Magnitude and Frequency of Floods in Western Oregon

By D. D. Harris, Larry L. Hubbard, and Lawrence E. Hubbard

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CECIL D. ANDRUS, Secretary
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H. William Menard, Director

For additional information write to:

U.S. GEOLOGICAL SURVEY
P.O. Box 3202
Portland, Oregon 97208

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Conversion factors for inch-pound system and International System Units (SI)

[For use of those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:]

Multiply inch-pound units	By	To obtain metric unit
	Length	
inch (in.)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Specific combinations	
cubic foot per second (ft^3/s)	0.0283	cubic meter per second (m^3/s)

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ABSTRACT

A method for estimating the magnitude and frequency of floods is presented for unregulated streams in western Oregon. Equations relating flood magnitude to basin characteristics were developed for exceedance probabilities of 0.5 to 0.01 (2- to 100-year recurrence intervals). Separate equations are presented for four regions: Coast, Willamette, Rogue-Umpqua, and High Cascades.

Also presented are values of flood discharges for selected exceedance probabilities and of basin characteristics for all gaging stations used in the analysis. Included are data for 230 stations in Oregon, 6 stations in southwestern Washington, and 3 stations in northwestern California. Drainage areas used in the analysis range from 0.21 to 7,280 square miles. Also included are maximum discharges for all western Oregon stations used in the analysis.

INTRODUCTION

A special need for updated flood-frequency information for Oregon results from recent emphasis on flood-plain zoning, flood insurance, and design adequacy of hydraulic structures. Studies of flood magnitude and frequency are based on analyses of available streamflow records. Very few long-term records for streams with less than 10 mi^2 of drainage area were available when the last flood-frequency reports were prepared for Oregon by the U.S. Geological Survey. Many data have been collected since a small-stream flood-data program was started in 1952 in cooperation with the Oregon State Highway Commission (now Oregon Department of Transportation, Highway Division). This program was expanded in 1965, through funds provided by the U.S. Forest Service, to include many previously unsampled areas in national forests. Inclusion of these data has enlarged the flood-data base, both areally and in range of basin size.

This analysis was limited to western Oregon, because of the large number of gaging-station records available for the western part of the State and the deficiency of peak-flow information for many areas of the eastern part. Limiting the analysis to western Oregon allows timely use of urgently needed flood information in a rapidly developing area. An eastern Oregon flood-frequency analysis will be presented in a later report.

In describing flood frequency in this report, the term "exceedance probability" is used in preference to the term "recurrence interval." However, both terms are used in most of the tables, graphs, and illustrative problems. For example, a flood with a 0.01 exceedance probability is a flood that has one chance in a hundred of being exceeded in any one year. This is a 100-year flood under the "recurrence interval" terminology.

Purpose and Scope

This report describes methods for evaluating the magnitude and frequency of floods at sites on streams with natural flow. The purpose is to provide a method to estimate flood magnitude and frequency at ungaged sites in western Oregon. The report is based on data from all unregulated streams (or data from regulated streams prior to their regulation) where gaging stations have been operated for at least 10 years.

Records at the gaging stations provided the basis for estimating flood-peak discharges and frequency of occurrence at ungaged sites. Stations used in this analysis have records ranging from 10 to 70 years. Peak-flow records of 230 gaging stations are available for western Oregon, 73 of which are crest-stage gaging stations that have drainage areas as small as 0.21 mi^2. Locations of the gaging stations are shown on plate 1.

The magnitude of a flood is influenced by physiographic characteristics of the drainage basin. These characteristics, which include climate, topography, geography, soils, and vegetation, are referred to as basin characteristics throughout this report.

Multiple-regression analysis was used to correlate flood discharges with selected basin characteristics and to develop appropriate regional relation equations. Although many basin characteristics were determined and investigated, the number retained in the equations was reduced for simplicity and practicality, without undue sacrifice of the accuracy of the flow estimate. The characteristics used were selected on the basis of the results of prior investigations, ease of determination, and the results of the regression analysis.

Previous Studies

A previous flood-frequency report by Hulsing and Kallio (1964), covering the Pacific slope basins in Oregon and lower Columbia River basin, contains peak-flow records for 173 gaging stations in western Oregon. Of these, 22 are for crest-stage gaging stations on small streams.

Regression equations for flood-peak discharge are presented in a report, "Evaluation of the streamflow data program in Oregon" (Lystrom, 1970), that is based on data from all stations with 10 or more years of record of unregulated flow through the 1967 water year (October 1966 through 1967).

GENERAL DESCRIPTION OF THE AREA

The area studied includes all that part of Oregon west of the crest of the Cascade Range. The principal physiographic areas in western Oregon include the Coast and Cascade Ranges and the Willamette, Rogue, and Umpqua River valleys, as shown in figure 1.

The western slope of the Coast Range is influenced directly by ocean-spawned storms and weather. Annual precipitation is commonly 60 to 80 in. in the area; some coastal mountains receive as much as 200 in. (U.S. Weather Bureau, 1964). Snowmelt is not normally a major factor in flooding.

In the Willamette, Rogue, and Umpqua River valleys, high streamflows are created by storms from the Pacific Ocean. High flows in some streams draining from the Cascade Range frequently are caused by runoff from snowmelt in combination with direct rainfall runoff. The proportional contributions from each source are difficult, if not impossible, to identify. Annual precipitation amounts range from lows of less than 20 in. in the Rogue River basin to more than 100 in. in the lower elevations of the Cascade Range.

In the higher elevations of the Cascade Range, flood peaks are predominantly from snowmelt runoff combined with heavy rainfall runoff. Much of the precipitation in this area falls as snow in late fall, winter, and early spring. Annual precipitation ranges from less than 20 in. in the south to more than 100 in. in the north.

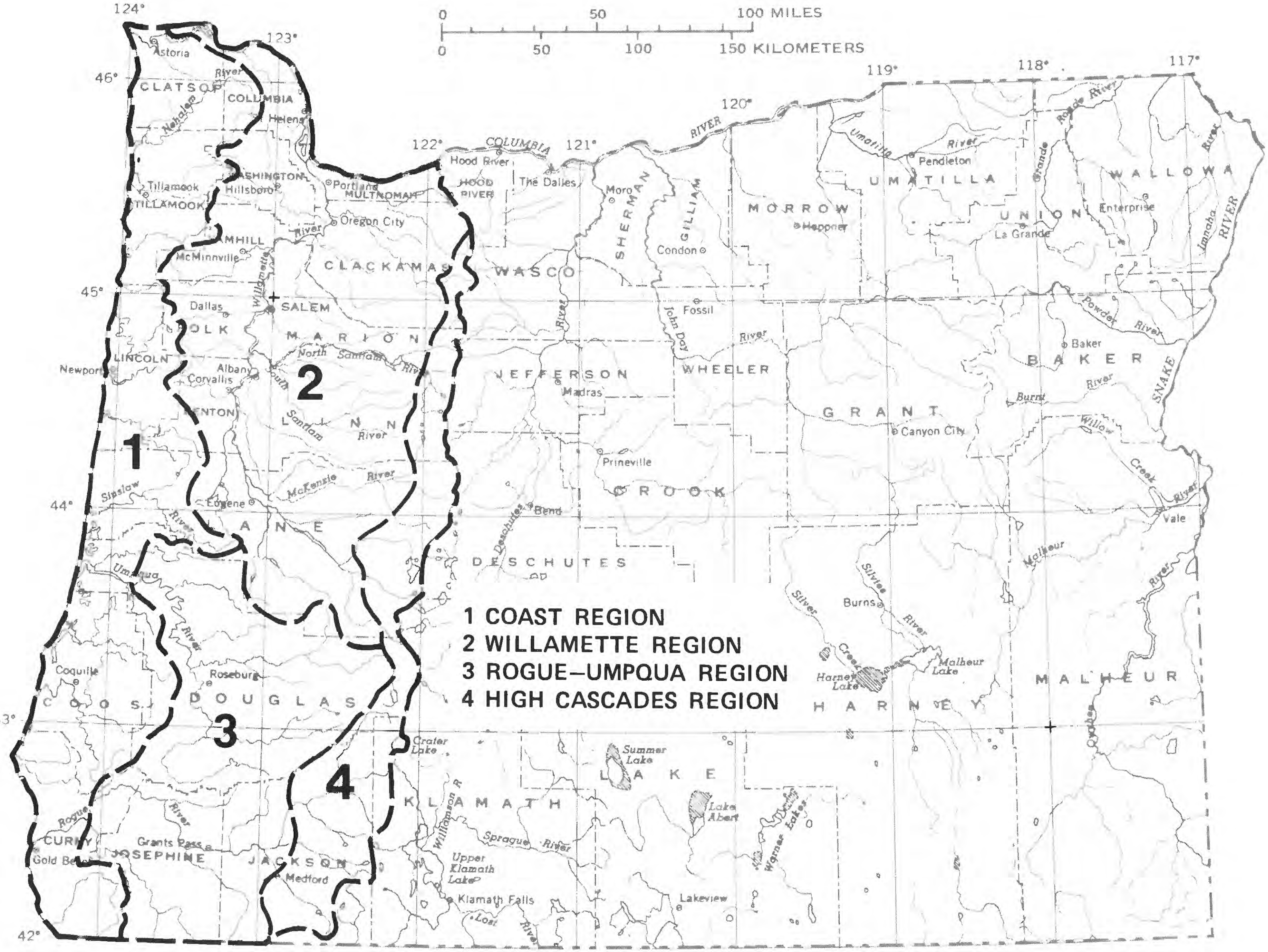

Figure 1.–Flood-frequency regions of western Oregon.

ANALYTICAL TECHNIQUE

Flood-frequency characteristics for gaged sites were related to drainage-basin characteristics by the multiple-regression technique to define regional flood magnitude-frequency relations.

Drainage-Basin Characteristics

The drainage-basin characteristics computed for each gaging station and used as an independent variable in the multiple-regression study are listed in table 2 at the back of the report and are defined as follows:

1. Drainage area (A), in square miles, the total contributing area upstream from the gaging-station site, as shown in the latest Geological Survey water-resources data reports.
2. Main-channel slope (S), in feet per mile, determined from elevations at points 10 and 85 percent of the distance along the channel from the gaging station to the divide. This index was described and used by Benson (1962b, 1964).
3. Main-channel length (L), in miles, from the gaging station to the basin divide, measured in accordance with guidelines given by the U.S. Water Resources Council (1968) or taken in part from the various River Mile Index publications prepared by the Hydrology and Hydraulics Committee of the Pacific Northwest River Basins Commission (1963–68).
4. Mean basin elevation (E), in feet above mean sea level, determined by the grid method from quadrangle map of a practical scale by laying a grid over the map, recording the elevation at each grid intersection, and averaging those elevations. The grid spacing was selected to give at least 25 intersections within the basin boundary.
5. Area of lakes and ponds (ST), expressed as a percentage of the drainage area, determined from the most recent quadrangle maps available.
6. Forest cover (F), expressed as the percentage of the drainage area covered by forests, as shown on the most recent quadrangle maps available.
7. The values of soils index (SI), determined from a map compiled from computed values of soils indexes according to procedures described by the Soil Conservation Service (1959, 1964). Data for these computations were derived from soils-association and land-use maps included in the Columbia North-Pacific Framework Study (unpub. manuscript). Data were also furnished by the Soil Conservation Service staff, State office, Portland, Oreg.
8. Azimuth (AZ), in degrees from north, of a straight line connecting points 85 and 10 percent of distance from gage to divide.
9. Latitude at gage (LAT). Latitude of stream-gaging station in decimal degrees.
10. Longitude of gage (LONG). Longitude of stream-gaging station in decimal degrees.
11. Mean annual precipitation (P), in inches, determined from an isohyetal map prepared by the National Weather Service River Forecast Center, Portland, Oreg., (U.S. Weather Bureau, 1964), using adjusted climatological data (1930–57) and values derived by correlation with other physiographic factors.
12. Precipitation intensity (I), defined as the maximum 24-hour rainfall having a recurrence interval of 2 years (2-year, 24-hour rainfall), expressed in inches. These values were determined by the grid method, using plate 2 which was prepared by U.S. National Oceanic and Atmospheric Administration (NOAA) (1973).
13. Temperature index (TI), the mean minimum January temperature, in degrees Fahrenheit, in the basin. This value was determined from a U.S. Weather Bureau publication (Sternes, 1960).

Magnitude and Frequency of Floods at Gaged Sites

Methods for estimating flow frequencies at gaged sites, presented in "Guidelines for Determining Flood Flow Frequency," published by the U.S. Water Resources Council (1977) were used in this study. Data from 230 gaging stations in Oregon, 6 in southwestern Washington, and 3 in northern California, representing basins that have virtually natural flow conditions and 10 years or more of record, provided the basic dependent variables (annual peak discharge). Historic flood information was used, when available, to supplement the systematic gaging-station record. For each station, the logarithms of the annual peaks were used to compute the mean, standard deviation, and skew coefficient that describe a log-Pearson Type-III distribution.

Frequency data from the log-Pearson Type-III frequency curve for each station are presented in table 4 at the back of the report. It lists flows for exceedance probabilities of $Q_{0.5}$(2 yr), $Q_{0.2}$(5 yr), $Q_{0.10}$(10 yr), $Q_{0.04}$(25 yr), $Q_{0.02}$(50 yr), and $Q_{0.01}$ (100 yr). The figures in parentheses are the corresponding recurrence intervals. As an example, if a flow of 900 ft^3/s is shown under an exceedance probability of 0.5 in the table, it means that there is a 50 percent chance that the flow at the gaging station will exceed 900 ft^3/s in any one year. Another way of describing the same peobability is that a 900-ft^3/s flow has a 2-year recurrence interval. A flow shown under an exceedance probability of 0.01 has a 1 percent chance of being exceeded in any one year. (It could be described as having a 100-year recurrence interval.)

