	15.4	54.3	119	11.6	34.1	66.4	14.1	24.9	54.2	125
13075000	62.2	75.5	95.2	64.2	78.6	100	60.9	75.1	97.6	59	74.6	96.5	65.7	87.9	122	77.7	105	156	70.4	98.1	151	54.0	90.2	165	45.6	69.4	109	36.8	49.9	70.0	39.5	54.9	72.1	53.4	68.5	87	87.1
13083000	9.4	11.2	12.9	9.9	11.7	13.3	9.6	11.8	13.6	9.4	11.5	13.9	10.5	12.2	14.7	11.7	14.2	18.1	14.2	19.1	28.9	17.3	29.7	44.1	12.3	19.7	29.5	9.0	12.0	15.8	8.2	9.8	12.3	8.6	9.9	12.2	15.2
13092000	8.1	9.6	12.2	9.5	11.5	13.9	9.7	12.4	16.0	9.7	12.9	18.9	12.0	16.0	23.6	14.9	21.7	36.7	36.1	66.2	123	58	111	199	24.0	44.9	83.3	9.5	15.7	23.6	6.3	8.5	11.5	6.4	8.2	9.9	34.5
13154000	2.2	2.8	3.6	3.2	3.8	5.4	3.6	4.9	14.4	5.0	7.0	11.7	8.3	24.6	89.4	20	61.3	171	10.4	31.8	87.0	2.1	5.8	17.1	0.8	2.3	7.4	0.1	0.7	1.3	0.3	0.7	1.1	0.5	0.9	2.0	29.9
13155300	0.6	1.2	1.6	0.8	1.2	1.5	0.9	1.2	2.0	1.2	2.2	11.3	1.6	5.5	18.1	5.7	10.0	17.5	11.3	16.8	51.0	8.1	26.9	57.2	2.5	8.1	14.5	0.6	2.7	4.2	0.3	0.9	1.8	0.3	0.8	1.5	10.9
13162500	7.9	10.9	15.3	8.5	11.0	14.3	8.1	9.9	13.2	7.8	9.3	12.9	8.5	11.1	20.9	11.9	18.5	27.4	33.1	56.9	96.7	106	176	312	116	236	376	24.4	55.1	122	9.9	17.5	28.7	7.6	10.5	17.7	60.8
13169500	0	0	1.5	0	0	1.7	0	0	0.6	0	0	1	0	0	5.5	0	2.3	30.0	0	3.3	21.1	0	1.5	12.0	0	0	5.8	0	0	2.5	0	0	1.2	0	0	1.1	5.3
13170000	0.1	0.2	0.3	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0.3	0	0.1	2.6	0	0.1	1.9	0	0.1	0.2	0	0.1	0.1	0	0.1	0.1	0.1	0.3	0.5	0	0.1	0.1	0.8
13172680	0.5	1.4	2.1	1.3	2.0	3.4	1.5	2.3	5.6	1.7	3.2	9.7	2.2	5.5	13.4	5.3	11.3	37.4	12.9	35.2	62.9	18.5	58.3	94.1	5.9	18.6	42.2	0.8	3.0	7.3	0	0.8	2.0	0	0.6	1.5	15.9
13172720	0	0	0.2	0	0.2	0.7	0.1	0.5	1.7	0.5	1.2	4.7	0.8	2.5	6.1	1.6	4.0	13.5	1.2	4.4	10.8	0.6	1.5	3.3	0.2	0.6	1.2	0	0.1	0.3	0	0	0.1	0	0	0.1	2.67
13172735	0.1	0.3	0.9	0.3	0.7	1.3	0.7	1.3	2.9	1.0	2.1	5.2	1.4	3.2	7.0	2.2	4.8	11.3	2.2	5.4	10.1	1.4	3.0	5.6	0.5	1.3	2.3	0	0.2	0.7	0	0	0.2	0	0.1	0.3	3.13
13172740	0.8	1.3	3.7	1.0	2.6	5.5	2.2	3.8	11.8	3.0	6.9	27.4	4.4	12.6	34.4	6.6	21.0	67.1	8.3	37.0	81.2	10.6	46	85.6	5.4	17	36.6	1.4	3.0	6.0	0.7	1.6	3.3	0.6	1.2	2.4	21.0
13176000	16.5	26.3	41.8	18.5	25.4	37	17.6	24.3	41.8	18.3	30.4	67.7	25.2	46.1	104	41.6	94.0	212	130	292	648	197	423	717	140	207	330	71.1	102	158	47.5	92.6	120	16.5	47.2	86.6	149
13178000	3.3	9.2	18.6	14.8	21.1	32	17.6	27.9	53.5	20	34.7	161	35.6	96.5	266	90.8	181	395	295	602	1160	234	506	938	58.3	147	290	6.2	15.5	45	1.9	3.9	6.8	1.9	3.2	5.8	195
13211309	32.5	43.5	56.8	31.7	37	45.3	28.0	33.2	38.3	24.3	29.5	33.1	21.9	26.3	32.2	23.3	26.8	34.0	31.7	46.7	67.9	37.3	47.2	70.2	37.9	49.8	66.8	35.3	47.1	63.4	34.8	48.1	61.6	37	54.7	72.4	40.3
