MAGNITUDE AND FREQUENCY OF FLOODS IN CALIFORNIA

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CONTENTS

ILLUSTRATIONS

CONTENTS

TABLES

CONVERSION FACTORS

For readers who prefer metric units rather than English units, the conversion factors for the terms used in this report are listed below. The empirical relations presented in the text were developed in English units and cannot be used with metric units without first deriving the metric equivalent of the regression constant.

Multiply English unit	*By*	*To obtain metric unit*
acres	4.047×10^{-3}	km^2 (square kilometers)
acre-ft (acre-feet)	1.233×10^{-3}	hm^3 (cubic hectometers)
ft (feet)	3.048×10^{-1}	m (meters)
ft^3 (cubic feet)	2.832×10^{-2}	m^3 (cubic meters)
ft^3/s (cubic feet per second)	2.832×10^{-2}	m^3/s (cubic meters per second)
$(ft^3/s)/mi^2$ (cubic feet per second per square mile)	1.093×10^{-2}	$(m^3/s)/km^2$ (cubic meters per second per square kilometer)
in (inches)	$2.540 \times 10^{+1}$	mm (millimeters)
mi (miles)	1.609	km (kilometers)
mi^2 (square miles)	2.590	km^2 (square kilometers)

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ABSTRACT

The magnitude and frequency of floods from gaged and ungaged drainage areas in California, for any recurrence interval from 2 to 100 years, can be estimated by use of the method presented. Equations relating flood magnitudes of selected frequency to basin characteristics such as drainage area, precipitation, and altitude were developed for six regions in the State. Nomographs are included for solution of the equations. The regression equations were developed for streams that have natural flow or flows not substantially affected by storage.

Annual flood peak discharges for more than 700 streamflow stations with records generally for 10 years or more, including more than 340 stations on streams with basins smaller than 10 square miles, were analyzed with respect to several drainage-basin characteristics. The drainage-basin areas ranged in size from 0.01 to 9,020 square miles. Maximum known peak discharges are shown and their relation to drainage area defined. Discharge rates greater than 1,000 cubic feet per second per square mile resulting generally from summer storms were observed in only 25 basins smaller than 25 square miles, most of which are in southern California or in desert areas.

Data on basin characteristics used in the regression analyses, in addition to those applicable to the regional equations, are tabulated to provide pertinent basic information for use in other studies and evaluations. Some adjustments to the estimated peak discharges for urbanization effects, based on flood-peak ratios for developed and undeveloped areas, are suggested.

INTRODUCTION

Studies of flood magnitude and frequency in California, based on the analysis of available streamflow records, have provided information generally applicable for streams with drainage areas greater than 10 mi^2. A need has existed, however, for information on the magnitude and frequency of floods in small streams--streams with drainage areas generally less than 25 mi^2, and particularly less than 10 mi^2. The determination of flood frequency for these small streams has been hampered by lack of adequate hydrologic data.

Collection of flood data for small streams was expanded beginning in October 1958 under a cooperative program between the U.S. Geological Survey and the California Department of Water Resources, the California Division of Highways (now Department of Transportation), the U.S. Forest Service, and the Federal Highway Administration.

Peak-discharge data for the streams and sites included in the study are available in the annual reports, "Water Resources Data for California," the water-supply-paper series, "Surface-Water Supply of the United States, Parts 10 and 11," and the report, "Floods From Small Drainage Areas in California, A Compilation of Peak Data, October 1958 to September 1973," (Waananen, 1973).

Purpose and Scope

This report describes methods for evaluating the magnitude and frequency of floods at gaged and (or) ungaged sites in California. The purpose is to provide a base for the study of floods and the review and extension of flood magnitude-frequency relations by agencies and individuals who are concerned with the management and control of floods, highway construction, and other related work.

The small streams program has provided flood information for about 300 streams. The records range in length from 10 to 15 years. Other data-collection programs have provided information for nearly 120 additional small streams. These data supplement the records previously available for about 70 small streams.

Streamflow records indicate that the wide range of climatic and topographic conditions in California produces wide variations in watershed response to precipitation. Documentation of some of the extreme hydrologic responses has been provided by records of long duration or by measurements of unusually large floods. Records at least 10 years in length generally may be reasonably representative of discharge at many sites. In the absence of such records, procedures such as those presented herein provide means for estimating flood potential. The relations presented are not applicable to regulated streams or to streams where the natural flow regimen has been significantly altered.

The flood-frequency technique presented herein was derived from analysis of annual flood-peak discharges for 705 stations with records ranging in length from 5 to 87 years. The drainage areas ranged from 0.01 to 9,020 mi^2. The principal difference between this study and previous studies is the additional data available for small streams.

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

Previous Studies

A series of reports entitled "Magnitude and Frequency of Floods in the United States" was published by the U.S. Geological Survey as water-supply papers. These reports provided summaries of flood data and presented methods for determining flood magnitude and frequency at ungaged sites. Data and methods for the Great Basin (Part 10) are given in Water-Supply Paper 1684 (Butler and others, 1966). Data and methods for the Pacific slope basins in California (Part 11) are presented in two parts by Young and Cruff (1967)--coastal basins south of the Klamath River basin and Central Valley drainage from the west are reported in Water-Supply Paper 1685 and those for the Klamath and Smith River basins and Central Valley drainage from the east are reported in Water-Supply Paper 1686. The applications of these methods are limited to the range of the data and generally to drainage basins greater than 10 mi^2 in area.

An analysis of the magnitude and frequency of floods, as well as other streamflow characteristics, was included in the Geological Survey open-file report, "A Proposed Streamflow Data Program for California," (Crippen and Beall, 1970). Data for selected streams, available as of September 1967, obtained at 385 sites were included in the evaluation; nearly one-fourth of these sites had drainage basins less than 25 mi^2 in area.

Waananen (1973) summarized annual peak-discharge data for small streams with drainage basins less than 25 mi^2 for 1958-73.

ESTIMATION OF DESIGN FLOW

Method

A method for estimating peak discharge, or design flow, at selected recurrence intervals at sites on streams in California is outlined below. The procedure is based on regional flood-frequency analysis and is subject to the limitations described herein.

1. Locate the site on the map in figure 5 at the end of the report and determine from tables 5 and 6 at the end of the report if a streamflow record has been obtained nearby on the same stream, or on nearby streams. Note also the flood-frequency region in which the site is located.

2. If a record exists for the site being studied, or nearby on the same stream, check table 5 for peak discharge at the desired recurrence interval at the gaged site and table 6 for the length of record and the maximum peak discharge of record. Frequency analysis of a long-term station record (more than 20 years) usually provides the best estimate of the flood-producing characteristics of a basin. Then:

a. If a gaged site is nearby

(1) Use the gaged data directly as equivalent to that at the site when the drainage-area difference is small (usually less than 5 percent) and a relatively long record is available; or

(2) Adjust the peak discharge for the difference in drainage area by using the relation $Q_u = Q_g (A_u/A_g)^b$ where Q_u and Q_g are the discharges at the ungaged and gaged sites, A_u and A_g are the drainage areas, and b is an exponent, the value for which can be selected from the exponents for the drainage area (A) given in the equations in table 1; or

b. If no gaged site is reasonably nearby, or if the available records are short, compute the peak discharge values from the applicable regional flood-frequency equations in table 1, as outlined in step 3. Data on basin characteristics are given in table 5.

3. a. For ungaged streams, or sites not near a gage, inspect the applicable regional equations in table 1, note which basin characteristics are needed, and determine the appropriate values, as follows:

Drainage area (A), in square miles, is determined by outlining on the best available topographic map, usually U.S. Geological Survey 7½- or 15-minute map sheets, the surface-water divide upstream from the point of interest and determining the area by planimetering.

Mean annual precipitation (P), in inches, is determined by evaluating the average precipitation over the outlined drainage area using an isohyetal map such as the map "Mean Annual Precipitation in the California Region" prepared by Rantz (1969).

Altitude index (H), in thousands of feet, is computed as the average of the altitudes at points along the main channel of the stream 10 and 85 percent of the distance from the site to the basin divide, as outlined on the topographic map.

b. Compute the peak discharge for the desired recurrence intervals directly through use of the appropriate regional equations or the nomographs in figures 6-15 at the end of the report.

4. Check the estimated peak discharge values, particularly for the longer recurrence intervals, for reasonableness by comparing them with the maximum peak discharge of record for nearby streams (table 6) and the maximum discharge in relation to drainage area (fig. 1). Comparison of station-frequency values with regional computed values for nearby gaged streams provides further evaluation of the station versus regional relations in the vicinity.

5. Peak discharge values for recurrence intervals between 2 and 100 years other than 2, 5, 10, 25, 50, and 100 years can be determined by plotting station values determined from table 5, or values computed from the equations, on probability paper as a function of the frequency and drawing a smooth curve through the points. Peak discharge for the desired recurrence interval, or the return period for a given peak discharge, can then be estimated from the curve.

6. Investigate further to determine if adjustments of the discharge values are necessary because of urbanization, fires, or other effects. Techniques for some adjustments, or evaluation of the possible magnitudes of the effects, are discussed briefly in the section on "Augmented Flood Discharge."

7. Peak discharge for basins smaller than about 200 acres may also be estimated reasonably by the Rational Method (Wright-McLaughlin Engineers, 1969) described in textbooks and manuals. The Rational Method, however, has some limitations, and the frequency or return period of the computed discharge is assumed to be that for the rainfall period used.