Regression Analysis

Multiple-regression analyses were used to define equations expressing flood discharges of selected exceedance probabilities as a function of the basin characteristics. This relation may be expressed by the mathematical model

$$Q_T = K\ C_1^{\ a}\ C_2^{\ b}\ C_3^{\ c}\ \ldots\ C_n^{\ n}$$

in which Q_T is the discharge for a selected exceedance probability, T; K is a regression constant; C_1, C_2, C_3, and C_n are basin characteristics; and a, b, c, and n are regression coefficients. A step-backward regression analysis of the variables was made using a STATPAC data matrix. The least significant independent variable (basin characteristic) was deleted at each step. An evaluation of the standard errors for the various steps of the multiple regression was made to determine the most suitable regional equation.

The program computes the logarithms of the regression constant, the exponents of the independent variables, and the logarithm of the standard error of estimate.

Data for the 230 gaging stations in western Oregon were used for the "first try" of regression equations. The residuals (the difference between the logarithms of the flood discharges estimated from the gaging-station record and the logarithms of the flood discharges estimated from the regression equations) were plotted on a map of western Oregon. This plot and topographic maps were evaluated to delineate the boundaries of the four flood-frequency regions selected for use in the regression analysis. These four regions (Coast, Willamette, Rogue-Umpqua, and High Cascades) are shown in figure 1. Flood-frequency equations were then developed for each of these regions.

Few gaging-station data for the extreme southern end of the Oregon coast are usable for flood-frequency analysis. Peak-flow and basin-characteristics data for three gaging stations at the extreme northern end of the California coastal area were used to supplement the Oregon coast data. To determine the flood-frequency equations for the Coast Region, data from 37 stations in Oregon and three in California were used in the multiple-regression analysis.

To develop the flood-frequency equation for the Willamette Region, peak-flow and basin-characteristics data from six stations across the Columbia River in Washington were used to supplement data from 105 stations in Oregon.

Data from 60 Oregon stations in the Rogue-Umpqua Region and from 28 Oregon stations in the High Cascades Region were used to develop the respective regional equations.

The final regression equations for each of the four regions are shown in table 1. These equations relate floods having exceedance probabilities of $Q_{0.5}$, $Q_{0.2}$, $Q_{0.10}$, $Q_{0.04}$, $Q_{0.02}$, and $Q_{0.01}$ to selected basin characteristics in each of the flood-frequency regions shown in figure 1. The general form of the equation and the standard error of estimate is also shown in table 1.

Drainage area (A) and precipitation intensity (I) were selected as the most significant independent variables for the flood-frequency equation for the Willamette Region. Drainage area, precipitation intensity, and area of lakes and ponds (ST) were selected as the most significant independent variables for the Coast and Rogue-Umpqua Regions. For the High Cascades Region, drainage area, area of lakes and ponds, precipitation intensity, and nonforested areas proved to be the most significant independent variables to use in the flood-frequency equation. In the frequency equation for the High Cascades Region, nonforested area is expressed as a function of forest cover (F).

Soils index and azimuth were not used in the final regression analysis. These two basin characteristics were not found to be significant in preliminary analysis, which was based strictly on data for Oregon stations.

APPLICATION OF RESULTS

Method Used

The design flow or peak discharge for selected exceedance probabilities (or recurrence intervals) can be estimated for sites on unregulated streams in Oregon by using the method described below.

1. Locate the site on the map (pl. 1, in pocket) and determine which region it is in and if it is on a gaged stream.
   a. If the site is at a gaging station used in this analysis or is on the same stream as a gaging station used in this analysis and has a drainage area within 5 percent of that at the gaged site, USE THE GAGING-STATION DATA DIRECTLY FROM TABLE 4.
   b. If the site is on a stream that has a gaging station listed in this report but has a drainage area estimated at 5 to 25 percent different from that at the gaging station, adjust the peak discharges of the gaged site (table 4) on the basis of drainage area by using the following equation: $Q_u = Q_g (Au/Ag)^a$, where Q_u and Q_g are the discharges at the ungaged and gaged sites, Au and Ag are the drainage areas, and "a" is an exponent. The value for "a" can be selected from the exponents for the drainage area (A) given in the equation in table 1.
2. If the site is on an ungaged stream or if the site is on a gaged stream shown in table 4 but the drainage area at the site differs by more than an estimated 25 percent from the drainage area at the gaging station, then
   a. Inspect the applicable regional equations in table 1 and identify which basin characteristics are needed to estimate discharge for selected exceedance probabilities.

Table 1.–*Regional flood-frequency equations*

General form of equation $Q_T=KA^a(ST+1)^b(101-F)^c I^d$ where

Q_T=discharge for selected exceedance probability,
K = regression constant,
A = drainage area, in square miles,
ST = area of lakes and ponds, in percent,
F = forest cover, in percent, and
I = precipitation intensity, in inches.

(When the functions of F and ST are not significant, the factors $(ST+1)^b$ and $(101-F)^c$ are omitted from the equation.)

Exceedance probability (RI)1/		Equation	Percent standard error
		(1) COAST REGION (40 stations)	
$Q_{0.5}(2)$	=	$4.59A^{0.96}(ST+1)^{-0.45}I^{1.91}$	33
$Q_{0.2}(5)$	=	$6.27A^{0.95}(ST+1)^{-0.45}I^{1.95}$	32
$Q_{0.1}(10)$	=	$7.32A^{0.94}(ST+1)^{-0.45}I^{1.97}$	33
$Q_{0.04}(25)$	=	$8.71A^{0.93}(ST+1)^{-0.45}I^{1.99}$	34
$Q_{0.02}(50)$	=	$9.73A^{0.93}(ST+1)^{-0.44}I^{2.01}$	35
$Q_{0.01}(100)$	=	$10.7A^{0.92}(ST+1)^{-0.44}I^{2.02}$	37
		(2) WILLAMETTE REGION (111 stations)	
$Q_{0.5}(2)$	=	$8.70A^{0.87}I^{1.71}$	33
$Q_{0.2}(5)$	=	$15.6A^{0.88}I^{1.55}$	33
$Q_{0.1}(10)$	=	$21.5A^{0.88}I^{1.46}$	33
$Q_{0.04}(25)$	=	$30.3A^{0.88}I^{1.37}$	34
$Q_{0.02}(50)$	=	$38.0A^{0.88}I^{1.31}$	36
$Q_{0.01}(100)$	=	$46.9A^{0.88}I^{1.25}$	37
		(3) ROGUE-UMPQUA REGION (60 stations)	
$Q_{0.5}(2)$	=	$24.2A^{0.86}(ST+1)^{-1.16}I^{1.15}$	44
$Q_{0.2}(5)$	=	$36.0A^{0.88}(ST+1)^{-1.25}I^{1.15}$	43
$Q_{0.1}(10)$	=	$44.8A^{0.88}(ST+1)^{-1.28}I^{1.14}$	44
$Q_{0.04}(25)$	=	$56.9A^{0.89}(ST+1)^{-1.31}I^{1.12}$	46
$Q_{0.02}(50)$	=	$66.7A^{0.90}(ST+1)^{-1.33}I^{1.10}$	49
$Q_{0.01}(100)$	=	$77.3A^{0.90}(ST+1)^{-1.34}I^{1.08}$	51
		(4) HIGH CASCADES REGION (28 stations)	
$Q_{0.5}(2)$	=	$4.75A^{0.90}(ST+1)^{-0.62}(101-F)^{0.11}I^{1.17}$	55
$Q_{0.2}(5)$	=	$8.36A^{0.86}(ST+1)^{-0.81}(101-F)^{0.08}I^{1.30}$	50
$Q_{0.1}(10)$	=	$11.3A^{0.85}(ST+1)^{-0.92}(101-F)^{0.07}I^{1.37}$	53
$Q_{0.04}(25)$	=	$15.4A^{0.83}(ST+1)^{-1.03}(101-F)^{0.05}I^{1.46}$	59
$Q_{0.02}(50)$	=	$18.8A^{0.82}(ST+1)^{-1.10}(101-F)^{0.04}I^{1.52}$	66
$Q_{0.01}(100)$	=	$22.6A^{0.81}(ST+1)^{-1.17}(101-F)^{0.03}I^{1.57}$	72

1/ Numbers in parentheses refer to recurrence intervals in years.

b. Determine the appropriate basin-characteristic values as follows:

Drainage area (A) – Compute the drainage area, in square miles, within the surface-water divide upstream from the desired site on the stream, using the best available topographic map, generally U.S. Geological Survey 7½- or 15-minute quadrangle maps. Determine the drainage area by planimetering.

Area of lakes and ponds (ST) – Compute the percentage of the total drainage area occupied by lakes and ponds, using a planimeter or a transparent grid overlay on 7½- or 15-minute topographic maps. In the equation, the value (ST+1) is used to avoid introducing zero values that cannot be accommodated in the equations used in this study.

Forest-cover index (F) – Compute the percentage of the total drainage area covered by brush or trees, as indicated by the extent of green overprint (vegetation) shown on U.S. Geological Survey topographic maps.

The value of 101-F is used in the equation for the High Cascades Region to reflect the percentage of "nonforest" cover. The value 101 is used rather than 100 to avoid having to deal with the logarithm of zero values. The use of nonforest cover rather than forest cover provided the most practical equation fit.

Precipitation intensity (I) – Determine the maximum 2-year, 24-hour precipitation, in inches, on plate 2 of this report by using the grid method as described under drainage-basin characteristics section for mean basin elevation on page 11.

c. Compute the peak discharge for the desired exceedance probabilities, or recurrence intervals, directly through the use of the appropriate regional equations.

d. Compare, for reasonableness, the estimated peak discharge values particularly those for small probabilities (long recurrence intervals) with (1) maximum peak discharges for nearby streams (table 3 at the back of the report) and (2) other maximum observed discharges (fig. 2).

Peak discharges for exceedance probabilities between 0.5 and 0.01, other than those shown in the equations, can be determined either by plotting station values from table 4 or by plotting computed values from the equations on probability paper and drawing a smooth curve through the points. Peak discharges for other exceedance probabilities can then be estimated from the curve.

Extrapolation of peak discharges for exceedance probabilities greater than 0.01 (the 100-year flood) exceeds the limits of this study. Such derived values should be qualified and used judiciously.

Evaluation of Estimates

Peak discharges estimated from the regression equation can be evaluated for credibility by comparison to maximum observed peak discharges for streams with similar drainage areas in the same regions. Maximum observed peak discharges for all gaging stations used in the analysis are listed in table 3. Figure 2 shows the maximum observed peak discharges for long-term gaging stations in western Oregon in relation to drainage area. Figure 2 also shows a maximum envelope curve developed by Matthai (1969). For drainage areas between 1 and 200 mi^2, the equation for the Matthai curve is $Q=11{,}000A^{0.61}$. Also shown are the observed discharges that have the highest unit runoff measured in

Oregon and the highest peak discharges observed throughout the United States. Figure 2 can be used to judge the reasonableness or uniqueness of flood-peak discharges estimated by use of flood-frequency equations. For example, if the 0.02 (50-year) flood discharge estimated for a site with a drainage area of 10 mi² was 10,000 ft³/s, a comparison with figure 2 indicates the discharge could be too high for western Oregon. The user might then check the computations and also decide that the regional equations are not applicable if the basin being studied is not typical of the region.

On some streams the geology of the drainage basin can have a large effect on the magnitude of the flood peak. An example is the Clearwater River above Trap Creek near Toketee Falls (14314500) in the Umpqua River basin. Most of the Trap Creek drainage is located in a geologic area of recent volcanics (Wells and Peck, 1961). Observed flood peaks at the Clearwater River above Trap Creek gaging station are much smaller in magnitude than are indicated by the regional equation. It appears that

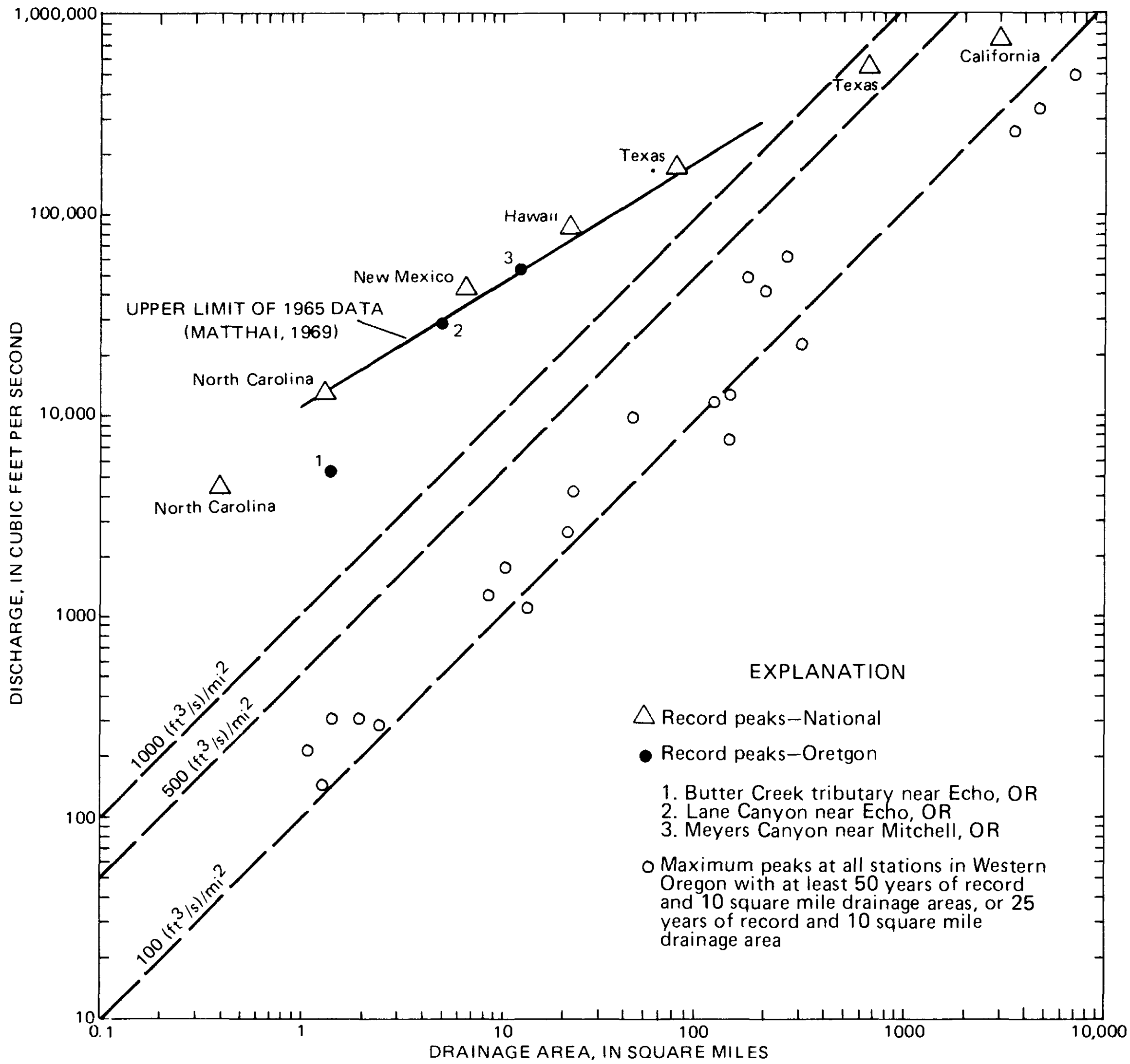

Figure 2.–Maximum observed peak discharges in relation to drainage areas.

peaks at this gaging station are greatly diminished because of temporary ground-water storage. Numerous springs along the Clearwater River above Trap Creek tend to support this assumption. Other streams in similar recent volcanic geology will probably respond in the same manner. Therefore, the geology map should be consulted to evaluate the possibility of the actual flood peaks differing from those indicated by the regional equation because of the local geology.