13226500	2.1	3.8	9.4	3.6	7.3	12.6	5.6	10.5	28.2	8.0	18.5	77.6	15.4	55.8	157	36.4	93.8	278	7.5	48.0	225	3.1	11.3	39.0	3.0	7.1	20.4	0.8	2.5	7.5	0.6	2.0	3.6	1.0	2.0	4.7	54.8
Region 8																												**Region 8**									
06037500	358	422	500	365	417	484	352	415	467	347	403	455	352	396	438	360	402	449	403	461	584	583	789	1100	516	767	1090	381	474	611	357	427	506	357	417	499	501
09223000	16.4	21.0	27.4	15.1	19.5	24.7	12.8	15.9	21.0	11.5	14.7	19.1	11.5	15.4	19.7	14.4	19.2	25.2	32.3	65.2	153	177	353	667	148	340	633	39.0	74.6	140	17.3	27.4	44.2	14.3	20.5	28.5	100
10015700	0.2	0.9	6.6	0.6	3.2	8.7	1.0	3.5	7.7	1.5	3.7	7.3	2.4	4.4	7.7	3.5	8.4	28.4	15.8	36.7	76.2	19.2	53.0	117	5.0	18.1	49.4	0.4	3.2	11.5	0.1	0.4	4.2	0	0.4	2.3	17.9
10040000	3.0	4.5	5.5	2.6	4.1	4.9	2.1	3.5	4.5	2.1	3.0	4.2	2.0	2.6	3.7	2.4	3.3	5.1	9.5	23.3	76.1	26.0	52.6	106	17.8	31.1	44.8	6.7	12.0	17.5	3.6	6.0	8.5	3.2	4.4	5.7	17.2
10041000	13.1	17.8	23.9	12.7	16.6	21.0	11.4	15.3	19.0	11.5	14.8	18.1	12.4	14.8	17.9	13.7	16.6	23.9	28.1	54.8	149	74.5	192	434	45.1	87.6	157	22	39.9	65.1	14.3	23.0	35.9	11.9	18.4	26.9	54.6
10058600	18.2	21.1	24.9	16.8	18.9	22.5	16.1	17.5	20.7	14.5	16.5	19.2	14.2	16.1	18.4	14.5	16.4	19.1	17.8	23.5	36.7	32.6	61.3	91.2	37.9	73.9	125	25.5	37.5	61.9	21.0	27.3	37.7	19.3	23.2	30.6	31.3
10077000	48.5	58.4	67.9	49.5	58.6	68.6	48.1	54.2	60.9	44.3	49.6	60.1	46	49.8	58.0	47.0	54.1	68.3	61.2	76.4	121	59.4	71.3	88.2	54.6	64.3	74.3	52.3	62.4	73.5	48.9	55.9	74.8	49.2	57.1	74.3	61.5
10093000	25.4	28.9	32.6	22.3	25.5	28.4	19.7	22.8	26.8	18.3	20.5	25.6	17.3	20.1	26.4	20.1	25.6	37.5	37.3	67.4	111	140	276	461	173	324	546	59.5	89.8	156	38.3	48.2	63.8	30.2	34.9	43.3	91.7
10096000	3.0	4.5	16.5	3.4	4.6	15.7	9.2	15.9	31.2	15.2	26.5	33.4	22.4	28.8	34.7	23.3	35.5	59.5	68.4	136	216	161	251	411	7.6	122	287	2.4	3.6	5.2	1.9	2.8	4.4	2.1	2.9	5.2	64.8
10099000	9.4	11.4	14.5	8.1	11.3	14	8.0	9.2	13.1	6.9	9.0	12.4	6.8	10.5	14.5	9.1	15.6	24.9	24.2	47.2	65.7	73.6	116	174	70.9	124	171	25.9	39.1	64.5	14.2	18.0	25.4	10.1	12.4	15.8	36.9
13010065	262	361	433	257	362	454	296	359	446	292	339	422	288	349	424	310	355	402	382	526	960	1370	2680	4580	1210	3020	5040	453	786	1400	274	438	610	262	358	465	929
13011500	50	61.2	79.2	42.2	52.8	65.3	37.3	47.2	58.7	34.9	44.8	55.7	36.7	46.1	55.6	41.9	50.4	62.5	59.9	94.0	210	421	872	1470	679	1180	1860	131	236	514	67.8	90.1	130	56.0	69.1	87.3	272