TABLE 1.--*Regional flood-frequency equations*

[Q = Peak discharge, subscript indicates recurrence interval, in years; A = Drainage area in square miles; P = Mean annual precipitation in inches; H = Altitude index in thousands of feet]

NORTH COAST REGION[1]

$$Q_2 = 3.52\, A^{0.90} P^{0.89} H^{-0.47} \quad (1)$$
$$Q_5 = 5.04\, A^{0.89} P^{0.91} H^{-0.35} \quad (2)$$
$$Q_{10} = 6.21\, A^{0.88} P^{0.93} H^{-0.27} \quad (3)$$
$$Q_{25} = 7.64\, A^{0.87} P^{0.94} H^{-0.17} \quad (4)$$
$$Q_{50} = 8.57\, A^{0.87} P^{0.96} H^{-0.08} \quad (5)$$
$$Q_{100} = 9.23\, A^{0.87} P^{0.97} \quad (6)$$

NORTHEAST REGION[2]

$$Q_2 = 22\, A^{0.40} \quad (7)$$
$$Q_5 = 46\, A^{0.45} \quad (8)$$
$$Q_{10} = 61\, A^{0.49} \quad (9)$$
$$Q_{25} = 84\, A^{0.54} \quad (10)$$
$$Q_{50} = 103\, A^{0.57} \quad (11)$$
$$Q_{100} = 125\, A^{0.59} \quad (12)$$

SIERRA REGION

$$Q_2 = 0.24\, A^{0.88} P^{1.58} H^{-0.80} \quad (13)$$
$$Q_5 = 1.20\, A^{0.82} P^{1.37} H^{-0.64} \quad (14)$$
$$Q_{10} = 2.63\, A^{0.80} P^{1.25} H^{-0.58} \quad (15)$$
$$Q_{25} = 6.55\, A^{0.79} P^{1.12} H^{-0.52} \quad (16)$$
$$Q_{50} = 10.4\, A^{0.78} P^{1.06} H^{-0.48} \quad (17)$$
$$Q_{100} = 15.7\, A^{0.77} P^{1.02} H^{-0.43} \quad (18)$$

CENTRAL COAST REGION

$$Q_2 = 0.0061\, A^{0.92} P^{2.54} H^{-1.10} \quad (19)$$
$$Q_5 = 0.118\, A^{0.91} P^{1.95} H^{-0.79} \quad (20)$$
$$Q_{10} = 0.583\, A^{0.90} P^{1.61} H^{-0.64} \quad (21)$$
$$Q_{25} = 2.91\, A^{0.89} P^{1.26} H^{-0.50} \quad (22)$$
$$Q_{50} = 8.20\, A^{0.89} P^{1.03} H^{-0.41} \quad (23)$$
$$Q_{100} = 19.7\, A^{0.88} P^{0.84} H^{-0.33} \quad (24)$$

SOUTH COAST REGION

$$Q_2 = 0.14\, A^{0.72} P^{1.62} \quad (25)$$
$$Q_5 = 0.40\, A^{0.77} P^{1.69} \quad (26)$$
$$Q_{10} = 0.63\, A^{0.79} P^{1.75} \quad (27)$$
$$Q_{25} = 1.10\, A^{0.81} P^{1.81} \quad (28)$$
$$Q_{50} = 1.50\, A^{0.82} P^{1.85} \quad (29)$$
$$Q_{100} = 1.95\, A^{0.83} P^{1.87} \quad (30)$$

SOUTH LAHONTAN-COLORADO DESERT REGION[2]

$$Q_2 = 7.3\, A^{0.30} \quad (31)$$
$$Q_5 = 53\, A^{0.44} \quad (32)$$
$$Q_{10} = 150\, A^{0.53} \quad (33)$$
$$Q_{25} = 410\, A^{0.63} \quad (34)$$
$$Q_{50} = 700\, A^{0.68} \quad (35)$$
$$Q_{100} = 1080\, A^{0.71} \quad (36)$$

[1]In the North Coast region use a minimum value of 1.0 for the altitude index (H).

[2]These equations are defined only for basins of 25 mi^2 or less in area.

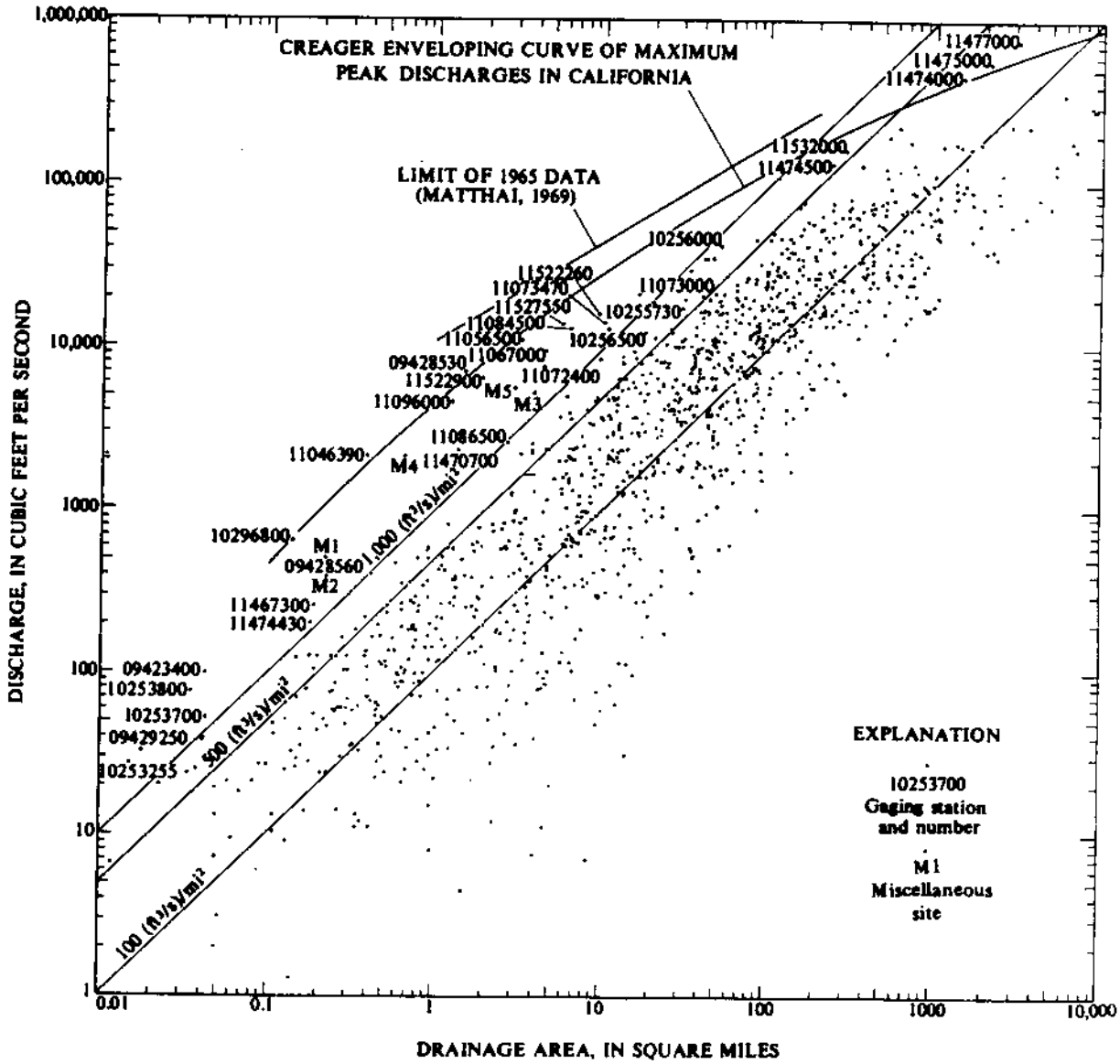

FIGURE 1.--Maximum peak discharges in relation to drainage area.

Maximum Peak Discharge

An evaluation of the relative magnitude and the credibility of peak discharge estimates at ungaged sites can be obtained by comparison with known maximum peak discharges. The magnitude and frequency of flood discharges in California vary widely throughout the State owing to variations in the hydrologic environment. Information about the maximum floods of record in the several hydrologic regions thus provides a basis for estimating flood potential at ungaged sites. The maximum known peak discharge in an area, for example, could be used as a design flow or as a basis for comparison with that of floods of selected frequency estimated by magnitude-frequency techniques.

The relative magnitude of peak discharge in California is indicated in figure 1. Virtually all available data for drainage basins smaller than about 25 mi^2 are included in the plotted data, together with significant maximum peak discharge values for basins as large as 9,020 mi^2 in area. These data include the values listed in table 6, the maximum discharges of record for many other streams, and selected large flood-discharge values determined at miscellaneous sites.

Discharges shown for basins less than 25 mi^2 in area are representative of natural flow, with little or no regulation by lakes and reservoirs. The data for many of the large basins in the State relate to floods that occurred prior to substantial development of storage and diversions, and thus may be indicative of the flood-producing potential. In other basins, the extensive long-term development of the water resources would preclude determination of natural-flow conditions, but the peak discharges in those streams still are of substantial magnitude and should be considered in the overall analysis of peak discharge.

Lines designating peak discharge at rates of 100, 500 and 1,000 $(ft^3/s)/mi^2$ are shown on the graph (fig. 1) to identify unit-discharge relations. The data plotted show the wide range in the peak discharge recorded. For drainage areas smaller than 100 mi^2 only those stations with maximum discharge of record greater than the highest of these rates have been identified by station number. For drainage areas greater than 100 mi^2 selected stations with high maximum unit discharge have been identified.

Peak discharge exceeded the lowest of these rates in about 65 percent of those basins smaller than 25 mi^2, exceeded the highest rate in 4 percent of the basins, and exceeded 5,400 $(ft^3/s)/mi^2$ at a site with a drainage area of 0.39 mi^2. Seventeen of the 25 basins with peak discharge greater than the highest rate are in southern California or in desert areas, and the greater intensities generally are associated with summer storms. Peak discharge exceeded the intermediate rate in several basins larger than 25 mi^2 in area but did not exceed the highest rate in any of these basins.

For comparative purposes a curve showing the limit of flood discharge observed through 1965 (Matthai, 1969) is shown in figure 1 together with the Creager (Creager and others, 1945, p. 125) enveloping curve. The equation for the Matthai curve is $Q = 11{,}000\ A^{0.61}$ for drainage areas less than 200 mi^2. The equation for the Creager enveloping curve is:

$$Q = 46CA^{(0.894\ A^{-0.048})}$$

or its equivalent

$$q = 46CA^{(0.894\ A^{-0.048}-1)}$$

where Q is the discharge, in cubic feet per second
q is the unit discharge, in cubic feet per second
C is a coefficient dependent on the drainage basin characteristics when A, the drainage area, is given in square miles.
A value of 100 for the coefficient, C, seems appropriate for California, and was used for the Creager enveloping curve shown in figure 1.

The Creager enveloping curve provides an estimate of the maximum peak discharge that might be expected for drainage areas generally less than 1,000 mi^2. Flood discharges have exceeded the limits indicated by the Creager enveloping curve in several basins greater than 1,000 mi^2.

Illustrative Problems

The estimation of peak discharge is illustrated by the following problems:

Problem 1

Required: Peak discharge of the 50-year flood (Q_{50}) at a site at about lat 40°11'N., long 123°46½'W., in north-coastal California (site is on the South Fork Eel River near Miranda).

Solution: Locate the site on the map in figure 5 and check for nearby gaged sites. Note the applicable flood-frequency region (fig. 5) and the basin characteristics used in the regional equations (table 1). For this problem the site is in the North Coast region downstream from site 107 (station 11476500, South Fork Eel River near Miranda). Then:

1. Determine the size of the contributory drainage area (A), or the intervening area between the site and the nearest gaged site.