Some of the older peak discharges used in this analysis were based on once or twice daily gage readings which may be lower than the actual instantaneous peak and therefore would not represent the highest discharge during the day. The effect of such peaks on the analysis has not been thoroughly evaluated; however, because only about 2 percent of the peaks were determined in this manner, their use likely has little influence on the resulting equations.

Weather stations are sparsely located in the High Cascades Region; therefore, the precipitation intensity values shown on plate 2 are probably somewhat less reliable for the High Cascades than for the other three flood-frequency regions, where there are more precipitation gages. This lack of basic precipitation data probably contributed to the higher standard error for the High Cascades Region. This higher standard error may also be attributed to the lack of regional snowpack information. No basin characteristics for snowpack were available for the regression analysis; however, it would be reasonable to assume that snowpack would influence the flood-frequency equations for the High Cascades.

Illustrative Problems

The method for estimating discharges of selected recurrence intervals is shown by the following examples:

Example 1. (Determining a single flood in an ungaged area)

Determine the discharge for an exceedance probability of 0.01 (100-year flood) for a site in the Coast Region, where the drainage area is 20 mi^2 and the area of lakes and ponds is 1.2 percent of the drainage area. According to the precipitation intensity map (pl. 2, in pocket), the site is at a location where the average 2-year, 24-hour precipitation intensity over the drainage basin is 4.0 in.

From the Coast Region equation (see table 1), the 0.01 exceedance probability flood is:

$$
\begin{aligned}
Q_{0.01} &= 10.7A^{0.92}(ST+1)^{-0.44}I^{2.02} \\
&= (10.7)(20)^{0.92}(2.2)^{-0.44}(4)^{2.02} \\
&= \frac{(10.7)(15.7)(16.4)}{(1.41)} \\
&= 1{,}950 \text{ ft}^3/\text{s}
\end{aligned}
$$

Example 2. (Determining two floods in an ungaged area)

Determine the discharge for exceedance probabilities of 0.5 and 0.1 (2- and 10-year floods) for a site on a stream in the High Cascades Region. The drainage area is 9.8 mi^2; the area of lakes and ponds (ST) is 2.5 percent; forest cover (F) is 96 percent; and the average 2-year, 24-hour precipitation intensity is 3.2 in.

From the High Cascades Region equation, the 0.5 exceedance probability flood is:

$$
\begin{aligned}
Q_{0.5} &= 4.75A^{0.90}(ST+1)^{-0.62}(101-F)^{0.11}I^{1.17} \\
&= 4.75(9.8)^{0.90}(2.5+1)^{-0.62}(101-96)^{0.11}(3.2)^{1.17} \\
&= (4.75)(7.80)(0.46)(1.19)(3.90) \\
&= 79 \text{ ft}^3/\text{s}
\end{aligned}
$$

From the High Cascades Region equation, the 0.1 exceedance probability flood is:

$$
\begin{aligned}
Q_{0.1} &= 11.3(A)^{0.85}(ST+1)^{-0.92}(101\text{-}F)^{0.07}I^{1.37} \\
&= 11.3(9.8)^{0.85}(2.5+1)^{-0.92}(101\text{-}96)^{0.07}(3.2)^{1.37} \\
&= 11.3(6.96)(0.32)(1.12)(4.92) \\
&= 139 \text{ ft}^3/\text{s}
\end{aligned}
$$

Example 3. (Developing a flood-frequency curve)

Develop a flood-frequency curve for a site in the Willamette Region. The drainage area is 230 mi^2; and the average 2-year, 24-hour precipitation intensity is 3.1 in.

Based on the above basin characteristics, develop a flood-frequency curve by computing the flood discharges for $Q_{0.5}$, $Q_{0.2}$, $Q_{0.1}$, $Q_{0.4}$, $Q_{0.02}$, and $Q_{0.01}$ exceedance probabilities, as shown below:

$$
\begin{aligned}
Q_{0.5} &= 8.70(A)^{0.87}(I)^{1.71} \\
&= 8.70(230)^{0.87}(3.1)^{1.71} \\
&= (8.70)(113)(6.92) \\
&= 6{,}800 \text{ ft}^3/\text{s}
\end{aligned}
$$

$$
\begin{aligned}
Q_{0.2} &= 15.6(A)^{0.88}(I)^{1.55} \\
&= 15.6(230)^{0.88}(3.1)^{1.55} \\
&= (15.6)(120)(5.78) \\
&= 10{,}800 \text{ ft}^3/\text{s}
\end{aligned}
$$

$$
\begin{aligned}
Q_{0.1} &= 21.5(A)^{0.88}(I)^{1.46} \\
&= 21.5(230)^{0.88}(3.1)^{1.46} \\
&= (21.5)(120)(5.22) \\
&= 13{,}500 \text{ ft}^3/\text{s}
\end{aligned}
$$

$$
\begin{aligned}
Q_{0.04} &= 30.3(A)^{0.88}(I)^{1.37} \\
&= 30.3(230)^{0.88}(3.1)^{1.37} \\
&= (30.3)(120)(4.71) \\
&= 17{,}100 \text{ ft}^3/\text{s}
\end{aligned}
$$

$$
\begin{aligned}
Q_{0.02} &= 38.0(A)^{0.88}(I)^{1.31} \\
&= 38.0(230)^{0.88}(3.1)^{1.31} \\
&= (38.0)(120)(4.40) \\
&= 20{,}100 \text{ ft}^3/\text{s}
\end{aligned}
$$

$$
\begin{aligned}
Q_{0.01} &= 46.9(A)^{0.88}(I)^{1.25} \\
&= 46.9(230)^{0.88}(3.1)^{1.25} \\
&= (46.9)(120)(4.11) \\
&= 23{,}100 \text{ ft}^3/\text{s}
\end{aligned}
$$

Then plot the flood discharges on probability paper at the respective exceedance positions and draw a smooth curve through the points, as shown in figure 3.

Example 4. (Determining the exceedance probability or recurrence interval for a selected discharge)

Using the curve developed in example 3 (fig. 3), determine the exceedance probability and recurrence interval for a peak discharge of 16,000 ft^3/s.

At the 16,000-ft^3/s discharge magnitude on the graph, project horizontally to the frequency curve. Project up vertically at the intersection with the curve and read an exceedance probability of 0.05 and project down vertically and read a recurrence interval of 20 years.

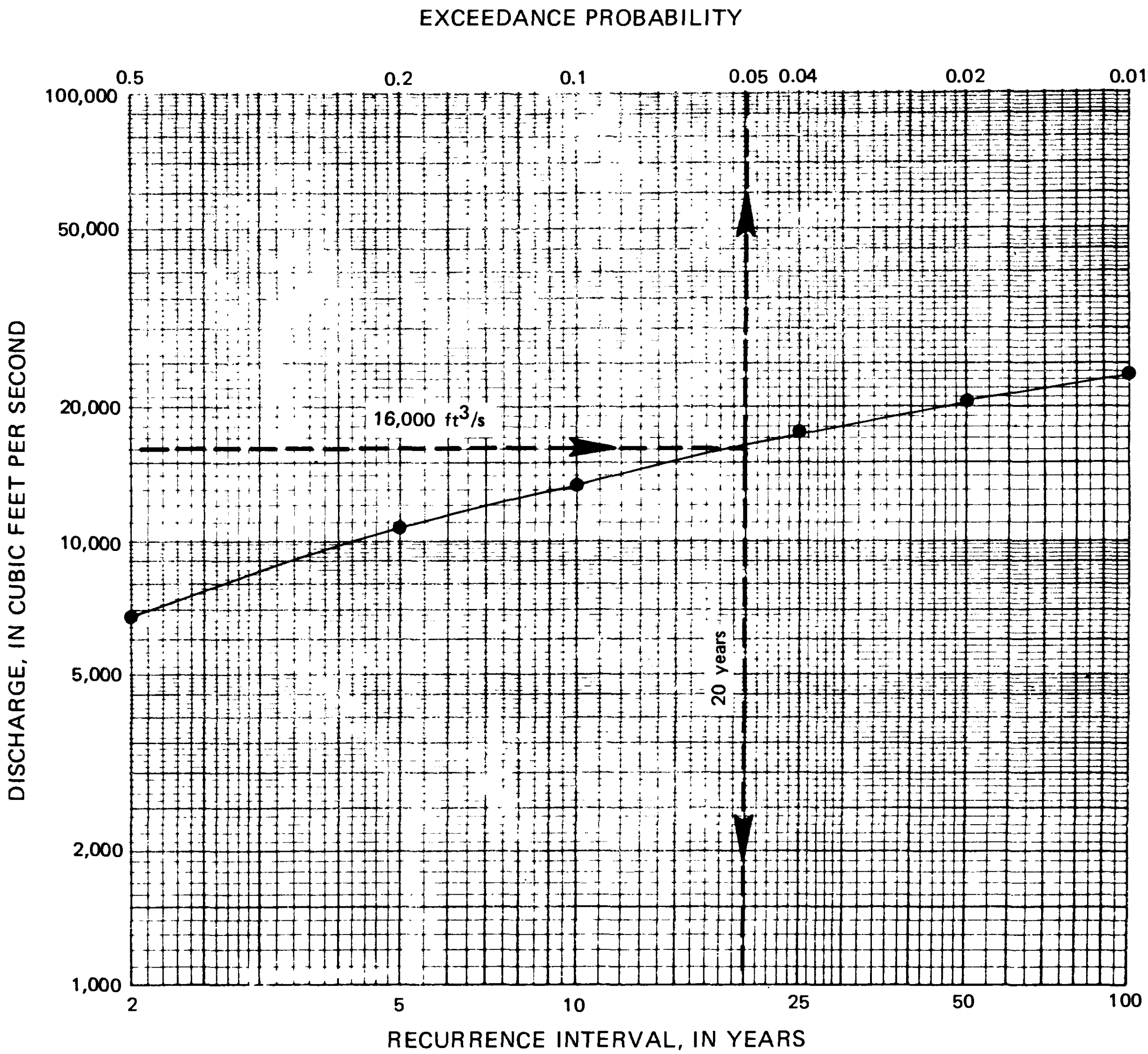

Figure 3.—Flood-frequency curve developed by regional analysis for an example computation at an ungaged site in the Willamette Region (example 3).

Example 5. (Determining a flood on a stream near an existing gaging station)

Determine the discharge for an exceedance probability of 0.01 (the 100-year flood) for a site upstream from the existing long-term gaging station on Salmon Creek near Oakridge (No. 1414650) in the Willamette Region. The gaged site has a drainage area of 117 mi^2, and the selected site has a drainage area of 100 mi^2. Therefore, the drainage areas differ by more than 5 percent but less than 25 percent. The flood for an exceedance probability of 0.01 at the gaged site (table 4) is 14,000 ft^3/s. Use the relationship $Q_u = Q_g (Au/Ag)^a$. The exponent "a" for an exceedance probability of 0.01 in the Willamette Region is 0.88.

$$
\begin{aligned}
Q_u &= Q_g (Au/Ag)^b \\
&= 14{,}000\left(\frac{100}{117}\right)^{0.88} \\
&= (14{,}000)(0.85)^{0.88} \\
&= (14{,}000)(0.87) \\
&= 12{,}200 \text{ ft}^3/\text{s}
\end{aligned}
$$

Limitations

The equations in this report, developed through regional analysis, are usable, under certain limitations, for estimating flood magnitudes of selected exceedance probabilities or recurrence intervals at ungaged sites in western Oregon.

The equations are based on data representing natural flood conditions and are not applicable to streams where storage or artificial structures have modified the flow appreciably such as sites downstream from large storage reservoirs. In general, the equations are not applicable at any site where flow from 10 percent or more of the drainage basin is controlled.

Ranges of characteristics used for defining equations for each region are:

Region	Drainage area (A) (mi^2)	Area of lakes and ponds (ST) (percent)	Forest cover (F) (percent)	Precipitation intensity (I) (in.)
1. Coast	0.27- 667	0-18.81	- -	3.0-6.2
2. Willamette	0.37-7,280	- -	- -	2.3-5.0
3. Rogue-Umpqua	0.75-3,939	0- 4.40	- -	2.5-6.2
4. High Cascades	0.21- 650	0- 3.65	48-100	1.4-4.3

Extrapolation beyond the limits of the data used for defining relationships is not advisable. Such extrapolations could produce erroneous discharge values. However, if extrapolations are made they should be used judiciously and qualified accordingly.