13011900	171	215	261	144	172	200	120	140	161	106	122	141	104	117	129	110	123	142	133	182	284	391	866	1610	1400	2140	3170	525	1180	2250	256	381	589	188	257	327	550
13012000	186	213	272	157	178	208	130	154	172	121	133	152	121	130	150	121	140	150	153	202	350	565	1050	1870	1570	2320	3350	732	1370	2150	300	410	596	212	266	336	597
13014500	174	207	236	158	178	204	142	160	184	138	148	165	135	144	161	136	145	161	156	196	373	556	1070	1960	1060	1620	2450	395	740	1210	195	266	394	174	215	266	475
13019438	5.5	7.3	11.3	5.2	6.7	9.3	4.6	5.6	7.6	3.8	4.9	6.5	3.9	5.1	6.3	4.8	6.6	8.9	12.1	28.1	56.8	58.9	86.9	168	40.0	90.7	188	18.4	28.5	49.1	9.8	14.7	20.9	6.7	9.1	14.2	29.5
13019500	238	264	308	200	229	258	178	204	237	177	193	220	171	190	207	166	187	208	221	364	1100	1200	2050	2870	1600	2170	3010	696	1110	1710	367	474	628	259	320	384	706
13023000	251	309	387	220	262	320	186	226	271	177	209	256	176	202	236	184	215	262	297	488	928	1090	1700	2460	1180	1960	2790	523	843	1380	343	469	632	279	367	459	654
13024000	6.8	10.3	13.2	5.7	8.4	11.9	4.8	7.5	9.1	4.0	6.4	9.2	3.8	5.9	9.1	6.0	7.8	9.6	10.3	21.3	66.6	79.4	129	197	73.1	127	188	22.9	36.9	64.5	12.1	16.6	23.2	7.8	12.1	15.2	36.2
13024500	20.2	23.1	27.0	16.8	19.3	22.4	15.2	17.3	19.5	13.6	15.4	17.5	12.3	14.1	16.2	11.7	13.4	15.3	14.6	18.8	32.2	38.3	69.8	128	101	157	215	55.6	77.4	114	33.8	43.8	56.4	24.3	28.8	35.6	44.5
13025000	44.7	49.5	55.7	39.5	44.4	49.1	36.5	39.8	44.7	34.3	37.4	41.9	32.4	35.5	38.5	32.2	34.8	37.4	35.3	40.9	49.9	58.0	103	189	198	277	378	110	173	280	66.7	80.4	106	50.9	60.4	69.1	86.9
13027000	42.4	46.0	50.0	36.5	41.5	45.4	32.8	37.8	40.9	30.9	34.4	36.3	28.9	32.1	34.6	27.4	30.6	32.1	29.4	38.4	58.1	63.2	95.6	141	110	148	213	71.7	87.7	124	59.3	67.5	81.7	48.0	55.8	63.4	62.4
13032000	24.9	28.4	32.2	22.3	25.1	28.9	19.8	22.7	26.6	18.1	21.5	26.7	16.9	20.8	28.2	18.8	24.0	30.9	46.2	90.0	176	177	291	460	109	176	267	51.7	72.4	105	34.3	42.9	54.3	27.0	33.2	39.1	78.2
13044500	196	215	230	187	208	230	179	200	219	181	199	215	184	198	215	179	198	216	197	221	298	237	335	461	209	269	339	201	229	252	200	216	235	198	216	233	229
13045500	63.8	77.6	99.8	61.0	76.1	96.9	55.3	71.2	87.7	51.2	65.0	75.3	52.4	61.7	72.0	54.5	66.2	82.0	84.2	121	262	215	411	605	96.0	196	315	67.4	98.0	122	65.4	82.7	100	60.2	77.2	99.8	124
13046680	65.5	83.4	97.4	67.4	79.8	96.9	64.4	78.0	93.1	61.6	73.5	85.2	60.9	69.8	82.4	62.6	69.2	82.6	74.7	98.0	168	160	248	403	94.0	247	336	71.6	98.5	129	66.7	86.9	105	64.6	82.4	101	116
13047500	391	483	572	385	470	546	353	438	499	332	406	457	343	389	435	352	391	434	411	522	913	1200	1830	2550	1360	2110	2920	484	691	1230	409	521	686	393	497	620	768