2. For nearby gaged site (site 107) check available station flood-frequency data (table 5), the maximum peak discharge recorded, and the length of record (table 6). These are:

   Drainage area (table 5)----------537 mi^2
   50-year peak discharge (table 5)------172,000 ft^3/s
   Maximum peak discharge (table 6)------199,000 ft^3/s
   Length of record (table 6)----------35 years

3. Assume intervening area downstream from site 107 to be 15 mi^2 which increases the drainage area at the site less than 5 percent. The record length is more than half that of the desired recurrence interval. Therefore, use the value of Q_{50} determined for the gaged site. Thus:

$$Q_{50} = 172{,}000 \text{ ft}^3/\text{s}$$

Problem 2

Required: Peak discharge of the 50-year flood (Q_{50}) at a site at about lat 40°05½'N., long 123°48'W., in north-coastal California. This is on the South Fork Eel River upstream from gaged site 107 (station 11476500) and at the site of the former gaging station at Garberville (station 11476000) for which the drainage area is 468 mi^2.

Solution: The drainage area at the site is more than 5 percent smaller than the 537 mi^2 at gaged site 107 (see problem 1). As the record length at site 107 is sufficient for use of the station data determine the discharge value desired by using the drainage-area relation $Q_u = Q_g(A_u/A_g)^b$ in which Q_u is the Q_{50} at Garberville, Q_g is the Q_{50} at site 107 (172,000 ft^3/s, table 5), and b is 0.87, the exponent for A in the equation in table 1. Thus:

$$Q_{50}(\text{Garberville}) = 172{,}000(468/537)^{0.87} = 153{,}000 \text{ ft}^3/\text{s}$$

Problem 3

Required: Peak discharge of the 25- and 50-year floods (Q_{25} and Q_{50}) at a site on a small stream on the west slope of the Sierra Nevada at about lat 38°55'N., long 121°05'W., (near Auburn).

Solution: Locate the site on the map in figure 5, check for nearby gaged sites, and note the applicable flood-frequency region (fig. 5) and the basin characteristics used in the regional equations (table 1). For this example, assume the site is on an ungaged stream, with no gaged streams nearby. Then:

1. As the site is in the Sierra region (fig. 5), determine the basin characteristics needed (table 1) as follows:

   a. Determine the drainage area (A).
   b. Determine the mean annual precipitation (P).
   c. Determine the altitude index (H).

2. Compute the desired flood values from the equations (table 1, equations 16 and 17) or the nomographs (figs. 9 and 10). For this example, assume A is 5.0 mi^2, P is 30 in, and H is 1.4 thousands of feet. Then:

(Eq. 16) $Q_{25} = 6.55A^{0.79}P^{1.12}H^{-0.52} = 6.55(5.0)^{0.79}(30)^{1.12}(1.4)^{-0.52}$

$= 885$ ft^3/s

Nomograph (fig. 9) $= 890$ ft^3/s

(Eq. 17) $Q_{50} = 10.4A^{0.78}P^{1.06}H^{-0.48} = 10.4(5.0)^{0.78}(30)^{1.06}(1.4)^{-0.48}$

$= 1{,}140$ ft^3/s

Nomograph (fig. 10) $= 1{,}140$ ft^3/s

Problem 4 (Effect of urbanization)

Required: Peak discharge at the site in problem 3 for the 25- and 50-year floods (Q_{25} and Q_{50}) as affected by urbanization when 60 percent of the basin is developed and 50 percent of the channels are sewered or lined.

Solution: Urbanization effects are discussed in the section on "Urban Development," and adjustments for these effects are given in figure 4. Thus:

1. From figure 4-d, using values of 60 percent developed and 50 percent of the channels sewered, obtain the corresponding adjustment coefficient for Q_{25} of 1.60. From figure 4-e obtain a similar coefficient for Q_{50} of 1.50.

2. Multiply the natural discharge values determined in problem 3 by these coefficients to obtain the required adjusted discharges.

Q_{25}(Urb) = Q_{25}(Nat) × 1.60 = 885 × 1.60 = 1,420 ft^3/s

Q_{50}(Urb) = Q_{50}(Nat) × 1.50 = 1,140 × 1.50 = 1,710 ft^3/s

Problem 5

Required: The probable recurrence interval for a peak discharge of 1,000 ft^3/s that occurred at an ungaged site on a small stream in the Central Coast region. The basin characteristics at the site are:

Drainage area----------5.0 mi^2
Mean annual precipitation----------30 in
Altitude index----------1.2 thousands of feet

Solution: The first step is to prepare a flood discharge-frequency curve for this basin.

1. Substitute the given values of area, precipitation, and altitude index in the regional equations for the Central Coast region (table 1, equations 19-24), or in the nomographs (figs. 11 and 12). The discharge values so determined will be:

		Equation	Nomograph
Q_2	(19)	124 ft^3/s	-
Q_5	(20)	336 ft^3/s	-
Q_{10}	(21)	528 ft^3/s	530 ft^3/s
Q_{25}	(22)	808 ft^3/s	810 ft^3/s
Q_{50}	(23)	1,060 ft^3/s	1,050 ft^3/s
Q_{100}	(24)	1,330 ft^3/s	1,360 ft^3/s

2. Plot these discharge values on probability graph paper as a function of their recurrence interval, and draw a smooth curve through the plotted points (fig. 2).

3. Select from the curve the recurrence interval corresponding to the peak discharge of 1,000 ft^3/s.

Recurrence interval----------44 years

Comment: The discharge-frequency curve may be used also to estimate the discharge for any recurrence interval from 2 to 100 years.

A discharge-frequency curve determined in this manner represents the relation based on regional analysis. Station discharge-frequency curves may be prepared in a similar manner using the discharge for selected recurrence intervals obtained directly from the station data (table 5).

Problem 6

Required: Determine the peak discharge of the 25- and 100-year floods (Q_{25} and Q_{100}) for a site on a small stream in the South Lahontan-Colorado Desert region at about lat 35°11'N., long 117°00'W., (near Barstow).

Solution: Locate the site on the map in figure 5, check for nearby gaged sites, and note the applicable flood-frequency equations for the region (table 1). The equations indicate that peak discharges are related only to the drainage area. Then:

1. Determine the drainage area (A). For this example, assume drainage area is 2.0 mi^2.
2. Compute the desired peak discharge values from the regional equations (table 1, equations 34 and 36), or the nomographs (fig. 15), as:

(Eq. 34) $Q_{25} = 410A^{0.63} = 410(2.0)^{0.63} = 634$ ft^3/s; nomograph, 635 ft^3/s
(Eq. 36) $Q_{100} = 1{,}080A^{0.71} = 1{,}080(2.0)^{0.71} = 1{,}770$ ft^3/s; nomograph, 1,770 ft^3/s

3. For comparison, data at nearby site 751 (station 10262600, Boom Creek near Barstow) show the following:

Drainage area (table 5)	0.24 mi^2
Maximum discharge (table 6)	125 ft^3/s
Length of record	15 years
Q_{25} from station record (table 5)	114 ft^3/s
Q_{25} computed from equation	167 ft^3/s
Q_{100} from station record (table 5)	188 ft^3/s
Q_{100} computed from equation	392 ft^3/s

Comment: The regional equations, though based on relatively short records (as much as 15 years) provide estimates of flows for the longer recurrence intervals. Many notable floods have been recorded, and floods with comparable unit peak-discharge rates might be expected at almost any desert site.

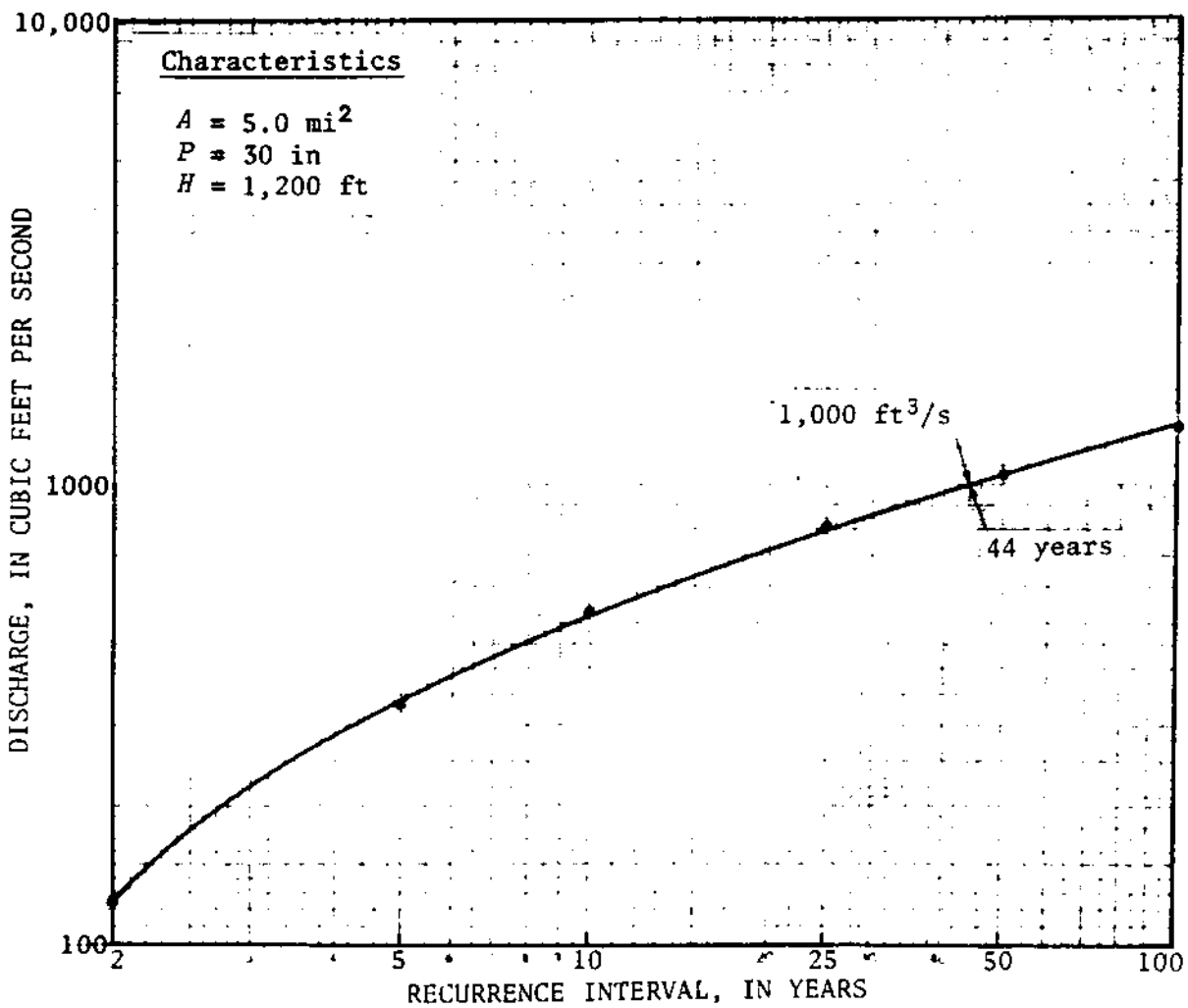

FIGURE 2.--Flood frequency by regional analysis in a basin in the Central Coast region.