SUMMARY

The study describes a method for estimating the magnitude and frequency of floods on natural streams in western Oregon. The equations were developed by regional multiple-regression analysis. An evaluation of the differences between the flood discharges estimated from the gaging-station records and the discharges determined from the general regression equation were used to help delineate boundaries for four flood-frequency regions in western Oregon.

Drainage-area size was the most significant basin characteristic for all four of the flood-frequency regions in western Oregon. Precipitation intensity was also a significant basin characteristic for all the regions. By utilizing only the drainage-area size and precipitation intensity for the Willamette Region, the standard error of estimate ranged from 33 to 37 percent, as shown in table 1. The area of lakes and ponds was used in addition to drainage-area size and precipitation intensity in the flood-frequency equation for the Coast and Rogue-Umpqua Regions. The standard error of estimate ranged from 32 to 37 percent in the Coast Region and from 43 to 51 percent in the Rogue-Umpqua Region.

The standard errors of estimate were greatest in the High Cascades Region, where the range was 50 to 72 percent. Four basin characteristics (drainage area, precipitation intensity, area of lakes and ponds, and forest cover) were required to reduce the standard error significantly in this region.

When used within the range of data used to define the relationships, the regional flood-frequency equations provide reasonably accurate estimates of floodflows of specified exceedance probabilities.

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Table 2.–Basin characteristics used in multiple regressions

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(1) COAST REGION													
11530850	.29	1740.0	1.1	2600	0.00	100.0			41.92	123.70	80	6.2	30.0
11531000	130	132.0	24.2	1500	.02	95.0			41.84	123.90	104	6.0	38.0
11533000	.92	375.0	2.0	700	0.00	98.0			41.96	124.20	80	4.8	39.0
14248700	3.33	340.0	4.2	1500	3.00	30.0	5.6	330	46.11	123.63	85	4.5	32.0
14251500	40.1	55.4	14.2	930	0.00	91.7	5.6	300	46.07	123.79	97	5.0	34.0
14299000	7.99	336.0	4.4	1170	0.00	67.6	5.6	15	45.89	123.83	110	5.0	35.0
14299500	1.97	1030.0	2.5	1010	0.00	98.5	5.6	275	45.82	123.96	90	4.0	36.0
14300200	11.6	111.0	8.4	1430	0.00	98.7	3.2	320	45.95	123.13	56	3.0	30.0
14301000	667	6.4	104.0	1180	.01	80.1	4.7	60	45.70	123.75	82	3.8	30.0
14301400	1.87	360.0	2.1	530	0.00	85.6	.9	220	45.53	123.89	90	3.5	34.0
14301500	161	50.4	32.3	1640	0.00	12.1	5.6	235	45.48	123.72	103	5.5	29.0
14302500	145	62.0	29.7	1740	.01	25.9	5.6	285	45.44	123.72	103	5.7	29.0
14303000	12.0	16.7	5.6	2070	.16	94.2	4.4	325	45.32	123.45	100	5.0	28.0
14303600	180	45.0	39.7	1300	.12	95.0	5.4	275	45.27	123.85	110	5.8	31.0
14303700	1.09	397.0	3.0	950	0.00	37.6	5.6	190	45.02	123.85	96	4.8	33.0
14305500	202	41.8	35.7	1260	.29	57.0	5.1	220	44.72	123.89	118	5.7	31.0
14306100	63.0	44.2	16.6	1410	.02	95.1	5.2	150	44.38	123.59	98	5.2	31.0
14306400	114	25.0	19.5	900	.03	96.5	4.7	355	44.34	123.83	100	4.5	30.0
14306500	334	21.9	45.0	1150	.03	73.9	5.0	250	44.39	123.83	93	5.0	31.0
14306700	.27	580.0	1.1	650	0.00	80.0	5.6	295	44.51	123.86	100	5.2	34.0
14306800	.78	174.0	1.3	947	0.00	100.0	5.6	185	44.54	123.85	98	5.0	34.0
14306810	1.17	458.0	1.6	1030	0.00	95.0	5.6	175	44.53	123.88	95	5.0	35.0
14306830	.90	170.0	1.5	510	0.00	100.0	5.6	160	44.45	123.98	100	5.5	35.0
14307500	52.5	45.5	16.3	1430	1.16	84.4	3.9	230	44.16	123.57	83	5.0	31.0
14307550	.75	308.0	1.6	1000	0.00	100.0	5.6	250	44.17	123.70	100	5.0	31.0
14307610	.42	479.0	1.3	500	0.00	95.2	5.6	115	44.07	123.88	88	4.5	33.0
14323200	87.0	15.3	15.3	502	6.01	87.9	5.6	290	43.58	124.19	80	4.4	36.0
14323300	11.0	12.0	6.6	190	18.81	74.3	5.6	200	43.58	124.18	65	3.8	40.0
14324500	46.9	35.5	28.2	1220	.02	98.7	5.6	230	43.48	124.06	91	5.0	34.0
14324600	31.2	96.3	12.6	2860	0.00	95.7	5.6	235	42.76	123.99	85	5.0	34.0
14324700	40.6	79.2	16.0	2780	.04	94.2	5.6	255	42.72	124.01	90	5.0	34.0
14324900	93.2	103.0	25.0	2420	.04	96.5	5.6	255	42.78	124.04	92	5.3	35.0
14325000	169	82.0	36.6	2200	.06	95.1	5.0	295	42.89	124.07	77	5.0	35.0
14326500	305	33.0	38.8	1460	.04	92.5	4.6	270	43.02	124.09	76	4.2	32.0
14326600	1.45	194.0	1.9	600	0.00	66.2	2.2	310	43.01	124.21	65	4.4	36.0
14326800	74.0	28.0	31.5	800	0.00	96.0	5.2	220	43.18	124.09	75	4.7	34.0
14327000	282	18.1	44.1	1180	.02	83.8	4.5	25	43.07	124.11	72	4.5	34.0
14327100	1.36	100.0	2.8	260	0.00	97.8	.7	325	43.10	124.38	60	4.5	40.0
14327240	.80	1390.0	1.1	1600	1.00	100.0	5.6	15	42.72	124.25	100	5.9	38.0
14327400	.86	542.0	1.4	690	0.00	95.3	5.6	250	42.69	124.43	75	5.5	39.0

Table 2.–Basin characteristics used in multiple regressions–continued

Station number	Drainage area (mi^2)	Main channel slope (ft/mi)	Main channel length (mi)	Mean basin elevation (ft)	Area of lakes and ponds (percent)	Forest cover (percent)	Soils index	Azimuth (degrees)	Latitude (degrees)	Longitude (degrees)	Mean annual precipitation (in.)	Precipitation intensity (in.)	Temperature index (°F)
	A	S	L	E	ST	F	SI	AZ	LAT	LONG	P	I	TI
(2) WILLAMETTE REGION													
14135000	100	129.0	24.8	3610	.18	95.6	5.6	320	45.32	121.95	80	4.0	23.0
14137000	262	92.2	37.6	3350	.08	92.2	5.5	275	45.39	122.13	85	4.1	26.0
14138800	8.17	370.0	3.6	3300	.24	92.0	5.6	330	45.45	121.89	120	4.5	28.0
14138850	47.9	186.0	10.5	3070	1.60	98.4	5.6	295	45.50	122.01	125	4.5	29.0
14141500	22.3	196.0	13.6	2440	.67	98.0	5.6	265	45.41	122.17	96	3.5	29.0
14143500	108	57.0	23.9	1610	0.00	94.0			45.62	122.20	100	4.0	28.0
14144000	23.3	120.0	10.7	810	0.00	85.0			45.61	122.30	70	3.9	29.0
14144600	.51	240.0	1.3	560	0.00	50.0			45.58	122.40	44	3.0	31.0
14144800	258	107.0	32.7	4380	.18	97.0	5.4	300	43.60	122.46	60	3.5	24.0
14144870	.50	710.0	1.3	2150	0.00	100.0	3.2	75	43.67	122.43	55	3.0	29.0
14144900	52.7	259.0	14.5	4090	.06	96.0	5.6	315	43.68	122.37	58	3.4	24.0
14145500	392	75.0	42.1	4080	.34	95.0	5.2	5	43.72	122.44	58	3.4	24.0
14146000	113	135.0	33.0	4460	1.15	96.0	5.5	300	43.73	122.42	60	3.4	21.0
14146500	117	89.7	24.7	4140	.51	97.0	5.0	270	43.76	122.37	62	3.4	24.0
14147500	246	112.0	51.0	3760	4.23	90.0	4.6	265	43.76	122.51	58	3.8	25.0
14148000	924	64.5	53.3	3970	1.38	94.0	4.9	295	43.80	122.56	58	3.5	25.0
14148700	.44	817.0	1.2	1540	0.00	100.0	3.2	45	43.86	122.68	50	3.5	31.0
14150300	118	72.0	18.7	2400	0.00	90.0	3.8	270	43.97	122.64	55	4.0	30.0
14151000	186	43.7	27.0	2320	0.00	91.0	3.7	260	43.94	122.77	62	4.0	31.0
14151500	52.5	89.0	18.0	2100	0.00	98.0	3.2	250	43.97	122.76	64	4.0	32.5
14152000	1340	42.0	78.5	3370	.95	92.0	4.3	315	44.00	122.91	58	3.7	28.5
14152500	72.1	59.0	16.4	2120	0.00	79.0	3.4	345	43.64	123.08	56	3.8	33.0
14153900	5.69	628.0	3.3	2630	0.00	97.0	3.2	145	43.71	122.74	49	3.0	31.0
14154500	211	98.3	24.0	2850	.05	92.0	3.2	290	43.74	122.87	60	3.4	31.0
14155500	270	82.3	31.7	2630	.04	91.0	2.6	310	43.79	122.99	56	3.4	31.3
14156000	85.0	49.4	21.3	2120	.02	95.0	3.2	330	43.74	122.98	57	3.3	32.0
14156500	95.3	42.8	24.0	2030	.02	93.0	3.1	335	43.78	123.00	56	3.3	32.5
14157000	529	29.3	32.3	2210	0.00	83.0	2.8	5	43.83	123.04	55	3.6	33.0
14158000	2030	34.3	88.2	2870	.63	87.0	3.8	295	44.05	123.03	54	3.5	31.0
14159000	348	44.6	30.8	4220	.45	84.0	5.1	210	44.18	122.13	86	4.3	20.0
14159200	160	137.0	26.2	4290	1.00	96.0	5.6	300	44.05	122.22	65	3.8	23.0
14159500	208	123.0	32.5	4080	.77	96.0	5.5	335	44.14	122.25	70	3.9	24.0
14161200	.39	1690.0	1.1	2460	0.00	100.0	5.6	320	44.22	122.24	118	4.0	26.0
14161500	24.1	258.0	9.5	3190	0.00	91.0	5.6	275	44.21	122.26	104	4.0	25.7
14161600	.37	1490.0	1.0	2380	0.00	100.0	5.6	295	44.21	122.26	90	4.0	26.0
14162000	75.0	145.0	14.7	3170	0.00	96.0	5.6	40	44.18	122.28	117	4.3	26.2
14162500	930	58.3	54.6	3850	.27	90.0	5.3	175	44.12	122.47	83	4.2	23.0
14163000	47.6	101.0	12.0	2150	0.00	92.0	3.8	240	44.15	122.57	92	4.3	31.0
14165000	177	39.8	29.5	1510	0.00	85.0	2.8	225	44.09	122.96	70	3.8	32.0
14165500	1340	13.7	94.8	3180	.19	86.0	4.6	260	44.11	123.05	79	4.2	30.0