13049500	311	452	596	423	523	644	431	514	607	410	474	557	414	466	528	419	470	547	501	660	1180	1220	1930	2770	878	1810	2750	82.5	239	768	96.1	196	373	183	293	449	788
13052200	241	317	390	211	286	345	177	224	277	165	200	246	167	208	252	198	239	332	247	348	452	324	466	678	547	849	1340	395	688	1110	272	430	546	234	359	440	411
13054000	279	321	378	257	288	348	198	230	267	177	205	229	181	208	232	177	218	285	267	367	543	270	418	698	520	815	1100	447	558	745	356	423	521	294	337	413	394
13055000	460	544	656	413	489	579	353	418	480	327	384	439	333	385	448	367	430	541	481	678	1000	912	1440	2310	1290	1940	2970	816	1070	1690	622	748	900	518	632	737	843

Appendix C. Basin characteristics for selected streamflow-gaging stations

[A, drainage area, in square miles; E, mean basin elevation, in feet above sea level; BR, basin relief, in feet; S30, slopes greater than 30 percent, in percent of drainage area; P, mean annual precipitation, in inches; F, forested area, in percent of drainage area; BS, basin slope, in percent; MCS, main channel slope, in feet per mile]

Gaging station number	A	E	BR	S30	P	F	BS	MCS
				Region 1				
12305500	55.3	4686.9	4134.8	69.4	48.3	91.9	37.1	140.1
12311000	133.1	3257.0	5376.7	27.0	30.4	72.6	21.2	19.6
12316800	12.5	4084.4	3178.5	33.2	29.1	94.5	25.4	265.6
12320500	29.9	5347.3	5803.1	81.4	41.3	89.5	46.4	206.9
12321000	71.1	5054.2	5866.9	62.3	46.1	70.4	37.0	151.0
12392155	115.1	4648.5	4844.3	71.8	54.3	82.4	43.2	128.3
12392300	121.4	4280.6	5441.4	52.4	38.1	62.6	32.2	126.9
12393500	596.6	3941.3	5124.1	46.3	38.8	79.0	28.9	13.1
12396000	68.2	3622.5	3731.6	51.8	36.7	79.6	30.1	96.6
12408500	82.5	3520.8	3832.5	46.2	37.7	89.4	29.6	105.0
12409000	1011.0	2904.3	5308.7	29.2	27.6	76.9	22.3	11.1
12427000	84.4	2459.0	2230.6	10.4	28.2	65.2	13.2	30.4
12431000	634.9	2397.7	4281.5	9.4	25.1	54.6	12.2	25.9
				Region 2				
12302500	23.7	5275.3	5917.3	82.4	53.0	66.4	54.1	246.0
12303100	11.3	5466.8	4788.9	71.2	52.6	76.7	48.3	466.2
12303500	125.0	4069.2	5752.5	62.8	43.9	87.3	38.5	76.9
12347500	26.1	6649.7	4871.1	83.8	60.9	50.3	57.0	156.6
12350500	29.0	6557.7	5711.5	89.6	55.6	60.4	58.8	289.4
12354000	43.6	4843.4	4434.8	84.6	44.5	88.3	47.2	180.4
12389500	641.5	4567.1	4998.9	47.0	29.6	85.8	30.0	18.5
12390700	181.5	4437.3	4349.7	79.6	43.7	93.1	43.5	79.3
12411000	334.0	3947.0	3722.1	75.6	48.2	89.7	40.8	29.8
12413000	893.7	3835.9	4637.1	77.6	45.4	88.9	41.9	20.8
12413140	15.0	4411.0	3461.3	88.8	41.5	94.2	49.6	217.1