Limitations

Regional analysis of flood frequency provides a means for extending use of flood data collected at gaging stations to ungaged sites. Use of the flood-frequency relations, however, is subject to some limitations.

The equations are applicable only to sites within the flood-frequency regions for which they were derived and on streams with virtually natural flows. In the regression analyses, basins necessarily were assigned to single regions only, despite probable gradation in flood discharge in transition zones between regions.

The relations are not applicable to sites where the usable storage within the basin exceeds 4.5 million cubic feet (103 acre-ft) per square mile, to sites just downstream from large reservoirs even though the storage requirements are not exceeded, or to streams in urban areas affected substantially by urban development. In urban areas, however, the relations can be used to determine peak discharge values for flow under natural conditions, which then would be adjusted by use of the techniques described in the section on urban development.

The relations also are not generally applicable to small basins on the floor of the Sacramento and the San Joaquin Valleys (fig. 5) as the annual peak data were obtained principally in the adjacent mountain and foothill areas. The hydraulic and hydrologic characteristics of the valley lands have been modified extensively by grading, leveling, and installation of agricultural irrigation systems. Values determined from the regression equations for these areas may be misleading or erroneous.

The relations were derived on the basis of hydrologic and physical characteristics that ranged within limits imposed by the available data. The limits for area, precipitation, and altitude, as used in the regional equations, are:

Region	Drainage area (mi^2)	Mean annual precipitation (in)	Altitude index (thousands of ft)
North Coast	0.13-3,113	19-104	[1]0.2-5.7
Northeast	.06-24.8		
Sierra	.14-9,020	7-85	.1-9.7
Central Coast	.17-4,156	8-52	.1-2.4
South Coast	.15-644	7-40	
South Lahontan-Colorado Desert	[2].01-89.9		

[1]Use minimum value of 1.0
[2]Use upper limit of 25 square miles

The suggested procedures for defining flood-frequency relations are valid for sites for which the physical and hydrologic characteristics, with two exceptions as noted, have values within the limits given above; use under any other conditions may lead to erroneous results. The methods should be used only for flood magnitude-frequency definition for recurrence intervals ranging between 2 and 100 years.

FLOOD-FREQUENCY ANALYSIS

The multiple-regression technique was used to define regional flood magnitude-frequency relations. Cruff and Rantz (1965) found this procedure, described by Benson (1962 and 1964), to be more suitable than the index-flood method for use in coastal California. In the regression procedure relations are established between sets of independent variables that describe physical and climatic characteristics and corresponding sets of dependent variables describing floods. The results are expressed as a set of equations that can be used to estimate the flow characteristics at ungaged sites.

Drainage Basin Characteristics

The basin and climatic characteristics measured and used in the initial analysis of data are described in the following paragraphs. Many other characteristics and variations were considered and rejected including: Basin geology, basin shape, and soils, which affect basin response to precipitation; basin aspect or orientation; latitude; and variability of precipitation in selected months such as March or August. Some of these characteristics were not amenable to uniform interpretation or numerical description, and previous studies had not shown others to be significant as indicators of flow characteristics. Data for the rejected characteristics are on file in the California District Office, Water Resources Division, U.S. Geological Survey, Menlo Park, Calif.

Drainage basin characteristics defined for this study are:

Drainage area (A), in square miles, is the total contributing drainage area upstream from the gaging-station site, as planimetered on current topographic map sheets, and is that shown in the latest U.S. Geological Survey reports.

Mean annual precipitation (P), in inches, was determined from an isohyetal map "Mean Annual Precipitation in the California Region," compiled by Rantz (1969) from U.S. Weather Bureau, now (1977) National Weather Service, data and data from other sources.

Precipitation intensity index (I), in inches, is the 2-year 24-hour precipitation, taken from a map in U.S. Weather Bureau Technical Paper No. 40 (1961).

Mean annual potential evapotranspiration (E), in inches, is taken from a map in U.S. Weather Bureau Technical Paper No. 37 (1959) showing average annual lake evaporation.

Main channel slope (S), in feet per mile, is the slope between two points 10 and 85 percent of the distance from the gaging-station site to the basin divide (main channel length) and is computed by dividing the difference in altitude, in feet, by the distance, in miles, between these two points (Benson, 1964).

Main channel length (L), in miles, is the length of the main channel between the gaging station and the basin divide measured, on the best available topographic maps, along the channel which drains the largest basin.

Altitude index (H), in thousands of feet, is computed as the average of the altitudes at the 10- and 85-percent points along the main channel used to compute channel slope. The altitude index of some basins for which the average basin altitude (not average channel altitude) had been determined in previous studies was computed as 0.9 times the average basin altitude on the basis of comparative data for about 20 basins.

Surface-storage index (W), in percent, is the percentage of the basin area occupied by lakes and marshes, as shown on and determined from 7½- or 15-minute topographic maps.

Forest-cover index (F), in percent, is the percentage of the basin covered by brush or trees, as determined from the extent of the green overprint (for vegetation) shown on U.S. Geological Survey topographic maps.

The values of these basin characteristics available for the 778 stations considered in this study are listed in table 5; the location of the sites (by map number) is given in figure 5. Information is included for all crest-stage gages operated under the small-streams program (Waananen, 1973), even though 73 of the sites were not included in the flood-frequency analyses owing to lack of sufficient data.

Magnitude and Frequency of Floods at Gaged Sites

Annual peak discharges for basins in which flows occur under virtually natural conditions are the basic dependent variables used in this study. For planning and design of structures and hydraulic facilities and evaluation of flood potential, however, these peaks need to be interpreted in terms of frequency of occurrence. A statistical procedure, as prescribed by the U.S. Water Resources Council (1967, 1976) for use by Federal agencies, was used for this interpretation. For each station, the logarithms of the annual peaks were used to compute a mean, standard deviation, and skew coefficient that describes a Pearson Type III distribution. This distribution then provides an estimate of the annual flood discharge that would be exceeded, on the average, once over given periods of time (or recurrence intervals). For each station the log-Pearson Type III magnitude-frequency relation and the annual peak discharge series relation using the recorded peak data were plotted. These relations were compared and analyzed for conformity with community experience. The relations for a few stations were adjusted for better fit with the recorded data after evaluation of outliers representing unusual flood discharge, historical peaks, and years of low peaks or no discharge.

Flood peak discharge values, computed in accordance with the U.S. Water Resources Council Bulletin 17 (1976), for selected recurrence intervals at 705 sites used in the regression analyses are listed, by flood-frequency region, in table 5. Records available at these sites generally are for 10 or more years of either unregulated flow or flow that could be adjusted to natural conditions. No adjustments have been made in the short-term records by cross-correlation with long-term records. The flood peak values in table 5 thus are based on the actual data available for the period of record at each site, using a fixed skew or the observed skew for sites with long records. No records were extended by simulation or other precipitation-runoff studies as preliminary studies were inconclusive, and long-term records were available for many streams. Selected flood values for some sites with less than 10 years of record are included to improve areal coverage.

Multiple-Regression Procedure

Use of multiple-regression analysis in flood magnitude-frequency studies permits development of regression equations expressing flood magnitude as a function of the physical and hydrologic characteristics of the basins. Past experience has shown that the logarithms of peak discharge are linearly related to the logarithms of most hydrologic variables. The relation may be expressed by the mathematical model

$$Q_T = K\, C_1^a\, C_2^b\, C_3^c \ldots$$

in which Q_T is the discharge for a selected recurrence interval; K is a regression coefficient; C_1, C_2, and C_3 are basin characteristics; and a, b, and c are exponents. Linear regression equations are derived by correlating the logarithms of T-year discharges with the logarithms of corresponding characteristics for all sites used in the analysis.

As an example, the equation with the lowest standard error for the 10-year flood peak discharge for basins in the North Coast region of California that contains all the independent variables significant at the 5-percent level is

$$Q_{10} = 6.21A^{0.88}P^{0.93}H^{-0.27} \qquad \text{(Table 1, equation 3)}$$

in which Q_{10} is the 10-year peak discharge, in cubic feet per second. Further improvement in the regression results through use of additional hydrologic variables was minor. The following table shows the slight improvement indicated by the multiple-correlation coefficient and the standard error of estimate. Mean annual potential evapotranspiration (E) was found to be barely significant at the 1-percent level, but was not found significant in the relations for other recurrence intervals and was not included in the final equations.

Hydrologic characteristics	Multiple-correlation coefficient	Standard error of estimate (log units)	Standard error of estimate (percent)
A	0.971	0.275	67.6
A, P	.976	.249	60.5
A, P, H	.979	.237	57.3
A, P, H, E	.980	.230	55.5
A, P, H, E, I	.981	.227	54.7
A, P, H, E, I, S	.981	.228	54.9
A, P, H, E, I, S, L	.981	.229	55.2

Regional Analysis

The diversity of climate, terrain, and geology within California creates a wide variation in hydrologic response. This is reflected in the flood magnitude-frequency relations and precludes development of a single set of flood-frequency equations that are applicable statewide.

An initial statewide regression for the 2-year flood using data from 705 stations provided a basis for regionalization. Mapping the deviations of the flood value for each station from the value computed using the statewide regression equation suggested regional patterns that almost coincided with regional divisions developed from previous studies. The boundaries of the flood-frequency regions thus differentiated are shown in figures 3 and 5. These boundaries are delimited by physiographic factors associated with floods. They are arbitrary, with broad transition zones between regions, and generally do not follow topographic drainage divides. The western boundary of the Sierra region, for example, is shown along the Sacramento and part of the San Joaquin Rivers, the axis of the Central Valley. The eastern boundaries of several regions extend to the east-side foothill zones of the mountain ranges included in the regions. The location of the latter boundaries may be attributed to the effects of heavy precipitation in the mountain areas and of storm precipitation carried over the divides.

The flood-frequency regions can be described as follows:

North Coast region.--The North Coast region includes Sacramento River drainage from the west and coastal basins from San Francisco Bay to the Oregon border, including the lower Klamath River basin downstream from the Shasta River basin. The climate ranges from subhumid to humid, with marked wet and dry seasons. The altitude ranges from sea level to more than 8,000 ft. Floods are caused by winter frontal-type storms that cover large areas, and the peaks generally last only a short time.