Table 2.–Basin characteristics used in multiple regressions–continued

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(2) WILLAMETTE REGION													
14166500	89.3	13.1	18.3	740	.07	78.0	1.9	15	44.05	123.42	67	3.6	31.0
14167000	95.1	10.9	23.3	730	0.00	60.0	1.7	340	44.02	123.25	43	3.2	32.5
14169700	5.19	67.5	5.3	857	0.00	54.0	1.2	140	44.16	123.35	48	3.5	32.0
14170500	14.6	277.0	7.8	1510	0.00	100.0	3.2	110	44.50	123.44	91	3.8	31.0
14171000	159	13.4	37.7	925	0.00	82.0	1.9	315	44.53	123.33	78	4.0	31.0
14171500	107	4.0	22.8	630	.03	42.0	1.0	15	44.50	123.33	50	3.5	32.0
14172000	105	64.6	30.5	2060	0.00	87.0	4.3	295	44.35	122.79	89	4.2	31.0
14172300	5.06	221.0	4.1	877	0.00	59.0	.8	305	44.47	122.96	50	2.9	33.0
14173500	372	21.1	72.9	955	0.00	31.0	1.9	300	44.62	123.13	56	3.3	33.0
14174000	4840	18.8	154.0	2230	.03	71.0	3.1	330	44.64	123.11	60	3.6	31.0
14174100	15.2	10.5	15.5	261	.30	0.0	.9	320	44.64	123.07	42	2.5	33.0
14178000	216	93.3	35.7	3720	.60	92.0	5.4	160	44.71	122.10	80	4.1	20.0
14178800	1.03	1420.0	1.5	3010	0.00	100.0	5.6	340	44.76	122.12	77	3.5	21.0
14179000	106	180.0	21.8	3720	.19	91.5	5.5	270	44.75	122.13	77	3.7	23.0
14181500	453	66.3	49.1	3510	.33	90.0	5.6	315	44.75	122.30	81	4.2	22.0
14181700	.41	529.0	1.4	1440	0.00	100.0	1.2	190	44.75	122.39	69	4.0	26.5
14182500	112	77.4	29.5	2640	.36	95.0	4.5	255	44.79	122.58	97	4.4	27.0
14183000	655	53.3	68.5	3350	.24	89.6	5.0	305	44.79	122.62	86	4.1	27.0
14184900	1.35	714.0	1.9	1780	0.00	100.0	3.2	10	44.39	122.51	68	3.4	28.0
14185000	174	102.0	23.5	2870	.03	92.0	5.5	280	44.39	122.51	101	4.7	27.0
14185800	104	100.0	22.0	3300	.30	100.0	5.6	300	44.52	122.37	110	5.0	28.0
14185900	99.2	107.0	21.2	3200	0.00	100.0	5.6	265	44.54	122.43	110	5.0	29.0
14186000	271	71.6	32.4	2970	.02	96.0	5.2	275	44.46	122.52	106	4.7	26.0
14187000	51.8	129.0	13.6	2480	0.00	83.0	4.7	305	44.37	122.62	71	3.9	30.0
14187500	640	35.7	49.4	2560	.02	86.0	4.5	285	44.50	122.82	90	4.3	28.0
14188800	109	88.0	27.0	1900	.03	90.0	3.3	285	44.71	122.77	55	3.5	28.0
14189000	1790	36.2	96.8	2470	.09	78.0	4.0	290	44.72	123.01	78	3.9	27.0
14189500	34.3	115.0	15.2	1310	0.00	95.0	3.3	55	44.72	123.50	91	4.6	30.0
14190000	115	39.5	28.7	1010	0.00	89.0	1.8	135	44.74	123.42	74	4.3	30.0
14190200	3.46	138.0	3.7	874	0.00	83.0	.6	35	44.87	123.41	80	4.2	30.0
14190500	240	17.8	44.9	910	0.00	78.0	2.1	90	44.78	123.23	72	4.4	31.0
14190600	.57	124.0	1.1	365	0.00	14.0	.6	55	44.70	123.22	41	4.6	33.0
14191000	7280	11.2	189.0	2150	.02	70.0	3.2	340	44.94	123.04	64	3.7	31.0
14192100	2.72	256.0	3.2	630	0.00	37.0	.6	105	44.95	123.08	43	2.6	32.0
14192200	4.83	227.0	4.0	595	.10	34.0	.6	100	44.97	123.07	44	2.5	32.0
14192500	133	40.5	21.1	950	.08	84.0	3.2	315	45.05	123.50	101	5.0	30.0
14192800	1.81	284.0	2.4	625	0.00	54.0	.9	40	45.04	123.47	70	2.5	29.0
14193000	64.7	124.0	15.1	1060	0.00	85.0	3.6	20	45.14	123.49	88	4.9	29.0
14193300	27.4	120.0	9.7	1720	0.00	99.9	5.6	0	44.97	123.45	115	4.9	28.5
14194000	502	9.4	49.9	750	.10	47.0	2.1	95	45.17	123.21	78	3.9	30.0

Table 2.--Basin characteristics used in multiple regressions--continued

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(2) WILLAMETTE REGION													
14195000	6.70	335.0	5.1	2320	0.00	93.9	4.0	130	45.31	123.37	105	3.5	28.0
14196500	48.8	147.0	9.8	1400	0.00	78.0	2.5	85	45.37	123.29	88	4.3	29.0
14197000	66.8	95.4	12.3	1270	0.00	72.5	2.0	95	45.37	123.25	80	4.0	29.0
14197300	3.19	518.0	2.6	1400	0.00	89.0	3.2	105	45.31	123.35	91	3.8	28.0
14198500	97.0	83.1	17.8	2910	.02	80.2	3.8	290	45.01	122.48	91	4.0	27.0
14199700	4.16	192.0	3.8	909	.04	71.6	.8	345	45.17	122.48	51	2.5	32.0
14200000	323	40.5	44.0	1910	.03	69.9	2.3	315	45.24	122.69	68	3.4	31.0
14201000	204	72.3	35.4	1280	.04	47.3	1.8	345	45.06	122.83	60	3.3	31.0
14201500	58.7	104.0	28.6	1670	.01	63.7	2.5	305	45.10	122.74	73	3.6	31.0
14202000	479	23.6	67.7	859	.02	30.1	1.5	15	45.23	122.75	55	2.9	33.0
14202500	51.0	96.1	20.3	1260	.03	37.3	2.2	115	45.44	123.17	76	3.9	29.0
14203000	43.3	87.3	15.9	1090	.18	48.3	2.1	125	45.46	123.15	66	2.5	29.0
14203500	125	76.5	23.8	1260	.09	42.3	1.7	95	45.47	123.12	59	3.4	30.0
14203600	4.31	121.0	3.2	940	.23	92.3	5.6	175	45.67	123.29	66	3.6	28.0
14204000	33.2	127.0	10.5	1310	.03	49.2	3.8	115	45.64	123.27	70	3.6	28.0
14204100	1.27	467.0	2.4	1140	0.00	86.6	3.2	120	45.63	123.26	65	3.5	29.0
14204500	66.1	71.2	19.3	1080	.03	59.6	2.5	130	45.56	123.18	63	3.6	29.0
14205500	43.0	96.7	13.1	1120	.03	84.6	1.9	175	45.63	123.04	48	2.6	31.0
14206000	27.6	136.0	11.1	1080	.03	80.2	2.2	170	45.63	122.97	48	2.7	32.0
14206500	568	12.9	51.5	750	.02	45.7	1.7	100	45.45	122.95	48	2.8	31.0
14207500	706	4.3	83.0	655	.02	44.2	1.5	110	45.35	122.67	46	2.7	32.0
14208000	136	136.0	19.3	3900	.22	97.0	5.6	330	45.02	121.92	91	3.9	20.0
14209500	479	95.3	30.5	3570	.35	92.1	5.3	325	45.12	122.07	79	3.8	23.0
14209900	2.52	227.0	3.3	1010	0.00	2.0	.9	330	45.28	122.34	60	3.0	31.0
14210000	671	60.9	55.2	3350	.29	91.0	4.6	315	45.30	122.35	77	3.8	25.0
14210800	2.25	107.0	3.0	576	0.00	25.0	.9	255	45.44	122.48	44	2.8	32.0
14211500	26.5	31.9	13.8	520	.07	35.8	.7	270	45.48	122.51	43	2.8	32.0
14211800	1.46	538.0	1.6	818	0.00	99.3	.9	35	45.56	122.74	40	2.3	34.0
14223500	198	73.0	45.2	1880	.01	98.0			46.04	122.80	82	4.0	29.0
14243500	.92	375.0	2.0	700	0.00	98.0			46.26	122.90	80	4.8	39.0
14245000	119	49.0	28.8	1390	.08	99.0			46.15	122.90	69	3.5	31.0

Table 2.—Basin characteristics used in multiple regressions—continued

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(3) ROGUE-UMPQUA REGION													
14307700	152	27.5	21.8	3570	0.00	97.5	5.2	245	42.95	122.83	49	3.1	30.0
14308000	449	87.1	39.8	3130	.09	98.0	5.3	240	42.93	122.95	45	3.1	31.0
14308500	54.4	133.0	10.0	2900	.60	91.7	5.6	340	42.89	122.92	52	3.4	31.0
14308700	55.3	480.0	13.5	1680	0.00	94.0	2.1	230	42.97	123.17	37	2.8	32.5
14308900	36.9	168.0	11.1	2100	0.00	98.2	2.6	350	42.92	123.27	39	2.9	32.0
14309000	78.0	73.3	20.0	2920	0.00	95.5	4.2	305	42.82	123.18	54	3.3	32.0
14309500	86.9	52.5	20.3	1990	0.00	99.3	5.0	275	42.80	123.61	83	4.4	30.0
14310000	456	18.8	49.5	683	0.00	95.8	3.7	350	42.92	123.43	59	3.5	31.0
14310700	43.9	128.0	15.0	1960	.01	85.7	3.1	250	43.03	123.19	37	2.6	33.0
14310900	3.16	545.0	3.1	1550	.63	76.6	1.2	140	43.09	123.20	30	2.5	33.0
14311000	54.2	42.3	20.5	2050	.02	84.1	2.4	225	43.04	123.26	35	2.8	33.0
14311200	61.3	146.0	10.2	1740	0.00	90.7	3.6	35	43.04	123.54	48	3.2	30.5
14311500	158	26.8	26.9	1430	.03	77.0	2.3	120	43.13	123.46	47	3.5	30.5
14312000	1670	19.3	94.0	2230	.02	91.9	3.4	270	43.13	123.40	46	3.2	32.0
14312100	2.42	274.0	2.5	1130	0.00	78.5	.6	325	43.20	123.35	31	2.5	33.0
14312200	53.2	115.0	14.2	1080	.03	48.2	1.4	315	43.22	123.29	33	2.6	33.0
14312300	1.25	236.0	1.9	750	0.00	30.2	.6	230	43.25	123.40	30	2.8	33.0
14313500	170	90.5	24.6	5670	4.40	94.6	13.8	285	43.32	122.19	43	3.2	18.0
14314500	41.6	257.0	9.8	5180	.16	95.6	11.2	0	43.24	122.29	65	3.4	20.5
14315500	339	69.0	40.0	5130	2.42	95.5	12.5	270	43.26	122.42	53	3.4	24.0
14316000	68.8	187.0	13.8	4880	.17	95.2	3.2	345	43.23	122.45	51	3.6	24.0
14316500	475	63.6	48.0	4870	1.77	95.8	9.4	275	43.30	122.54	52	3.4	20.0
14316700	227	60.7	24.2	2640	.02	99.0	4.1	210	43.35	122.73	57	3.5	30.0
14317500	886	69.6	79.0	3980	.96	97.1	7.1	270	43.33	123.00	52	3.4	27.0
14317600	97.4	164.0	17.2	2800	.02	79.5	4.6	195	43.35	122.99	56	4.1	32.0
14317800	56.9	210.0	14.0	2700	0.00	84.0	5.6	225	43.22	123.02	45	3.5	33.0
14318000	177	139.0	23.9	2590	.10	89.5	4.9	275	43.25	123.02	51	3.5	32.5
14318500	1210	58.2	79.5	3520	.44	90.0	6.6	275	43.31	123.12	50	3.5	30.0
14318600	.75	517.0	1.5	1180	0.00	49.3	2.8	185	43.32	123.17	38	3.0	33.0
14319200	16.4	55.9	7.4	902	.04	45.0	.8	285	43.39	123.30	40	3.0	34.0
14319500	1340	47.5	108.0	3480	.65	86.9	5.9	270	43.27	123.41	49	3.4	33.5
14320600	1.28	188.0	2.3	810	0.00	21.9	1.8	120	43.44	123.31	45	3.0	34.0
14320700	210	54.6	28.8	1310	0.00	58.3	2.3	255	43.40	123.36	46	3.3	33.7
14321000	3680	8.1	170.0	2480	.25	85.9	4.1	290	43.59	123.55	47	3.3	32.0
14321900	26.0	23.0	7.7	700	.30	36.6	1.8	5	43.62	123.29	43	3.0	34.0
14322000	104	28.0	19.5	1020	.04	55.0	2.2	325	43.64	123.30	43	3.3	34.0
14322400	61.9	23.0	13.2	800	0.00	90.0	4.7	55	43.70	123.28	40	3.2	34.0
14322700	5.13	163.0	3.8	1280	0.00	48.2	2.2	60	43.63	123.37	45	3.0	34.0
14338000	133	121.0	20.5	3100	0.00	98.6	3.5	210	42.66	122.75	39	3.3	28.0
14339000	1220	34.2	79.5	3930	1.14	95.9	3.9	235	42.52	122.84	43	3.2	25.0

Table 2.–Basin characteristics used in multiple regressions–continued

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(3) ROGUE-UMPQUA REGION													
14339200	6.42	72.0	5.1	1570	0.00	48.3	1.2	175	42.51	122.89	18	2.5	29.0
14359000	2050	30.3	92.3	3560	.16	85.0	3.6	235	42.44	122.99	35	2.9	25.0
14359500	116	158.0	19.3	2710	0.00	99.0	3.3	230	42.58	123.02	40	3.0	30.0
14361300	7.41	334.0	4.1	1980	0.00	92.8	3.2	205	42.44	123.29	29	3.0	30.0
14362000	223	166.0	17.5	4280	.09	94.4	2.1	35	42.06	123.11	35	3.5	27.0
14363000	302	95.3	28.4	3900	.07	95.1	2.6	30	42.17	123.05	32	3.4	28.0
14366000	483	64.7	37.1	3660	.04	92.1	3.2	15	42.24	123.14	29	3.1	28.5
14368500	8.60	475.0	5.0	3220	0.00	95.6	3.2	60	42.27	123.29	38	2.9	28.0
14369800	3.07	376.0	3.1	1760	0.00	83.7	3.2	95	42.34	123.57	38	3.0	31.0
14370000	31.4	180.0	10.4	2160	0.00	90.9	3.2	140	42.36	123.52	45	3.5	31.0
14370200	3.16	332.0	2.7	1630	0.00	99.1	3.2	140	42.38	123.50	34	3.0	30.5
14371500	22.1	132.0	10.3	3480	0.00	99.6	1.2	205	42.64	123.21	53	3.2	31.0
14372300	3939	22.0	189.0	3100	.08	89.0	3.3	250	42.58	124.06	40	2.7	27.0
14372500	42.3	308.0	9.7	3900	.04	98.1	3.2	0	42.00	123.62	74	5.3	29.0
14375000	76.2	170.0	15.1	3910	.05	96.9	3.6	330	42.15	123.47	57	4.1	27.0
14375500	42.4	128.0	9.7	2500	.02	92.0	3.2	20	42.04	123.75	80	6.2	31.0
14377000	364	112.0	26.9	2930	.04	87.0	3.2	0	42.21	123.66	66	4.8	29.0
14377500	22.0	333.0	6.8	3370	.04	96.5	3.2	250	42.26	123.45	43	3.6	28.4
14377800	1.62	1240.0	2.5	3050	0.00	92.0	.6	200	42.28	123.69	42	4.6	31.0
14378000	665	38.1	48.3	2780	.02	87.3	3.1	345	42.38	123.81	58	4.6	29.0