12413150	105.6	4615.4	4133.8	82.3	42.5	89.8	45.8	84.2
12413210	181.8	4301.2	4438.3	82.5	43.3	88.4	45.8	62.8
12413470	287.1	4096.4	4605.6	80.7	45.1	83.5	44.6	50.8
12413500	1207.4	3878.0	4673.2	77.8	45.0	87.3	42.3	19.5
12414500	1024.5	4545.6	5487.6	74.4	47.0	89.8	41.3	29.2
12414900	272.6	3592.6	3792.4	34.9	37.7	80.5	25.1	34.8
12415000	434.5	3465.5	4214.6	31.7	35.6	82.2	23.8	26.7
12416000	21.5	3564.7	3243.5	81.2	38.8	95.1	41.8	242.0
13336500	1913.1	5511.8	7789.6	75.6	40.6	82.8	44.2	39.8
13336900	88.3	4467.2	4633.9	55.7	46.3	91.3	34.7	159.2
13337000	1179.4	5197.2	7331.2	63.5	46.6	88.2	38.5	43.0
13340500	997.5	4888.8	5663.4	68.1	52.5	82.1	39.0	43.1
13340600	1294.2	4732.9	6182.5	69.9	51.4	82.9	40.4	34.1
13341300	3.0	3716.0	1643.9	55.6	48.1	86.8	32.0	282.7
13341400	42.7	3617.2	2146.1	36.4	42.7	86.0	26.3	63.4
				Region 3				
12424000	674.9	2647.1	3187.9	6.8	20.8	19.4	10.5	13.0
13334700	170.5	3752.2	5098.9	57.5	23.0	30.5	35.4	121.9
13345000	316.0	3165.1	2859.7	25.8	30.1	63.4	21.2	17.4
13346100	491.7	2963.6	3350.1	17.8	26.9	41.7	17.7	11.8
13346800	17.6	2844.2	1801.2	6.0	24.5	12.5	11.8	32.9
13348000	126.9	2745.5	2637.5	3.3	23.8	6.9	11.9	21.4
13348500	27.1	2652.2	1442.8	0.1	23.2	0.6	10.0	26.0
13341500	453.7	2969.1	3849.7	17.8	29.5	59.8	18.2	46.5
13342450	268.9	3149.2	4100.8	22.2	19.3	30.7	18.9	139.3
				Region 4				
13196500	4.8	5313.2	2396.4	57.4	22.1	60.4	32.9	318.3
13200000	397.0	5070.8	5019.7	51.0	24.8	66.3	31.3	83.3
13200500	16.0	4680.6	3410.5	70.6	23.3	65.0	39.8	317.0
13201000	424.4	5024.2	5068.8	52.0	24.5	65.0	31.7	71.8
13207000	19.2	4017.4	3094.6	30.2	19.4	8.0	24.3	197.1
13207500	59.4	3963.4	4310.5	34.3	20.4	11.7	25.3	162.8
13216500	342.5	5360.8	4668.1	23.2	23.8	52.7	21.6	58.1
13250600	55.2	4099.3	2987.5	28.0	15.9	4.8	23.6	76.7
13251300	4.0	4947.6	1821.4	41.5	39.8	81.5	27.3	328.9
13251500	36.6	4654.2	1896.9	27.1	34.6	87.8	22.3	53.8
13253500	105.4	4969.7	4662.7	38.0	32.3	88.1	26.5	53.7
13256000	391.9	4668.2	5242.5	32.7	29.6	64.6	24.2	41.4
13257000	86.1	5430.2	5221.5	38.3	34.0	74.1	27.4	133.0
13258500	596.4	4636.5	5444.7	30.6	29.2	58.2	23.5	33.5
13260000	55.3	4751.8	5035.8	37.9	22.4	42.3	26.4	240.6
13261000	79.5	5313.9	4618.1	36.5	28.2	67.1	26.9	165.2
13266000	1448.3	4141.3	5874.7	22.1	22.2	32.6	19.3	26.1

Appendix C. Basin characteristics for selected streamflow-gaging stations--Continued

Gaging station number	A	E	BR	S30	P	F	BS	MCS
				Region 4--Continued				
13267000	56.8	4846.2	4800.2	53.4	22.1	55.4	31.6	160.9