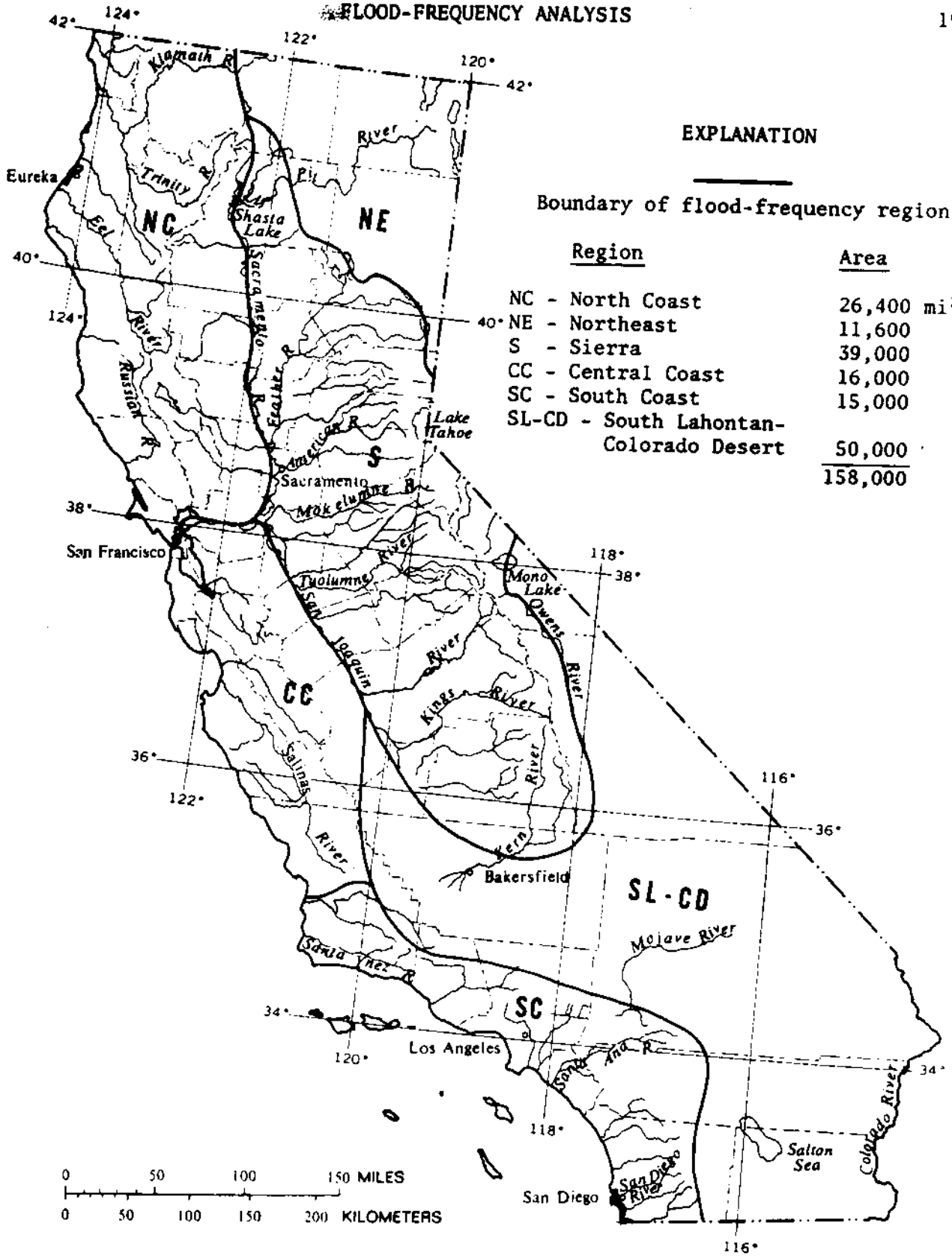

FIGURE 3.--Flood-frequency regions used in this study.

Northeast region.--The Northeast region includes Great Basin streams in California north of the Truckee River basin, the Pit and the upper McCloud river basins upstream from Shasta Lake north and east of Mount Shasta, and the upper Klamath River basin upstream from and including most of the Shasta River basin. The climate ranges from semiarid to subhumid. Altitudes range from less than 2,000 to 10,453 ft. Much of the region is underlain by volcanic rock that, because of substantial capacity for infiltration and storage of water, reduces flood peaks. Floods are caused by general winter frontal-type storms and by spring snowmelt. Flows in the Pit and Klamath Rivers are subject to substantial natural and artificial regulation.

Sierra region.--The Sierra region includes Great Basin streams in California draining the east Sierra Nevada slopes from the west-side tributaries of the Owens River to the Truckee River basin, and streams draining from the east into the Central Valley south of the Pit and McCloud river basins but including the Shasta River basin and Mount Shasta slopes upstream from Shasta Valley. The climate ranges from semiarid to humid with seasonal snow cover in mountain areas. Altitudes range from near sea level in the Central Valley to 14,495 ft. Floods in and south of the American River are caused by spring and summer snowmelt, winter frontal storms, and occasionally by summer thunderstorms. Floods north of the American River are caused by winter frontal-type storms that cause heavy runoff and occasionally by snowmelt.

Central Coast region.--The Central Coast region includes coastal basins that drain into the Pacific Ocean between the Arroyo Grande basin on the south and San Francisco Bay on the north and streams that drain from the west into the San Joaquin Valley. The climate is subhumid with marked wet and dry seasons. Altitudes range from sea level along the coast to about 5,800 ft. Floods are caused by winter frontal-type storms and are generally flashy with peaks lasting only a short time.

South Coast region.--The South Coast region includes the upper basins of streams draining from the west into the Salton Sea and the Mojave Desert, and streams that drain into the Pacific Ocean from the Tijuana River basin at the international boundary to and including the Santa Maria River basin. The climate ranges from semiarid to subhumid. Snow occurs seasonally at high altitudes. Altitudes range from sea level to 11,485 ft. Most of the floods in the region are caused by general winter frontal-type storms that produce heavy runoff from large areas, but floods along the eastern boundary of the region are caused also by local summer thunderstorms. Floods generally are flashy.

South Lahontan-Colorado Desert region.--The South Lahontan-Colorado Desert region includes streams in southeastern California between the international boundary and Mono Lake, except the upper basins of Sierra Nevada streams draining to the Owens River and streams draining into the south San Joaquin Valley from the south and west. The climate is semiarid. Altitudes range from 278 ft below to more than 14,000 ft above sea level. Floods along the western boundary of the region generally are caused by winter frontal-type storms, but annual peaks in the desert regions are the result of summer thunderstorms.

The 705 stations used in the regional regression analyses are distributed among the flood-frequency regions as follows:

Flood-frequency region	Number of stations considered	Number of stations used
North Coast	157	141
Northeast	32	31
Sierra	259	249
Central Coast	113	98
South Coast	148	143
South Lahontan-Colorado Desert	69	43
Total	778	705

The distribution is not equal among the regions or proportional to the respective areas owing to differences in the availability of water and concomitant availability of data, the extent and effect of storage and flow regulation, geographic location, and the status of water demand, development, and use.

The Regression Equations

Regional regression analysis produced equations relating floods for 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals to selected physical and hydrologic characteristics in each of the flood-frequency regions shown in figures 3 and 5.

Drainage area, mean annual precipitation, and the altitude index were used at the selected frequencies to derive regression equations for use in the North Coast, Sierra, and Central Coast region. Drainage area and mean annual precipitation only were used to derive regression equations for use in the South Coast region.

In the Northeast and South Lahontan-Colorado Desert regions the available data were limited to short-term records for streams with basins less than 25 mi^2 in area. In these two regions the regression analysis showed drainage area to be the only significant characteristic.

The regression equations for the six regions are summarized in table 2. The number of stations used to define the equation, the regression coefficient and exponents, and the standard error of estimate, expressed in log units, are shown for each equation. The coefficients and exponents for the regression equations were modified slightly by graphical smoothing to provide for a smooth and orderly increase in flood values with increase in the length of the recurrence interval. The standard error of estimate is a measure of the departure of the computed flood magnitudes from those observed. The regression equations are shown in nomograph form in figures 6-15; use of the nomographs is illustrated in the illustrative problems presented in the section "Estimation of Design Flow." The ranges and critical values of the basin and climatic characteristics used in the regional regression analyses are shown in table 3.

Curves of flood magnitude and frequency may be plotted using values computed from the equations for the appropriate flood-frequency regions or determined from the nomographs (figs. 6-15). These curves can be used to estimate the peak discharge for a given recurrence interval at any site, gaged or ungaged, or to determine the recurrence interval for a given flood (fig. 2).

Discussion of Results

Regionalized frequency equations are convenient and useful for estimating design flows for ungaged sites in the absence of more definitive data from nearby sites, particularly as no single set of equations seems suitable for all-purpose use in California. Regional equations, however, being based on data from many basins and records of variable length and applicable to extensive geographic areas, may not provide a close correlation within all subregions of a flood-frequency region.

An assessment of the accuracy of regionalized estimates of peak flows is provided by the standard error of estimate, a statistical evaluation. The standard error of estimate is a measure of the departure of the estimated flood magnitudes from those observed. Approximately 68 percent of the observed values can be expected to be within one standard error of the estimated value. The standard error of estimate of the equations for each region are shown in table 2.

For a few stations the results of flood-frequency relations estimated by the regional method will differ considerably from values obtained by single-station analysis. For some stations the records, when used in a single-station analysis, may be too short to reflect long-term conditions. Other stations may reflect local anomalies or variations in physical and hydrologic characteristics that influence the basin response to storm precipitation. Intense short-term storms often may affect only individual small basins and have little impact on adjacent basins. Wide variations in the relation between the estimated and observed peak discharge from adjacent or nearby drainage areas thus may be anticipated.

TABLE 2.--*Summary of regional regression equations for peak discharges*

[Equations are of the general form $Q_{RI} = K A^a P^b H^c$, with items P and H omitted when not of significant value]

Recurrence interval, in years	Coefficient	Exponent of indicated basin characteristic			Standard error of estimate (log_{10} units)	Number of stations used in analysis
		Drainage area (A)	Mean annual precipitation (P)	Altitude index (H)		
RI	*K*	*a*	*b*	*c*	*Se*	*N*
			NORTH COAST REGION			
2	3.52	0.90	0.89	[1]-0.47	0.26	141
5	5.04	.89	.91	[1]-.35	.24	125
10	6.21	.88	.93	[1]-.27	.24	125
25	7.64	.87	.94	[1]-.17	.24	125
50	8.57	.87	.96	[1]-.08	.25	125
100	9.23	.87	.97	0	.26	125
			NORTHEAST REGION[2]			
2	22	0.40			0.46	31
5	46	.45			.38	20
10	61	.49			.38	20
25	84	.54			.40	20
50	103	.57			.42	20
100	125	.59			.45	20
			SIERRA REGION			
2	0.24	0.88	1.58	-0.80	0.34	249
5	1.20	.82	1.37	-.64	.32	214
10	2.63	.80	1.25	-.58	.27	214
25	6.55	.79	1.12	-.52	.30	213
50	10.4	.78	1.06	-.48	.34	212
100	15.7	.77	1.02	-.43	.37	212
			CENTRAL COAST REGION			
2	0.0061	0.92	2.54	-1.10	0.47	98
5	.118	.91	1.95	-.79	.39	91
10	.583	.90	1.61	-.64	.35	91
25	2.91	.89	1.26	-.50	.35	91
50	8.20	.89	1.03	-.41	.38	91
100	19.7	.88	.84	-.33	.41	91
			SOUTH COAST REGION			
2	0.14	0.72	1.62		0.47	143
5	.40	.77	1.69		.37	137
10	.63	.79	1.75		.33	137
25	1.10	.81	1.81		.32	137
50	1.50	.82	1.85		.35	137
100	1.95	.83	1.87		.39	137
			SOUTH LAHONTAN-COLORADO DESERT REGION[2]			
2	7.3	0.30			0.60	43
5	53	.44			.35	36
10	150	.53			.31	35
25	410	.63			.32	35
50	700	.68			.33	35
100	1,080	.71			.36	35

[1]Use minimum altitude index value of 1.0.
[2]These equations are defined only for basins of 25 mi^2 or less in area.