Table 2.–Basin characteristics used in multiple regressions–continued

Station number	Drainage area (mi²) A	Main channel slope (ft/mi) S	Main channel length (mi) L	Mean basin elevation (ft) E	Area of lakes and ponds (percent) ST	Forest cover (percent) F	Soils index SI	Azimuth (degrees) AZ	Latitude (degrees) LAT	Longitude (degrees) LONG	Mean annual precipitation (in.) P	Precipitation intensity (in.) I	Temperature index (°F) TI
(4) HIGH CASCADES REGION													
14134000	8.70	590.0	5.2	4800	0.00	93.1	5.6	180	45.27	121.72	88	4.3	22.5
14134500	54.0	135.0	15.6	4000	.11	93.0	5.6	325	45.22	121.86	85	4.1	22.0
14145690	1.51	1260.0	2.0	4130	0.00	91.3	5.6	265	43.66	122.21	56	3.4	22.0
14147400	1.52	670.0	2.5	2850	0.00	76.6	3.2	320	43.88	122.37	50	3.5	29.4
14158250	.21	1590.0	.9	4630	0.00	48.0	5.6	160	44.40	122.12	95	3.5	23.0
14158500	92.4	76.6	12.3	4120	.65	89.0	4.9	340	44.36	121.99	81	4.2	21.0
14208500	54.0	47.6	9.8	3740	1.59	97.7	5.6	295	45.12	121.80	70	3.7	21.0
14208850	2.30	388.0	2.0	4230	0.00	85.2	5.6	230	45.14	121.90	60	4.0	23.0
14209000	126	87.5	19.2	3750	.08	86.9	5.6	265	45.07	121.95	69	3.6	22.0
14209100	3.75	343.0	3.8	3400	0.00	90.1	5.6	330	45.07	121.96	60	3.5	23.0
14327490	19.3	243.0	12.6	5200	0.00	100.0	3.6	260	43.00	122.36	60	3.5	24.0
14327500	156	76.6	28.2	5200	.16	96.3	4.1	225	42.93	122.43	56	3.4	23.0
14328000	312	59.1	44.7	4900	.08	96.6	5.3	215	42.77	122.50	54	3.4	23.0
14330500	52.0	138.0	17.4	5230	.84	98.3	5.6	330	42.70	122.38	50	3.6	20.0
14331000	26.0	311.0	9.0	4850	.17	99.2	5.6	280	42.70	122.38	58	3.5	21.0
14332000	83.8	134.0	17.9	5150	.68	98.5	5.6	330	42.71	122.39	53	3.6	20.0
14333000	56.5	242.0	15.3	5310	.36	99.2	5.6	295	42.73	122.40	56	3.6	21.0
14333500	45.5	220.0	15.1	5290	0.00	97.7	5.7	265	42.78	122.43	54	3.5	20.0
14335000	650	61.0	53.8	4700	.18	96.5	5.0	255	42.70	122.59	50	3.4	23.0
14335500	138	141.0	16.4	3950	.34	96.6	4.2	260	42.54	122.55	36	3.3	22.5
14337500	245	109.0	29.8	3520	.20	95.3	3.3	285	42.65	122.69	36	3.2	24.0
14339500	16.6	108.0	7.5	5350	.05	98.8	5.6	285	42.34	122.36	26	1.4	22.0
14341500	138	182.0	22.3	4440	.01	86.5	3.6	285	42.41	122.60	22	2.6	25.0
14342500	20.8	127.0	6.8	6520	3.65	70.1	5.6	260	42.38	122.36	34	3.0	22.0
14343000	43.8	217.0	17.2	4820	1.73	83.6	5.1	275	42.40	122.54	31	3.0	24.0
14347000	269	144.0	31.3	3880	.36	82.0	2.9	285	42.47	122.73	26	2.6	25.0
14353000	10.5	617.0	5.8	5120	0.00	99.5	5.6	25	42.14	122.72	21	3.0	27.0
14353500	8.14	535.0	6.2	5040	0.00	99.1	5.6	10	42.15	122.71	22	3.0	26.0

Table 3.–Maximum discharges at gaging stations used in western Oregon flood-frequency analysis

Station number	Station name	Years of record	Date	Discharge (ft³/s)
11530850	MIDDLE FK SMITH RIVER TRIB. NR OBRIEN,OR	12	12-22-64	102
11531000	MIDDLE FK SMITH RIVER AT GASQUET,CA	16	12-22-64	41100
11533000	LOPEZ CREEK NEAR SMITH RIVER,CA	12	03-02-72	570
14134000	SALMON RIVER NEAR GOVERNMENT CAMP, OREG.	51	12-23-64	1300
14134500	SALMON RIVER BELOW LINNEY CREEK, OREG.	23	03-31-31	3670
14135000	SALMON RIVER AT WELCHES, OREG.	13	03-31-31	13000
14137000	SANDY RIVER NEAR MARMOT, OREG.	65	12-22-64	61400
14138800	BLAZED ALDER CREEK NEAR RHODODENDRON, OREG.	13	12-22-64	2610
14138850	BULL RUN R NR MULTNOMAH FALLS, OREG.	10	01-20-72	8610
14141500	LITTLE SANDY RIVER NEAR BULL RUN, OREG.	58	12-20-74	4280
14143500	WASHOUGAL RIVER NR WASHOUGAL, WA	28	01-20-72	22600
14144000	LITTLE WASHOUGAL R NR WASHOUGAL, WA	17	12-22-64	24300
14144600	GROENVELD CREEK NEAR CAMAS, WA	15	12-22-64	103
14144800	MIDDLE FORK WILLAMETTE RIVER NR OAKRIDGE OREG	18	12-22-64	39800
14144870	MIDDLE FK WILLAMETTE R TRIB NR OAKRIDGE,OREG.	16	12-22-64	82
14144900	HILLS CR AB HILLS CR RES, NR OAKRIDGE,OREG.	18	12-22-64	10700
14145500	M F WILLAMETTE R AB SALT CR., NR OAKRIDGE, OREG	26	12-28-45	34000
14145690	SWAMP CREEK NEAR MCCREDIE SPRINGS,OREG.	10	12-22-64	120
14146000	SALT CREEK NEAR OAKRIDGE,OREG.	19	10-29-50	4500
14146500	SALMON CREEK NEAR OAKRIDGE,OREG.	50	12-22-64	11600
14147400	TUMBLE CREEK NEAR WESTFIR,OREG.	11	12-22-64	98
14147500	N FK OF M FK WILLAMETTE R NR OAKRIDGE,OREG.	46	12-22-64	24400
14148000	MF WILLAMETTE R NR OAKRIDGE OREG	39	12-28-45	81800
14148700	FERN CREEK NEAR LOWELL,OREG.	21	02-10-61	52
14150300	FALL CR. NEAR LOWELL, OREG.	13	01-21-72	12100
14151000	FALL CREEK BL WINBERRY CR NR FALL CR,OREG.	30	12-11-56	24700
14151500	LITTLE FALL CREEK NEAR FALL CREEK OREG.	13	12-28-45	6110
14152000	MF WILLAMETTE R AT JASPER OREG	10	11-23-09	94000
14152500	COAST FORK WILLAMETTE RIVER AT LONDON, OREG.	41	12-22-64	12500
14153900	PRATHER CREEK NEAR DISSTON, OREG.	12	02-10-61	326
14154500	ROW RIVER ABOVE PITCHER CREEK,NEAR DORENA,OREG.	41	12-22-64	33100
14155500	ROW RIVER NEAR COTTAGE GROVE, OREG.	11	12-28-45	21400
14156000	MOSBY CREEK NEAR COTTAGE GROVE, OREG.	11	12-28-45	8520
14156500	MOSBY CR AT MOUTH, NR COTTAGE GROVE,OREG.	30	12-22-64	14100
14157000	COAST FK WILLAMETTE R AT SAGINAW OREG.	19	02-20-27	32500
14158000	WILLAMETTE RIVER AT SPRINGFIELD, OREG.	36	12-29-45	140000
14158250	HACKELMAN CREEK NR UPPER SODA,OREG.	16	12-11-56	102
14158500	MCKENZIE RIVER AT OUTLET OF CLEAR LAKE,OREG.	32	12-23-64	3300
14159000	MCKENZIE R AT MCKENZIE BRIDGE, OREG.	49	01-06-23	16500
14159200	S FK MCKENZIE R AB COUGAR LK NR RAINBOW,OREG.	19	12-22-64	18400
14159500	SOUTH FORK MCKENZIE RIVER NR RAINBOW,OREG.	16	12-28-45	24500
14161200	LOOKOUT CR TRI NO 3 NR BLUE RIVER OREG.	11	12-20-57	52
14161500	LOOKOUT C NR BLUE R OREG	19	12-22-64	6660
14161600	LOOKOUT CR TRIB NR BLUE R,OREG.	15	12-11-56	75
14162000	BLUE RIVER NR BLUE RIVER, OREG.	30	12-22-64	19600

Table 3.—Maximum discharges at gaging stations used in western Oregon flood-frequency analysis—continued

Station number	Station name	Years of record	Date	Discharge (ft³/s)
14162500	MCKENZIE R NR VIDA OREG	38	12-28-45	64400
14163000	GATE CREEK AT VIDA.OREG.	24	12-22-64	7140
14165000	MOHAWK RIVER NR SPRINGFIELD, OREG.	31	12-22-64	13000
14165500	MCKENZIE RIVER NEAR COBURG,OREG.	18	12-29-45	88200
14166500	LONG TOM RIVER NEAR NOTI, OREG.	41	12-22-55	6990
14167000	COYOTE CREEK NEAR CROW, OREG.	36	02-10-61	10600
14169700	BEAR CREEK NEAR CHESHIRE.OREG.	20	01-15-74	530
14170500	ROCK CREEK NEAR PHILOMATH, OREG.	18	12-24-64	2500
14171000	MARYS RIVER NEAR PHILOMATH, OREG.	36	12-22-64	13600
14171500	MUDDY CREEK NEAR CORVALLIS, OREG.	10	12-22-64	6040
14172000	CALAPOOIA R AT HOLLEY OREG	41	12-22-64	12600
14172300	BUTTE CR NR PLAINVIEW,OREG.	14	11-24-60	647
14173500	CALAPOOIA RIVER AT ALBANY,OREG.	36	12-22-55	32700
14174000	WILLAMETTE RIVER AT ALBANY, OREG.	56	12-04-61	340000
14174100	COX CREEK AT ALBANY,OREG.	16	12-21-64	1070
14178000	NORTH SANTIAM R BEL BOULDER CR NR DETROIT, OREG.	51	12-22-64	26700
14178800	WIND CR NR DETROIT.OREG.	23	12-21-64	231
14179000	BREITENBUSH R ABV CANYON CR NR DETROIT, OREG.	44	12-22-64	16900
14181500	NORTH SANTIAM RIVER AT NIAGARA,OREG.	26	11-22-09	63200
14181700	N SANTIAM RIVER TRIB NR GATES,OREG.	17	01-30-65	132
14182500	LITTLE NORTH SANTIAM RIVER NEAR MEHAMA, OREG.	44	12-22-64	36000
14183000	NORTH SANTIAM RIVER AT MEHAMA, OREG.	37	12-28-45	76600
14184900	SHEEK CREEK NEAR CASCADIA.OREG.	24	12-22-64	116
14185000	SOUTH SANTIAM RIVER BELOW CASCADIA, OREG.	41	12-22-64	27600
14185800	MIDDLE SANTIAM R NEAR CASCADIA,OREG.	13	12-22-64	22900
14185900	QUARTZVILLE CREEK NEAR CASCADIA, OREG.	13	12-22-64	36500
14186000	MIDDLE SANTIAM RIVER NEAR FOSTER, OREG.	16	12-28-45	41800
14187000	WILEY CREEK NEAR FOSTER, OREG.	26	01-21-72	9640
14187500	SOUTH SANTIAM RIVER AT WATERLOO, OREG.	45	12-22-64	95200
14188800	THOMAS CREEK NEAR SCIO,OREG.	14	12-22-64	27400
14189000	SANTIAM R AT JEFFERSON OREG	23	11-21-21	202000
14189500	LUCKIAMUTE RIVER NEAR HOSKINS, OREG.	42	12-14-46	5560
14190000	LUCKIAMUTE R AT PEDEE OREG	30	12-22-64	15700
14190200	WAYMIRE CR NR FALLS CITY,OREG.	15	12-22-64	598
14190500	LUCKIAMUTE RIVER NEAR SUVER, OREG.	42	12-22-64	32900
14190600	SOAP CREEK TRIBUTARY NEAR SUVER,OREG.	24	03-02-72	86
14191000	WILLAMETTE RIVER AT SALEM,OREG.	51	12-04-61	500000
14192100	GLENN CREEK NEAR SALEM,OREG.	25	12-21-55	172
14192200	GIBSON CREEK NEAR SALEM, OREG.	15	12-23-64	434
14192500	SOUTH YAMHILL RIVER NEAR WILLAMINA, OREG.	42	12-22-64	19600
14192800	SOUTH YAMHILL R TRIB NR WILLAMINA,OREG.	23	12-21-55	420
14193000	WILLAMINIA CREEK NEAR WILLAMINA,OREG.	43	12-22-64	10800
14193300	MILL CREEK NEAR WILLAMINA, OREG.	15	12-22-64	6170
14194000	SOUTH YAMHILL RIVER NEAR WHITESON,OREG.	36	12-23-64	47200
14195000	HASKINS CREEK NEAR MCMINNVILLE, OREG.	21	03-31-31	610

Table 3.—Maximum discharges at gaging stations used in western Oregon flood-frequency analysis—continued