13269300	110.8	4901.1	3066.8	17.7	25.1	81.6	18.7	60.1
13270800	38.9	5823.5	3427.4	42.0	28.6	91.6	28.2	220.3
13275500	205.2	5224.6	5393.4	40.8	24.7	74.5	26.5	63.4
13288200	155.7	5742.6	6684.6	63.7	47.5	67.6	40.5	140.3
13289960	177.1	5037.5	6313.8	43.3	27.5	62.2	29.4	107.0
13290190	298.5	4287.7	7681.4	40.0	33.7	50.2	27.4	100.7
13315500	15.1	4742.2	2183.3	45.0	35.4	93.0	27.4	115.0
13316500	576.1	5421.1	7591.0	51.5	29.6	71.8	33.4	57.6
13316800	15.3	5031.2	3191.9	44.2	30.2	69.3	30.6	298.5
13317000	13418.3	6753.8	11152.1	60.3	24.7	58.3	37.7	17.2
13319000	687.4	4582.0	5095.2	21.8	27.6	68.4	20.3	46.0
13320000	104.1	5263.8	5586.1	40.8	39.7	85.9	28.6	164.9
13323600	24.8	5515.7	3278.0	20.8	43.6	77.1	21.3	220.4
13329500	29.6	7461.3	5298.0	87.0	64.6	47.0	57.2	259.5
13330000	71.5	6893.5	5981.8	77.2	56.7	53.1	49.2	196.8
13330500	72.1	5804.7	5859.0	75.0	44.7	67.2	45.6	161.3
13331500	239.2	5699.5	6598.7	70.5	46.5	66.4	43.5	60.8
13337500	260.8	5095.1	3584.2	28.8	35.3	91.7	24.1	36.1
13338000	843.4	5116.5	7070.0	42.4	34.9	91.8	29.7	46.1
13338500	1168.3	4546.6	7553.9	35.1	31.3	70.5	25.7	42.4
13339000	4827.4	4956.2	8163.1	58.6	38.3	77.4	36.2	27.5
13339500	241.4	3528.6	4938.4	25.5	31.5	84.1	22.6	58.2
13340000	5507.9	4736.4	8364.5	54.5	37.4	76.6	34.4	22.1
14010000	61.9	4273.1	3818.7	74.7	46.4	68.3	46.3	157.3
14011000	42.6	3640.0	4263.5	71.2	42.2	57.2	42.1	158.6
				Region 5				
12343400	379.3	6361.7	5278.4	55.1	28.4	78.6	33.2	59.8
12346500	88.1	6676.0	4576.0	67.5	29.6	86.4	38.8	208.0
12351000	73.0	6495.2	4390.9	62.0	30.6	79.6	36.5	163.2
13135500	137.5	8204.0	4931.8	67.5	31.4	55.8	40.6	66.8
13136500	92.6	7696.0	4229.0	77.8	35.8	59.7	42.6	63.3
13139500	627.6	7685.6	6615.8	74.0	29.4	43.2	42.7	48.3
13141000	786.2	7347.3	7120.0	69.3	26.5	35.5	40.2	39.5
13185000	831.6	6415.7	7338.2	75.1	32.4	50.2	44.3	57.7
13186000	641.6	7025.2	6088.8	74.4	34.7	50.6	42.1	42.7
13186500	133.6	6276.7	5458.7	47.3	22.4	22.4	29.3	113.8
13187000	55.6	6171.1	5094.1	59.3	32.2	59.2	33.6	166.4
13235000	449.3	6824.5	6785.8	76.6	34.5	54.3	46.7	72.8
13240000	48.7	6921.9	3860.7	67.9	37.2	71.6	42.1	117.4
13292500	93.9	8181.1	3434.5	53.1	34.7	56.9	32.8	59.1
13293000	35.6	8161.5	3578.7	60.4	44.5	47.1	37.6	70.2
13295000	148.9	7318.8	4478.4	37.0	23.9	63.0	26.1	54.8
13295500	510.4	7786.2	4677.4	45.2	29.6	54.9	30.4	36.9
13296000	187.3	7992.1	4200.9	71.1	27.1	74.5	41.0	82.9
13296500	811.1	7791.6	4965.3	53.7	28.0	61.9	33.6	31.5
13308500	133.8	7482.6	3135.5	40.2	28.4	70.8	26.6	89.5
13309000	181.7	7060.3	2987.5	24.7	30.0	70.1	20.2	25.8