TABLE 3.--*Selected statistics of some basin characteristics used in the study of regional flood frequency*

Variable and unit	Region	Mean	Median	Maximum	Minimum
Drainage area (square miles)	North Coast	156	6.38	3,113	0.05
	Northeast	5.20	2.45	24.8	.06
	Sierra	163	20.4	9,020	.05
	Central Coast	83.4	9.26	4,156	.01
	South Coast	48.1	15.8	644	.05
	South Lahontan-Colorado Desert	5.54	.95	89.9	.01
Mean annual precipitation (inches)	North Coast	50.2	50.0	104.0	19.0
	Northeast	21.9	17.5	49.0	10.0
	Sierra	41.7	42.0	85.0	7.0
	Central Coast	23.8	21.0	52.0	8.0
	South Coast	22.8	22.0	40.0	7.0
	South Lahontan-Colorado Desert	7.4	6.0	20.0	2.0
Precipitation intensity index (inches)	North Coast	3.83	3.70	6.2	1.8
	Northeast	1.63	1.45	2.5	1.1
	Sierra	3.62	3.65	6.2	1.2
	Central Coast	3.04	2.90	6.2	1.2
	South Coast	3.44	3.00	7.0	1.7
	South Lahontan-Colorado Desert	1.46	1.20	3.2	.9
Mean annual potential evapotranspiration (inches)	North Coast	41.6	42.0	53.0	28.0
	Northeast	43.6	44.0	46.0	38.0
	Sierra	40.9	41.0	59.0	30.0
	Central Coast	43.2	43.0	52.0	35.0
	South Coast	53.8	51.0	74.0	44.0
	South Lahontan-Colorado Desert	67.9	68.0	86.0	37.0
Main channel slope (feet per mile)	North Coast	397	180	1,740	8.7
	Northeast	300	247	835	10
	Sierra	344	208	2,520	8.0
	Central Coast	265	155	1,730	9.8
	South Coast	381	282	1,670	22.4
	South Lahontan-Colorado Desert	387	307	2,240	70
Main channel length (miles)	North Coast	18.14	5.00	173.2	0.2
	Northeast	3.96	3.45	12.0	.7
	Sierra	19.04	9.79	298.0	.3
	Central Coast	12.48	5.75	183.2	.3
	South Coast	11.02	7.80	66.8	.4
	South Lahontan-Colorado Desert	4.01	2.90	16.8	.5
Altitude index (thousands of feet)	North Coast	1.69	1.50	5.7	0.2
	Northeast	5.19	5.15	7.1	3.2
	Sierra	4.93	5.10	9.7	.1
	Central Coast	1.00	1.00	2.4	.1
	South Coast	2.60	2.35	8.2	.4
	South Lahontan-Colorado Desert	3.10	2.60	8.6	.1

In the semiarid environment in the South Lahontan-Colorado Desert region flood discharges at any given station are erratic. Some stations may have had only minor discharge while others may have had extremely high discharges from intense storms. The records for the desert area are shorter, in general, than those from more humid regions. The effect of bias from the short-term records, however, is probably countered to some degree by the combined records for many stations. The estimates obtained by regression equations may seem high compared with the flood record at a site that had only low peak discharges in a short history. When compared with other nearby records that do include high peak discharges the regression results seem reasonable.

Limitations in the application of the regional flood-frequency equations were described under "Limitations" in the "Estimation of Design Flow" section of this report.

AUGMENTED FLOOD DISCHARGE

The regional analysis of flood magnitude and frequency presented herein is related primarily to streamflow under natural conditions, that is, not affected significantly by storage and regulation, by substantial increase in imperviousness resulting from development, or by other factors modifying basin characteristics, albeit temporarily. The maximum discharge data similarly relate principally to natural conditions. Peak discharge data for some streams, however, may reflect augmented runoff from forest areas denuded by fires.

Detailed criteria or techniques for flood-frequency estimates for areas affected by substantial urbanization or for recently burned areas in forests have not been developed for this report, owing to the wide range of physical conditions throughout the State. Aspects of the impacts of urbanization and fires, however, are discussed briefly in the following sections.

Flood-frequency estimates for areas affected by urbanization, fires, or other discharge-augmenting factors, may be developed by appropriate adjustment of the estimates for discharge under natural conditions determined initially by the design-flow method or other flood-frequency techniques. Although the physical conditions would govern the magnitude of such adjustments, an approximate range of the adjustments is suggested by data from developed basins or by other analyses.

Urban Development

The effect of urban development on the water regimen, particularly flood discharge, has long been recognized. Numerous investigations have been made in the past 30 years to determine the magnitude and characteristics of the changes caused by urbanization. The results of many investigations have been reported, evaluated, or summarized by Waananen (1969), Smith (1969), Espey and Winslow (1974), Schneider (1975), and others.

The investigators have generally agreed that urban development has a dramatic impact on the peak discharges in streams and storm drains. Changes in timing and time distribution of direct runoff from urban areas, as reported by Waananen (1969), are a distinct reflection of the influence of development. These result from reduction in opportunity for infiltration, evaporation, and transpiration; increase in degree of imperviousness; and modification of surface-drainage patterns, including the associated development of storm-drainage facilities. As an area becomes urbanized the time of concentration (lag time) of storm runoff is reduced, and the storm discharge often in concentrated in higher peaks of shorter duration than those for natural runoff. A shorter lag time reduces the time available for infiltration and thereby increases the total storm runoff from a basin. The shorter time is reflected also in factors properly applicable in the discharge formulas used in storm-sewer design. The shorter time dictates selection of considerably higher precipitation intensities from duration-frequency curves for use in the Rational Method and other formulas.

The urbanization impact on floods has been greatest for the smaller, more frequent floods, and the effect on the infrequent major floods is small. The major floods generally occur following saturation of surface soils by sustained storm precipitation with resultant discharge from most or all of the basin area.

Durbin (1974), in a digital simulation of urbanization effects on runoff in the San Bernardino area in southern California, determined that urbanization could increase the magnitude of peak discharge and daily mean discharge with a 2-year recurrence interval by a factor of three to six. He determined further that peak discharges and daily mean discharges with recurrence intervals ranging from 50 to 200 years or more are little affected by urbanization and that in southern California the degree of imperviousness of a fully urbanized area is about 30 percent. By contrast, James (1965) noted that urbanization accented both high and low discharges but was most influential in increasing the peaks of lesser floods.

Evaluation of Urbanization Effect

Rantz (1971) provided an evaluation of urbanization effects in the San Francisco Bay region. The report presented basic criteria, in the form of tables and graphs, for hydrologic design by the four methods most commonly used in the San Francisco Bay region--flood-frequency analysis, Rational Method, unit-hydrograph method, and runoff simulation by means of hydrologic basin modeling. The evaluation of the urbanization effect for use in flood-frequency analysis provides a basis for adjusting flows computed for natural conditions. Pertinent aspects of the information presented by Rantz (1971) are summarized in the following discussion.

The extent of urbanization may be defined by the degree of imperviousness and the proportion of the drainage area provided with storm-drainage facilities. Urban developments are usually sewered for storm drainage, though that may not always be the case. A term "percentage of channels sewered," used later, refers to the percentage of well-defined channels that are lined, paved, or replaced by pipe.

The degree to which peak discharges are increased depends also on the manner in which the runoff from impervious surfaces reaches the collector channel. The percentage of impervious area in a basin may be easily measured, but often the entire impervious area does not have a direct or surface connection with a principal watercourse or drain. Rain falling on a roof, for example, may leave by passing through a downspout into a dry well, and thence to the underlying ground-water body; or through a downspout and splash-block onto a lawn, where part may infiltrate the lawn; or through downspout and pipe drain to a street gutter; or may be retained in surface storage and eventually evaporated.

A set of percentage values for impervious areas associated with various types of development in the San Francisco Bay region, as suggested by Rantz (1971, table 1, p. 7) on the basis of review of values generally used, is summarized in table 4. These values reflect average overall characteristics of urban development in the region, not the detailed characteristics of any particular urban development. Values of the coefficient C (the runoff coefficient) in the Rational Method are presented for reference. These values are considered representative also for similar types of developments in other areas in California. Thus, in the absence of more definitive information, the values could be used generally throughout the State.

Storm runoff may be affected substantially by the physical characteristics of urban areas. The specific location of a development within a drainage basin affects the flood discharge at its mouth. If a development is near the mouth of the basin the accelerated runoff from precipitation in the urbanized lower part of the basin may result in heavy discharge from the basin before the peak discharges from headwater areas reach the mouth, with possible smaller peak discharges in the downstream reaches of the main channel. Conversely, with development in the headwater areas, the accelerated urban runoff may result in an increased peak discharge in the lower reaches of the main channel.

The hydraulic characteristics of impervious areas also have an effect on storm runoff. Building practices can affect the rate of roof drainage. The design of sewer systems, particularly the location and number of inlets and storm-sewer connection, influences discharge rates. Peak discharges in main sewers, for example, are affected by the timing of peak discharges in the tributary laterals. Storage, including greenways and other detention basins that serve secondary recreational functions, temporary pondage in streets and intersections, and surcharge of the sewer system, may be incorporated into a storm-sewer system. The effect of such built-in storage is to reduce the magnitude of flood peaks discharged to the principal receiving channels or streams from infrequent major storms.

A guide for evaluating urbanization effects is given in figure 4 which shows the ratio of flood-peak magnitude for urbanized basins in relation to that for unurbanized basins. Figure 4 was adapted by Rantz (1971, p. 16) from the model study by James (1965) for the basin of Morrison Creek in Sacramento County, Calif. The coefficients (ratios) are intended for use with the flood-frequency method. The percentage of basin developed means simply the percentage of the basin that has been urbanized, without regard to the degree of imperviousness. The percentage of channels sewered refers to the percentage of well-defined channels that are lined, paved, or replaced by pipe.