Station number	Station name	Years of record	Date	Discharge (ft³/s)
14196500	NORTH YAMHILL RIVER NR PIKE, OREG.	11	02-10-49	4780
14197000	NORTH YAMHILL R AT PIKE, OREG.	25	12-21-55	9530
14197300	PANTHER CREEK NEAR CARLTON,OREG.	16	12-21-64	612
14198500	MOLALLA R AB PC NR WILHOIT, OREG.	41	12-22-64	24300
14199700	HULL CR NR COLTON,OREG.	13	11-24-60	293
14200000	MOLALLA R NR CANBY, OREG.	44	12-22-64	43600
14201000	PUDDING RIVER NEAR MOUNT ANGEL, OREG.	26	12-22-64	16700
14201500	BUTTE CREEK AT MONITOR,OREG.	22	01-21-72	7310
14202000	PUDDING RIVER AT AURORA, OREG.	38	01-07-23	27900
14202500	TUALATIN RIVER NR GASTON,OREG.	20	12-21-55	8170
14203000	SCOGGIN CREEK NEAR GASTON, OREG.	34	12-21-55	5320
14203500	TUALATIN RIVER NEAR DILLEY, OREG.	37	12-22-64	17100
14203800	BEAVER CREEK NEAR GLENWOOD,OREG.	17	02-02-63	472
14204000	GALES CREEK NR GALES CREEK, OREG.	17	12-22-64	3970
14204100	BATEMAN CREEK NEAR GLENWOOD,OREG.	25	12-21-55	145
14204500	GALES CREEK NEAR FOREST GROVE, OREG.	22	02-17-49	6410
14205500	EAST FORK DAIRY CREEK AT MOUNTAINDALE, OREG.	11	02-17-49	1420
14206000	MCKAY CREEK NEAR NORTH PLAINS, OREG.	11	02-17-49	2100
14206500	TUALATIN RIVER AT FARMINGTON,OREG.	19	12-22-55	24200
14207500	TUALATIN RIVER AT WEST LINN, OREG.	46	12-23-33	29300
14208000	CLACKAMAS RIVER AT BIG BOTTOM, OREG.	50	12-22-64	11200
14208500	OAK GROVE FORK AT TIMOTHY MEADOWS, OREG.	16	01-07-23	970
14208850	EAST FORK SHELLROCK CR NR GOVT CAMP,OREG.	10	12-24-64	118
14209000	OAK GROVE FORK ABOVE POWERPLANT INTAKE, OREG.	43	01-07-23	5000
14209100	KINK CR NR GOVERNMENT CAMP,OREG.	19	12-21-64	94
14209500	CLACKAMAS RIVER ABOVE THREE LYNX CREEK, OREG.	38	03-31-31	34800
14209900	DUBOIS CREEK AT ESTACADA,OREG.	20	12-22-64	508
14210000	CLACKAMAS RIVER AT ESTACADA, OREG.	47	03-31-31	60800
14210800	ROCK CR NR BORING OREG.	10	11-20-62	280
14211500	JOHNSON CREEK AT SYCAMORE, OREG.	36	12-22-64	2620
14211800	SALTZMAN CREEK AT PORTLAND,OREG.	25	12-21-55	306
14223500	KALAMA R BL ITALIAN CR NR KALAMA,WA	26	01-20-72	17900
14243500	DELAMETER CREEK NEAR CASTLE ROCK, WA	19	01-19-62	2420
14245000	COWEMAN RIVER NEAR KELSO, WA	22	11-20-62	9720
14248700	BEAR CREEK NEAR SVENSEN,OREG.	10	01-11-72	342
14251500	YOUNGS RIVER NEAR ASTORIA, OREG.	31	02-10-49	4750
14299000	SO FK NECANICUM RIVER NEAR SEASIDE,OREG.	16	01-25-64	3040
14299500	ASBURY CREEK NEAR CANNON BEACH,OREG.	25	02-10-61	314
14300200	OAK RANCH CR NR VERNONIA OREG.	10	12-21-64	514
14301000	NEHALEM RIVER NEAR FOSS, OREG.	37	01-20-72	46900
14301400	PATTERSON CREEK AT BAY CITY,OREG.	17	01-28-65	300
14301500	WILSON RIVER NEAR TILLAMOOK, OREG.	46	01-20-72	36000
14302500	TRASK RIVER NEAR TILLAMOOK,OREG.	37	11-20-21	30000
14303000	NESTUCCA RIVER NEAR MCMINNVILLE, OREG.	16	12-22-33	1480
14303600	NESTUCCA R NR BEAVER OREG	11	01-11-72	29400

Table 3.—Maximum discharges at gaging stations used in western Oregon flood-frequency analysis—continued

Station number	Station name	Years of record	Date	Discharge (ft³/s)
14303700	ALDER BROOK NR ROSE LODGE,OREG.	23	01-21-72	218
14305500	SILETZ RIVER AT SILETZ, OREG.	60	11-20-21	40800
14306100	N FK ALSEA R AT ALSEA, OREG.	18	12-22-64	14100
14306400	FIVE RIVERS NR FISHER, OREG.	14	01-21-72	17200
14306500	ALSEA RIVER NEAR TIDEWATER, OREG.	37	12-22-64	41800
14306700	NEEDLE BRANCH NEAR SALADO,OREG.	15	01-11-72	64
14306800	FLYNN CREEK NEAR SALADO,OREG.	15	01-21-72	139
14306810	DEER CREEK NEAR SALADO,OREG.	15	01-28-65	201
14306830	LYNDON CREEK NEAR WALDPORT,OREG.	11	01-28-65	162
14307500	LAKE CREEK AT TRIANGLE, OR	32	01-15-74	4640
14307550	DEADWOOD CREEK TRIB AT ALPHA, OR	12	12-22-64	89
14307610	SIUSLAW R TRIB NR RAINROCK,OREG.	20	01-21-72	62
14307700	JACKSON CREEK NEAR TILLER, OREG.	21	12-22-64	21100
14308000	SOUTH UMPQUA RIVER AT TILLER, OREG.	38	12-22-64	60200
14308500	ELK CREEK NEAR DREW, OREG.	22	12-22-64	8880
14308700	DAYS CREEK AT DAYS CREEK,OREG.	17	02-21-56	3450
14308900	CANYON CREEK AT CANYONVILLE, OREG.	15	12-21-55	3810
14309000	COW CREEK NEAR AZALEA, OREG.	48	01-15-74	10600
14309500	WEST FORK COW CREEK NEAR GLENDALE,OREG.	21	12-22-64	15700
14310000	COW CREEK NEAR RIDDLE, OREG.	22	10-29-50	41100
14310700	SOUTH MYRTLE CREEK NEAR MYRTLE CREEK,OREG.	17	12-11-56	3050
14310900	W F FROZEN CR NR MYRTLE CREEK,OREG.	14	12-26-55	300
14311000	NORTH MYRTLE CREEK NEAR MYRTLE CREEK, OREG.	21	01-20-64	3260
14311200	OLALLA CREEK NEAR TENMILE, OREG.	17	01-03-66	9160
14311500	LOOKINGGLASS CREEK AT BROCKWAY,OREG.	21	12-26-55	35000
14312000	SOUTH UMPQUA RIVER NEAR BROCKWAY, OREG.	46	12-23-64	125000
14312100	PARROTT CREEK AT ROSEBURG,OREG.	25	12-21-55	290
14312200	DEER CREEK NEAR ROSEBURG,OREG.	17	12-28-65	7910
14312300	MARKS CREEK NEAR ROSEBURG,OREG.	17	02-10-61	260
14313500	NORTH UMPQUA R BL LEMOLO LK NR T FALLS,OREG.	27	06-09-33	1190
14314500	CLEARWATER RIVER AB TRAP CR NR TOKETTE FLS, OR	49	12-23-64	1020
14315500	NORTH UMPQUA RIVER AT TOKETEE FALLS OREG.	24	12-31-42	5080
14316000	FISH CR AT BIG C R STATION NR T FLS,OREG.	28	12-22-64	12100
14316500	NO UMPQUA R AB COPELAND CR NR T FLS,OREG.	27	12-22-64	40700
14316700	STEAMBOAT CREEK NEAR GLIDE,OREG.	21	12-22-64	51000
14317500	N UMPQUA RIVER AB ROCK CR NR GLIDE OREG	23	12-22-55	68000
14317600	ROCK CREEK NEAR GLIDE, OREG.	17	12-22-64	22800
14317800	CAVITT CREEK NEAR PEEL,OREG.	12	12-11-56	10600
14318000	LITTLE RIVER AT PEEL, OREG.	22	12-11-56	21100
14318500	NORTH UMPQUA RIVER NEAR GLIDE, OREG.	20	11-22-09	94000
14318600	NORTH UMPQUA R TRIB NR GLIDE OREG.	12	12-26-55	188
14319200	SUTHERLIN CR AT SUTHERLIN OREG.	12	02-10-61	2250
14319500	NORTH UMPQUA R. AT WINCHESTER, OREG.	11	12-22-64	150000
14320600	CABIN CR TRIB NR OAKLAND,OREG.	19	11-23-61	246
14320700	CALAPOOYA CREEK NEAR OAKLAND,OREG.	18	11-23-61	26600

Table 3.–Maximum discharges at gaging stations used in western Oregon flood-frequency analysis–continued

Station number	Station name	Years of record	Date	Discharge (ft³/s)
14321000	UMPQUA RIVER NEAR ELKTON, OREG.	70	12-23-64	265000
14321900	YONCALLA CR NR YONCALLA OREG.	12	02-10-61	1570
14322000	ELK CREEK NEAR DRAIN, OREG.	22	02-10-61	19000
14322400	PASS CREEK NEAR DRAIN,OREG.	12	02-10-61	10300
14322700	BEAR CREEK NEAR DRAIN, OREG.	14	02-10-61	674
14323200	TENMILE CREEK NEAR LAKESIDE,OREG.	19	12-26-64	3330
14323300	EEL CREEK AT LAKESIDE,OREG.	19	01-17-74	316
14324500	WEST FORK MILLICOMA RIVER NEAR ALLEGANY, OREG.	22	11-24-60	8100
14324600	S FK COQUILLE R AB PANTHER CR, NR ILLAHE,OREG.	14	12-22-64	8840
14324700	SOUTH FORK COQUILLE RIVER NEAR ILLAHE,OREG.	18	12-22-64	12000
14324900	SF COQUILLE R NR POWERS OREG	14	12-22-64	29600
14325000	SOUTH FORK COQUILLE RIVER AT POWERS, OREG.	58	12-22-64	48900
14326500	MIDDLE FK COQUILLE R NR MYRTLE POINT OREG.	17	10-31-24	31800
14326600	GETTYS CREEK NEAR MYRTLE POINT,OREG.	24	02-10-61	245
14326800	NORTH FORK COQUILLE RIVER NR FAIRVIEW,OREG.	13	03-02-72	7760
14327000	N FK COQUILLE R NR MYRTLE POINT, OREG.	24	12-23-64	38400
14327100	GEIGER CREEK NEAR BANDON,OREG.	16	02-10-61	206
14327240	MILBURY CREEK NEAR PORT ORFORD,OREG.	11	01-04-66	286
14327400	DRY RUN CR NR PORT ORFORD,OREG.	22	01-18-71	213
14327490	NATIONAL CREEK NEAR UNION CREEK,OREG.	11	12-22-64	475
14327500	ROGUE RIVER ABOVE BYBEE CREEK, NR UNION CR, OREG	22	11-29-42	4430
14328000	ROGUE RIVER ABOVE PROSPECT, OREG.	55	12-22-64	22400
14330500	S FK ROGUE R AB IMNAHA CR NR PROSPECT OREG.	18	12-01-42	2170
14331000	IMNAHA CREEK NEAR PROSPECT, OREG.	18	02-13-45	500
14332000	SOUTH FORK ROGUE RIVER NEAR PROSPECT, OREG.	34	12-22-64	7010
14333000	MIDDLE FK ROGUE RIVER NR PROSPECT OREG.	30	12-22-55	3230
14333500	RED BLANKET CREEK NEAR PROSPECT, OREG.	50	02-13-45	9900
14335000	ROGUE R BL S FK ROGUE R NR PROSPECT OREG.	34	12-22-64	55000
14335500	SOUTH FORK BIG BUTTE CR NR BUTTE FALLS,OREG.	56	12-22-64	12600
14337500	BIG BUTTE CREEK NEAR MCLEOD,OREG.	20	12-22-55	8950
14338000	ELK CREEK NEAR TRAIL, OREG.	31	12-22-64	19200
14339000	ROGUE R AT DODGE BR NR EAGLE POINT,OREG.	38	12-22-64	87600
14339200	CONSTANCE CR NR SAMS VALLEY OREG.	10	12-02-62	950
14339500	S FK LITTLE BUTTE CR AT BIG ELK RG STA,OR	22	05-25-42	145
14341500	SOUTH FORK LITTLE BUTTE CR NR LAKECREEK,OREG.	55	12-02-62	7660
14342500	NO FK LITTLE BUTTE CR AT F L NR LAKECREEK,OREG.	59	07-17-59	163
14343000	NO FK LITTLE BUTTE CR NR LAKECREEK,OREG.	51	12-22-64	1750
14347000	LITTLE BUTTE CREEK AB EAGLE POINT OREG.	10	10-30-24	7000
14353000	W FK ASHLAND CREEK NEAR ASHLAND,OREG.	19	01-15-74	4780
14353500	EAST FK ASHLAND CREEK NEAR ASHLAND,OREG.	19	01-15-74	5630
14359000	ROGUE RIVER AT RAYGOLD, NEAR CENTRAL POINT, OREG	71	12-23-64	131000
14359500	EVANS CR NR BYBEE SPRINGS NR ROGUE R OREG.	13	02-20-27	11100
14361300	JONES CREEK NEAR GRANTS PASS,OREG.	25	02-22-56	1350
14362000	APPLEGATE RIVER NEAR COPPER, OREG.	38	01-15-74	29800
14363000	APPLEGATE RIVER NEAR RUCH, OREG.	31	02-20-27	20000

Table 3.—Maximum discharges at gaging stations used in western Oregon flood-frequency analysis—continued