13310000	451.5	6981.2	5385.2	74.0	28.7	78.6	44.3	75.5
13310500	91.7	6631.3	3717.0	52.9	37.5	88.7	31.7	99.9
13310700	329.3	6381.8	5387.1	63.8	33.6	83.8	38.0	46.1
13311000	19.3	7724.4	2743.5	62.6	34.0	83.7	35.3	213.0
13311500	42.9	7619.9	3363.9	72.5	30.9	77.3	40.8	178.3
13312000	106.9	7404.6	4182.6	73.0	30.0	78.2	41.7	132.3
13313000	216.4	7135.2	4457.6	40.7	34.3	81.7	28.2	65.6
13314000	1164.0	6696.9	6378.5	60.5	33.2	81.2	37.4	63.7
13315000	12228.0	6913.7	10701.3	60.4	24.4	57.4	37.8	19.9
				Region 6				
06013500	277.0	7928.2	4691.8	31.8	18.8	14.5	24.1	78.4
06015500	349.0	6940.1	5193.8	19.6	19.2	28.8	18.8	31.8
06019500	525.5	7235.2	5130.4	20.5	22.9	26.0	20.1	49.9
13108500	228.4	6943.3	3641.5	12.8	26.8	39.4	12.8	36.7
13112000	393.9	6428.8	5062.4	7.5	21.1	22.9	8.6	35.7
13113000	123.2	7027.5	3015.2	23.5	20.3	29.9	19.6	59.3
13113500	238.7	6696.9	3696.0	18.8	19.4	24.4	16.7	52.8
13117300	74.2	8380.5	4280.2	53.7	23.8	54.1	32.7	125.2
13120000	114.7	8659.7	4984.0	72.1	29.8	58.1	43.1	76.3
13120500	440.4	8626.3	5284.1	60.8	27.0	38.0	37.8	42.1
13128900	8.4	9461.0	5123.4	94.2	26.6	21.0	66.2	869.9
13297330	29.5	7618.4	3963.8	85.8	22.6	68.9	47.7	175.6
13297350	6.4	7520.2	3470.0	68.3	21.7	66.3	40.8	403.6

Appendix C. Basin characteristics for selected streamflow-gaging stations--Continued

Gaging station number	A	E	BR	S30	P	F	BS	MCS
				Region 6--Continued				
13297355	71.6	7729.2	4114.3	60.2	25.2	73.0	36.3	160.3
13297450	18.3	8951.8	5501.5	64.3	32.0	39.2	41.3	298.9
13298000	540.2	8092.5	6227.5	62.7	26.0	31.7	38.2	58.0
13299000	84.6	7780.8	4996.6	62.0	25.6	62.4	37.2	196.8
13302500	3746.1	7397.5	8655.9	52.9	21.6	37.3	33.4	19.6
13305000	907.1	7430.9	6430.2	36.9	15.6	24.3	25.2	48.6
13305500	1258.0	7108.2	7370.8	39.1	15.3	24.9	26.4	39.8
13306000	210.3	6258.1	6244.4	78.0	22.9	77.8	43.6	100.0
13306500	520.7	7028.2	6652.8	62.2	24.0	80.2	38.6	87.8
13307000	6236.7	7154.3	9419.7	52.8	20.4	41.1	33.3	18.0
				Region 7				
10119000	107.1	6070.2	3724.2	17.8	13.2	8.1	17.7	59.0
10172940	28.7	6681.4	2659.9	13.7	17.0	0.7	17.5	187.5
10315500	389.8	6589.8	5032.4	21.8	15.2	2.3	17.5	34.3
10329500	176.2	6210.4	4930.3	26.4	21.9	4.1	21.0	73.6
10352500	225.4	5890.4	3931.3	17.2	17.0	1.4	17.3	60.6
10353000	137.9	6117.4	3436.4	28.0	22.2	2.1	22.2	70.3
10396000	204.7	6197.6	5455.7	15.2	29.1	22.4	16.2	78.3
10406500	86.7	6025.9	3926.9	31.2	16.9	3.9	23.1	147.5
13057940	431.4	6422.9	2544.2	8.4	16.6	19.2	13.3	29.1
13075000	367.4	5587.7	4652.6	20.2	14.3	9.0	16.8	32.6