TABLE 4.--*Regional values of percentage of impervious area and of* C *in the Rational Method*

[From Rantz (1971)]

Type of development	Density, in units per acre	Percent impervious		C^1, in Rational Method	
		Santa Clara County	San Francisco Bay Region	ASCE	San Francisco Bay Region
Residential:					
Hill areas	0.5- 2	6	8	--	0.11-0.30
Low urbanization	3 - 6	10	15	0.25-0.40	.21- .38
Medium urbanization	7 -10	20	25	.30- .50	.32- .52
Heavy urbanization (apartments)	11 -20	32	40	.50- .70	.45- .70
Industrial:					
Nonmanufacturing		50	60	.60- .90	.58- .88
Manufacturing		40	50	.50- .80	.52- .79
Reserve		20	25	--	.32- .52
Commercial		50	60	.50- .95	.58- .88
Transportation		70	75	.70- .95	.60- .90
Public buildings		40	50	--	.52- .79
Public parks		12	12	.10- .25	.16- .32
Agricultural		4	4	--	.10- .30
Natural watersheds		2	2	--	.10- .30

[1] C is a dimensionless coefficient whose magnitude depends on the basin characteristics, including the character and degree of development.

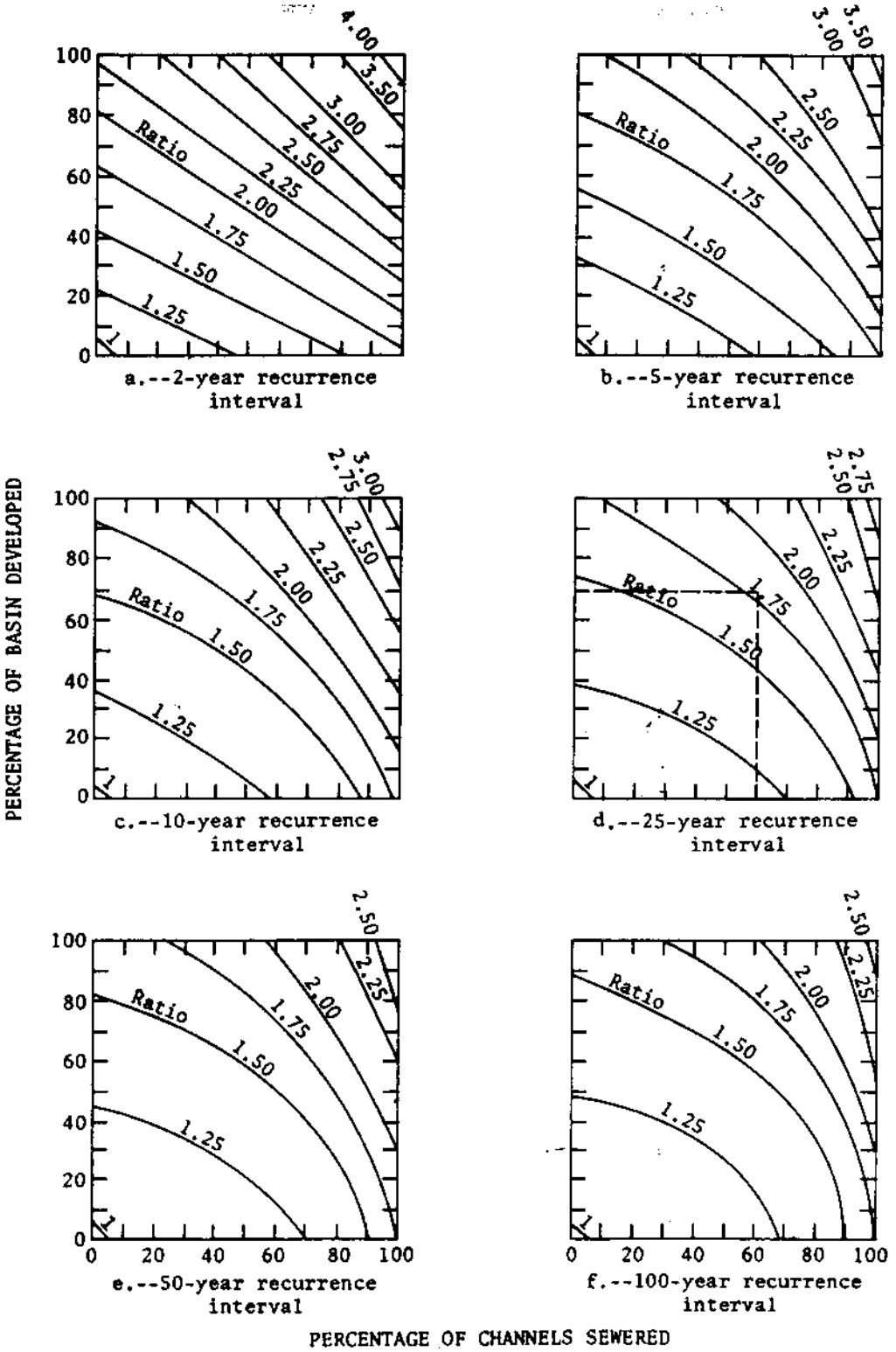

FIGURE 4.--Ratios of flood-peak magnitude for urbanized basins to that for unurbanized basins--for use with flood-frequency method. (After Rantz, 1971.)

A discharge value computed for natural conditions may be adjusted for the effect of urbanization as follows:

Given: Peak discharge under natural conditions for 25-year recurrence interval----------Q_{25}(Nat)

Desired: Peak discharge adjusted for following urbanized conditions----------Q_{25}(Urb)

Recurrence interval----------25 years
Percentage of basin developed----------70
Percentage of channels sewered----------60

Solution: Determine adjustment coefficient from figure 4-d, as----------1.80

Adjusted discharge then is:

$$Q_{25}(\text{Urb}) = 1.80 \times Q_{25}(\text{Nat})$$

The adjustment coefficients in figure 4 were developed for the San Francisco Bay region (Rantz, 1971, p. 15-16) but in the absence of more definitive data these values may be useful for estimating the approximate effects of urban development in other areas in California.

Relation of Fire and Flood

Fires in brush-covered mountain and foothill areas, particularly in central coastal and southern California, remove the vegetative cover and sharply increase the rates of subsequent storm discharge and soil erosion. Wildfires in the mountain areas of southern California, for example, have repeatedly been followed by debris-laden floods downstream. Some insight into the effect of burns on stream discharge may be provided by the following studies.

The California Forest and Range Experiment Station reported in 1951 (U.S. Forest Service, 1951, p. 28) that records of stream discharge from burned and long-unburned (unburned for 40 or more years) areas showed peak discharge increases from 2 to 30 times in the first year after burning. The following table shows the general storm and flood relations. Annual erosion rates increased by an average of about 35 times in the first year after a complete burning of a good chaparral cover; about 8-10 years were required for return of erosion rates to normal and, during recovery, the erosion rates might have been 9 to 10 times larger than those before the burning.

Size of storm	Increase in peak discharge following fire (times)	Period of return to normal discharge (years)
Small	10-30	20
Medium	3-10	40
Large	2-3	60

Heavy rains in January and February 1969 in areas in the San Gabriel Mountains in southern California denuded by fires in 1968 caused highly destructive floods along the foothills between Los Angeles and San Bernardino. In many areas the floods transported large volumes of debris, including large logs, rocks, and boulders. The extreme flood discharges are shown by the data in table 6 and in figure 1 for stations 11067000, 11072400, 11073470, 11084500, and 11086500 in the South Coast region.

Fires in autumn 1971 in the mountain areas northeast of Santa Barbara, about 90 mi northwest of Los Angeles, caused extensive damage to the vegetation. Rains in December 1971 caused moderate flood peaks generally, but discharge from the burned areas was heavy. Peak discharge from a 3.5-mi^2 basin reached a rate of 1,800 $(ft^3/s)/mi^2$. The streams draining the burned area reportedly transported heavy debris loads, including boulders as much as 10 ft in diameter.

The effect of fires on stream discharge, particularly after smaller storms, is substantial. Discharge augmentation continues at a declining rate for many years after a fire while vegetation is being reestablished. Discharge from major storms is increased somewhat, but the peak discharge may fall within the limits experienced generally in the region. Erosional effects constitute a major destructive impact, both through damage within the basin and in the transport and deposition of sediment and other debris downstream. For design purposes adjustments for the effects of past fires should include increase in the anticipated peak discharge and allowances for the bulking effect and the potential for blocking and damage by the large quantities of debris likely to be transported. Such adjustments are substantial for recent fires on steep soil-mantled slopes but are reduced when the effects have been lessened by revegetation.

Other Effects

Other factors that may influence the magnitude of flood peaks include mudslides, debris flows, backwater and ponding effects, logging, and farming practices that alter the characteristics of overland flow and the runoff.

Mudslides and debris transported by floods may affect peak discharge through temporary channel blockage and subsequent release of impounded water and debris, the blockage of structures with resultant overflow of channels, and the bulking effect of entrained sediment and other debris which increases the volume of the water-sediment-debris mixture. The effects are similar to those from fire-flood sequences.

The availability of temporary storage in backwater areas upstream from structures such as highway embankments, as well as pondage through surcharge of culverts, generally may act to reduce peak discharge downstream, but cause rises in water surfaces upstream. At times, however, when discharges exceed the temporary storage capacity, structures may be overtopped or breached, with resultant sudden release of impounded water. Flood peaks downstream then may exceed those that might have occurred with unrestricted flows.

Some of the maximum peak discharge values in table 6 may have been affected by breaching and releases from blockage or temporary storage, by mudslides, or by destruction of highway embankments. The extreme values of 7,160 ft^3/s for station 09428530, Arch Creek near Earp, in the South Lahontan-Colorado Desert region, and 2,130 ft^3/s for station 11046390, San Juan Creek tributary near Elsinore, in the South Coast region (sites 712 and 607, fig. 5), given in figure 1 and table 6, reflect possible discharge augmentation through breaching of an embankment or release of channel blockage.

The effects of logging generally include increase in flood peaks because of augmentation and acceleration of discharge from the logged areas. The impact, however, decreases as regrowth proceeds. Farming practices also alter flood discharges from valley and foothill basins through changes in the pattern of overland flow, in infiltration opportunity, and in the extent of contributory areas.

SUMMARY

A method for estimating the magnitude and frequency of floods in California, based on regional regression analysis, has been developed and presented. Regional equations provide a means for estimating annual peak discharge at any site, gaged or ungaged, for any desired recurrence interval from 2 to 100 years. Application of the method is convenient, but the procedure is subject to some limitations.

Data for 705 stations, representing the full range of drainage-area size for which data were available, were included in the regression analysis. A data-collection program for the study of floods from small drainage areas provided 275 short-term (as much as 15 years) records distributed throughout the State supplementing the limited data on small streams previously available. The peak data obtained under the small-streams study program were intentionally limited to streamflows under virtually natural conditions. The regression analyses were similarly limited to study of unregulated discharges or discharge that could be adjusted to natural conditions.

A study of maximum peak discharge at gaging stations permits evaluation of the relative magnitude of known or estimated peak discharge and the maximum floods that might be anticipated in the State. Peak discharge rates greater than 1,000 $(ft^3/s)/mi^2$ were not observed in basins larger than 25 mi^2 in area, but this rate was exceeded at many sites on streams with smaller drainage areas and exceeded 5,400 $(ft^3/s)/mi^2$ at one site.