Station number	Station name	Years of record	Date	Discharge (ft³/s)
14366000	APPLEGATE RIVER NEAR APPLEGATE, OREG.	38	01-15-74	37200
14368500	POWELL CREEK NEAR WILLIAMS, OREG.	12	01-18-53	1110
14369800	BUTCHERKNIFE CREEK NEAR WONDER,OREG.	16	01-03-66	432
14370000	SLATE CREEK AT WONDER, OREG.	19	12-22-64	4650
14370200	ROUND PRAIRIE CREEK NR WILDERVILLE.OREG.	16	01-03-66	375
14371500	GRAVE CREEK AT PEASE BRIDGE,NEAR PLACER,OREG.	34	12-22-64	6240
14372300	ROGUE RIVER NEAR AGNESS,OREG.	16	12-23-64	290000
14372500	E F ILLINOIS RIVER NEAR TAKILMA.OREG.	39	12-22-64	15700
14375000	SUCKER CREEK NEAR HOLLAND, OREG.	24	12-22-64	17500
14375500	W FK ILLINOIS R BL ROCK CR NR OBRIEN, OR	22	12-24-64	16100
14377000	ILLINOIS RIVER AT KERBY, OREG.	35	12-22-55	56800
14377500	DEER CREEK NEAR DRYDEN, OREG.	15	01-18-53	5000
14377800	SNAILBACK CR NR SELMA,OREG.	17	12-21-64	329
14378000	ILLINOIS R NR SELMA, OREG.	12	12-22-64	160000

Table 4.—Discharges for selected flood-frequencies at gaging stations

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(1) COAST REGION						
11530850	40	60	74	91	104	117
11531000	14600	21100	25500	30800	34800	38700
11533000	152	286	393	546	671	805
14248700	147	207	249	304	348	393
14251500	2960	3590	3980	4450	4780	5110
14299000	1900	2360	2650	3000	3260	3510
14299500	212	253	277	306	327	347
14300200	285	415	509	636	736	841
14301000	27900	35200	39800	45500	49600	53600
14301400	109	164	205	259	303	349
14301500	17400	22600	26000	30100	33200	36300
14302500	12900	16900	19500	22900	25400	27900
14303000	727	1130	1440	1880	2240	2620
14303600	14500	20100	24000	28900	32600	36300
14303700	88	132	163	204	236	269
14305500	20900	26600	30200	34300	37300	40200
14306100	5120	7350	8880	10900	12400	14000
14306400	8680	12000	14200	17100	19200	21300
14306500	20600	27300	31700	37100	41000	45000
14306700	30	39	45	51	56	61
14306800	63	86	101	120	135	149
14306810	103	135	156	182	201	219
14306830	55	88	112	144	170	197
14307500	2230	3400	4240	5360	6230	7140
14307550	53	71	82	96	106	116
14307610	25	37	46	57	66	75
14323200	2190	2910	3340	3860	4220	4560
14323300	164	219	253	293	321	348
14324500	5380	7150	8240	9550	10500	11400
14324600	3780	4900	5560	6330	6850	7340
14324700	4850	6650	7760	9080	10000	10900
14324900	13100	16800	19000	21500	23200	24800
14325000	15300	21900	26200	31600	35500	39400
14326500	14800	21100	25000	29700	33100	36300
14326600	137	190	223	262	290	316
14326800	4980	6810	7960	9330	10300	11200
14327000	13400	21000	26200	32800	37800	42700
14327100	95	141	170	206	232	257
14327240	111	190	256	357	447	548
14327400	107	158	191	231	261	289

Table 4.--Discharges for selected flood-frequencies at gaging stations--continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(2) WILLAMETTE REGION						
14135000	5490	7590	8990	10800	12100	13400
14137000	14000	21300	26600	33700	39400	45300
14138800	1180	1650	1980	2390	2700	3020
14138850	6160	7180	7780	8470	8940	9400
14141500	2270	3200	3850	4700	5350	6030
14143500	13500	16600	18500	20700	22300	23800
14144000	1250	1710	2020	2410	2700	2990
14144600	42	57	66	77	86	94
14144800	8140	13700	18300	24900	30600	36900
14144870	25	44	59	81	100	122
14144900	2010	3330	4380	5890	7170	8570
14145500	11700	20800	28400	39800	49800	61000
14146000	1670	2830	3760	5120	6270	7550
14146500	3150	5300	7020	9520	11600	14000
14147500	7350	11500	14800	19300	23000	27000
14148000	26900	44900	59200	79800	97100	116000
14148700	23	34	43	53	62	71
14150300	6140	9640	12300	16100	19200	22600
14151000	9700	15000	19000	24500	29000	33700
14151500	2470	4250	5710	7880	9750	11800
14152000	45500	81400	111000	157000	197000	242000
14152500	3700	5960	7670	10100	12000	14100
14153900	207	288	344	417	475	534
14154500	11200	16900	20900	26400	30700	35100
14155500	11100	17300	22000	28500	33800	39500
14156000	3570	5820	7570	10100	12100	14400
14156500	4860	7450	9360	12000	14100	16300
14157000	18300	24300	28400	33600	37500	41500
14158000	55500	78500	94500	116000	132000	149000
14159000	6360	9330	11400	14200	16300	18500
14159200	4980	7580	9480	12100	14200	16400
14159500	9500	15300	19800	26200	31400	37000
14161200	33	45	54	66	75	84
14161500	1860	2850	3570	4570	5360	6190
14161600	35	55	70	90	107	124
14162000	5920	8900	11100	14000	16300	18800
14162500	28300	40100	48300	58900	67000	75300
14163000	2970	4610	5830	7540	8940	10400
14165000	5820	8570	10500	13200	15300	17500
14165500	49600	68700	81800	99000	112000	126000

Table 4.—Discharges for selected flood-frequencies at gaging stations—continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(2) WILLAMETTE REGION						
14166500	3150	4710	5790	7210	8300	9410
14167000	4130	7680	10600	14900	18500	22600
14169700	234	353	439	556	649	746
14170500	1070	1510	1820	2220	2520	2840
14171000	5990	8630	10500	12900	14700	16600
14171500	3220	4190	4820	5610	6200	6790
14172000	5620	8270	10200	12800	14800	16900
14172300	237	391	512	688	837	1000
14173500	12500	20100	26000	34200	41000	48200
14174000	106000	160000	199000	254000	299000	346000
14174100	533	750	903	1110	1260	1430
14178000	7510	11600	14600	18700	21900	25400
14178800	86	127	157	196	226	257
14179000	6260	8890	10700	13100	14900	16700
14181500	21300	34700	44900	59300	71000	83600
14181700	61	86	103	124	141	158
14182500	13500	18900	22700	27600	31400	35300
14183000	34100	48600	58500	71200	80800	90600
14184900	55	80	98	122	141	161
14185000	11700	17500	21700	27300	31700	36300
14185800	8210	11800	14300	17700	20200	22900
14185900	12000	17900	22100	27900	32400	37200
14186000	20900	28400	33600	40200	45300	50500
14187000	3410	5300	6730	8730	10400	12100
14187500	37500	54200	65900	81500	93700	106000
14188800	8250	12900	16500	21500	25600	30000
14189000	77000	120000	152000	199000	237000	278000
14189500	3020	3960	4580	5360	5940	6530
14190000	6410	8700	10300	12300	13900	15500
14190200	248	384	486	628	744	867
14190500	11800	17100	21000	26300	30500	34900
14190600	44	60	71	86	97	108
14191000	165000	241000	298000	376000	439000	507000
14192100	72	117	152	203	246	293
14192200	139	212	267	343	405	472
14192500	9520	12300	14100	16400	18000	19700
14192800	129	199	252	324	382	444
14193000	3850	5240	6210	7500	8490	9530
14193300	3060	4100	4780	5660	6330	7000
14194000	22300	28800	33100	38500	42600	46800

Table 4.—Discharges for selected flood-frequencies at gaging stations—continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(2) WILLAMETTE REGION						
14195000	287	397	473	574	651	732
14196500	2770	3550	4060	4710	5190	5670
14197000	4060	5630	6730	8190	9330	10500
14197300	224	325	399	499	579	664
14198500	7660	10800	13100	16100	18500	20900
14199700	116	195	257	346	421	502
14200000	13800	20200	24800	31100	36000	41200
14201000	6080	9470	12000	15500	18400	21400
14201500	3080	4610	5730	7260	8480	9760
14202000	8650	13600	17500	22800	27300	32100
14202500	2940	3990	4700	5620	6330	7050
14203000	1810	2610	3190	3980	4620	5300
14203500	5090	7530	9360	11900	14000	16300
14203800	200	289	360	468	561	668
14204000	1890	2880	3630	4670	5520	6420
14204100	61	87	106	132	152	173
14204500	3170	4640	5710	7170	8330	9550
14205500	1150	1290	1380	1470	1540	1610
14206000	954	1250	1440	1680	1870	2050
14206500	10200	15000	18500	23300	27100	31100
14207500	10100	14700	18000	22400	25900	29600
14208000	3010	4750	6030	7780	9170	10600
14209500	16900	25100	30700	38100	43700	49300
14209900	84	163	231	335	426	529
14210000	24400	37600	46900	59300	68900	78700
14210800	151	234	296	379	446	516
14211500	1170	1800	2250	2840	3300	3770
14211800	104	168	217	287	344	406
14223500	10300	12900	14500	16500	17900	19400
14243500	1260	1770	2110	2560	2910	3260
14245000	4860	6340	7300	8510	9410	10300

Table 4.—Discharges for selected flood-frequencies at gaging stations—continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(3) ROGUE-UMPQUA REGION						
14307700	5770	9680	12800	17200	20900	25000
14308000	17900	28600	36600	47500	56300	65500
14308500	2910	5070	6800	9320	11400	13800
14308700	1580	2370	2940	3690	4280	4890
14308900	2530	3140	3510	3960	4280	4590
14309000	2430	4490	6090	8330	10100	12000
14309500	7300	10200	12100	14500	16200	17900
14310000	21400	31300	37700	45500	51200	56700
14310700	1830	2510	2960	3520	3950	4370
14310900	147	232	294	380	449	521
14311000	2030	2500	2780	3110	3350	3580
14311200	3920	6600	8620	11400	13600	16000
14311500	11500	17900	22600	28800	33700	38800
14312000	49400	76100	94400	118000	135000	153000
14312100	163	187	202	218	229	240
14312200	4000	5390	6300	7430	8270	9110
14312300	132	198	244	305	353	402
14313500	710	929	1070	1260	1390	1530
14314500	320	421	492	586	660	736
14315500	2560	3560	4250	5180	5890	6640
14316000	2100	3790	5220	7430	9380	11600
14316500	7750	13700	18700	26200	32700	40100
14316700	15000	22600	28100	35700	41800	48300
14317500	24500	37100	46300	58700	68700	79100
14317600	6270	10300	13400	17800	21500	25500
14317800	3520	6090	8150	11200	13700	16500
14318000	9740	14500	17900	22500	26000	29800
14318500	39500	57400	69900	86400	99100	112000
14318600	55	87	111	144	170	198
14319200	1310	1920	2330	2880	3300	3730
14319500	49300	74700	92900	117000	136000	156000
14320600	152	217	262	320	364	409
14320700	11700	19700	25800	34500	41700	49400
14321000	94500	141000	173000	216000	249000	284000
14321900	1250	1490	1640	1810	1930	2050
14322000	5600	10600	14900	21500	27300	33800
14322400	4040	6720	8780	11700	14100	16700
14322700	370	492	572	673	747	822
14338000	5500	8970	11600	15300	18400	21700
14339000	21100	35500	46800	63100	76700	91600

Table 4.–Discharges for selected flood-frequencies at gaging stations–continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(3) ROGUE-UMPQUA REGION						
14339200	425	631	775	965	1110	1260
14359000	26200	46500	63300	88700	111000	136000
14359500	3880	7340	10200	14500	18100	22100
14361300	319	533	693	912	1090	1270
14362000	6710	13300	18700	26600	33300	40600
14363000	4940	9770	13800	19900	25000	30700
14366000	9110	18700	26700	38900	49200	60500
14368500	410	937	1430	2230	2960	3800
14369800	228	348	431	538	620	702
14370000	2600	4070	5110	6470	7520	8580
14370200	180	319	427	580	704	837
14371500	1690	2840	3680	4810	5690	6600
14372300	106000	182000	236000	308000	363000	418000
14372500	4190	6340	7790	9630	11000	12400
14375000	3200	6150	8530	11900	14800	17800
14375500	5840	8280	9810	11700	13000	14200
14377000	24800	38100	47000	58200	66500	74600
14377500	1950	3500	4680	6330	7640	9030
14377800	157	227	273	329	370	410
14378000	54400	78600	94100	113000	127000	140000

Table 4.–Discharges for selected flood-frequencies at gaging stations–continued

Station number	Peak discharge, in cubic feet per second, for selected exceedance probabilities (indicated recurrence interval)					
	0.50 (2-yr)	0.20 (5-yr)	0.10 (10-yr)	0.04 (25-yr)	0.02 (50-yr)	0.01 (100-yr)
(4) HIGH CASCADES REGION						
14134000	290	444	559	717	846	982
14134500	1380	2100	2620	3320	3860	4420
14145690	12	37	69	135	209	313
14147400	36	80	124	199	271	360
14158250	35	60	79	106	129	153
14158500	1470	2030	2410	2900	3270	3640
14208500	503	712	855	1040	1180	1320
14208850	64	93	113	139	159	179
14209000	1680	2430	2960	3660	4210	4780
14209100	49	76	95	120	140	161
14327490	177	253	307	381	438	498
14327500	2250	3070	3640	4390	4970	5560
14328000	4790	7620	9880	13200	16000	19200
14330500	735	1110	1380	1760	2060	2380
14331000	171	286	377	510	622	745
14332000	1050	1870	2560	3610	4530	5590
14333000	909	1510	1990	2700	3300	3960
14333500	569	1130	1680	2620	3550	4720
14335000	9040	15300	20300	27900	34400	41600
14335500	818	1590	2320	3560	4750	6210
14337500	3420	5540	7170	9460	11300	13400
14339500	104	116	124	132	138	144
14341500	1130	2290	3310	4910	6330	7950
14342500	121	143	154	167	176	183
14343000	247	421	573	812	1030	1290
14347000	3100	4850	6130	7880	9270	10700
14353000	92	267	467	847	1240	1760
14353500	94	278	491	900	1330	1890