13083000	52.4	6339.4	3095.6	41.3	17.4	6.2	28.1	116.4
13092000	81.6	6350.2	3685.2	48.7	14.5	9.4	31.6	144.5
13154000	103.3	4812.3	3683.5	14.0	14.0	0.0	15.1	104.0
13155300	14.2	5927.8	2397.6	36.8	23.5	3.0	25.2	203.3
13162500	84.9	7603.0	5683.3	55.2	24.8	24.5	35.3	124.3
13169500	243.7	5170.0	3447.7	7.4	13.8	0.0	10.1	63.9
13170000	103.4	5067.4	3447.5	11.5	14.2	0.1	13.2	114.6
13172680	18.7	6133.6	2569.4	24.9	21.2	38.4	23.0	372.8
13172720	12.5	4883.0	2467.9	21.6	13.6	11.1	21.1	265.9
13172735	13.1	5001.8	2329.3	36.3	14.7	5.5	26.1	322.0
13172740	91.8	5015.7	3719.2	20.7	14.8	12.4	20.2	150.2
13176000	452.3	6660.1	3672.2	24.6	21.6	2.9	20.6	25.2
13178000	454.2	5781.8	3905.0	21.8	26.1	38.9	19.5	30.2
13211309	233.7	2984.4	1178.3	0.0	8.2	0.0	1.7	18.4
13226500	535.3	4133.8	3958.2	15.3	12.3	0.8	17.4	40.2
				Region 8				
06037500	434.9	7900.0	2785.6	7.9	42.3	93.9	11.3	30.3
09223000	128.6	8466.6	2454.4	19.5	32.0	72.8	20.4	52.4
10015700	58.5	7971.5	2997.9	1.2	21.6	25.4	9.6	119.9
10040000	45.4	7243.6	2730.5	36.9	23.8	24.8	26.5	56.9
10041000	113.8	7330.7	2826.5	40.7	25.1	36.5	27.4	87.7
10058600	24.3	7684.3	3487.4	40.5	35.1	37.6	27.4	197.2
10077000	50.9	6184.9	1100.5	5.5	18.2	2.3	6.1	24.7
10093000	30.4	7384.3	3983.1	49.4	36.0	53.7	31.3	276.1
10096000	23.2	5691.9	1695.4	18.0	14.2	2.5	19.8	138.9
10099000	16.3	7655.4	4510.9	86.6	40.9	62.2	49.4	413.0
13010065	502.5	8199.4	3509.4	14.7	47.4	82.8	15.8	38.3
13011500	162.7	8134.7	3763.2	20.8	36.3	72.4	20.3	60.6
13011900	330.1	8951.0	4566.8	33.9	37.1	59.7	27.0	58.9
13012000	370.2	8815.8	4619.9	32.8	36.6	60.2	26.3	48.7
13014500	608.0	8863.0	5015.9	26.9	31.6	62.6	23.3	46.4
13019438	82.7	8559.5	4943.0	60.8	31.0	54.5	38.6	129.1
13019500	561.3	7961.5	5650.1	42.6	26.7	60.9	30.3	43.7
13023000	448.8	8105.3	5632.6	54.5	34.9	72.2	35.1	40.0
13024000	48.2	8010.1	4119.5	40.5	32.9	73.4	28.0	106.6
13024500	25.7	8647.5	3738.3	81.3	39.5	73.4	45.1	248.9
13025000	27.7	8496.0	4223.5	84.9	39.3	72.3	49.3	256.8
13027000	20.1	8469.4	3663.7	80.7	40.8	54.0	49.7	243.4
13032000	78.3	7187.5	3806.4	69.7	26.7	56.1	38.8	89.2
13044500	131.1	6675.6	2604.8	5.5	31.8	69.3	9.1	42.7
13045500	123.7	6418.3	2516.2	5.4	35.3	65.4	10.6	93.5
13046680	85.4	7912.5	2270.2	3.3	56.0	87.7	6.9	112.8
13047500	333.6	7540.3	3655.8	7.8	52.9	83.6	11.0	73.7
13049500	512.9	6974.2	4197.5	6.4	42.6	63.3	9.9	50.3
13052200	341.4	7302.9	5223.4	34.5	31.7	39.7	23.6	46.0
13054000	479.2	7200.1	5277.0	30.0	30.3	38.2	21.5	33.6
13055000	874.8	6920.9	6232.1	24.3	27.7	36.1	19.0	28.7

Printed on recycled paper