Basin characteristics are summarized to present a standard set of values for use by investigators interested in further detailed analysis of flood magnitude and frequency in selected areas in the State.

The impact of urban development, fires, and other factors that result in accelerated or augmented water discharge and heavy debris discharge is considered. A guide for evaluating urbanization effects in the San Francisco Bay region was developed by Rantz (1971) and pertinent information is summarized. This information should be useful also in estimating the impact of urban development in other areas in the State where more definitive information is not available.

A continuing need exists for extension and expansion of the flood-data base, particularly for streams that have small drainage areas. This may be accomplished through continuing collection of flood data from small drainage areas to provide improved estimates of floods for recurrence intervals greater than about 20-25 years. A particular need for these data exists in the Northeast and the South Lahontan-Colorado Desert regions where few long-term records are available for peak discharges under natural conditions.

Review and refinement of the flood-frequency regression equations at intervals as additional data are added to the flood-data base is appropriate and is suggested.

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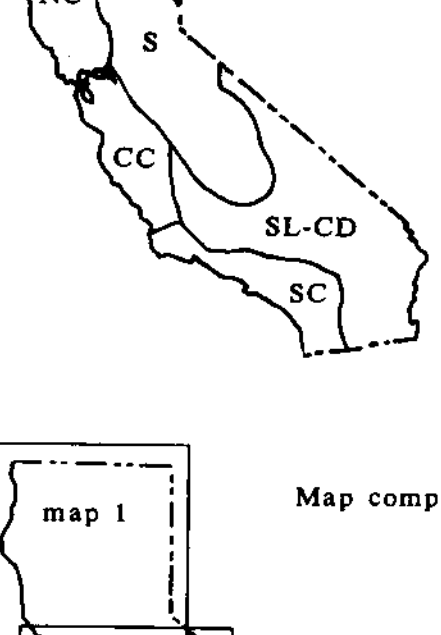
EXPLANATION OF FIGURE 5

• 521 Gaging station site and map number
Numbers refer to those in table 5.

Boundary of flood-frequency region

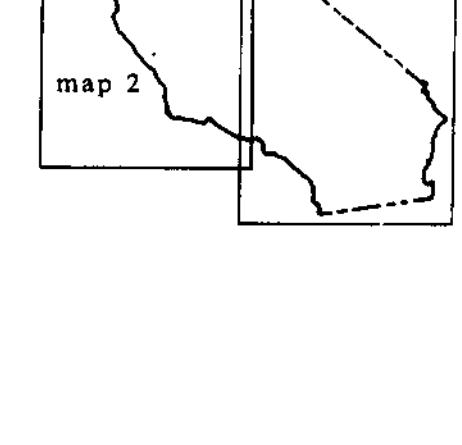
Undefined region

INDEX MAPS



Flood-frequency regions

CC	Central Coast
NC	North Coast
NE	Northeast
S	Sierra
SC	South Coast
SL-CD	South Lahontan-Colorado Desert



Map components

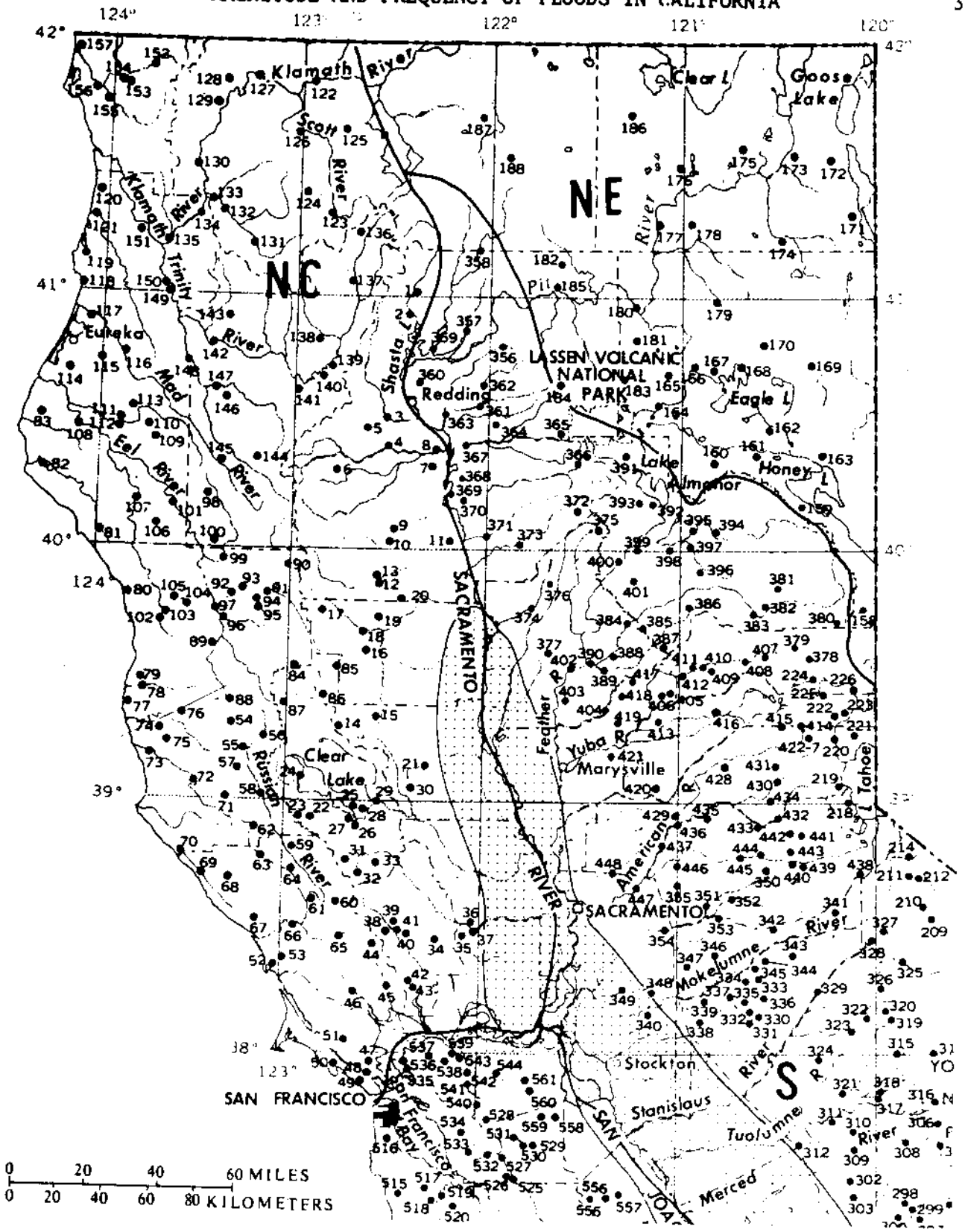


FIGURE 5.--Location of gaging stations and flood-frequency regions (map 1).

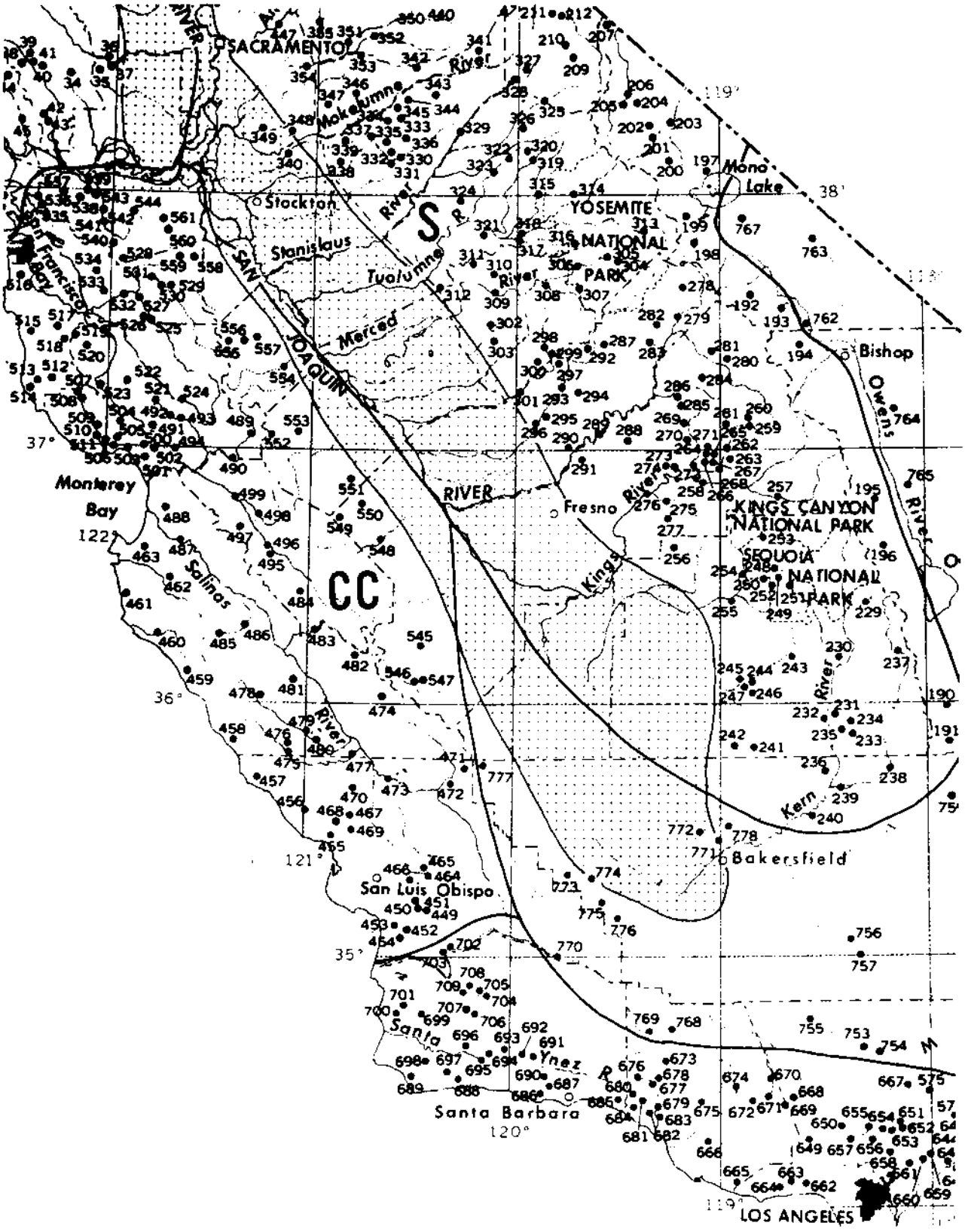


FIGURE 5.--Location of gaging stations and flood-frequency regions (map 2).

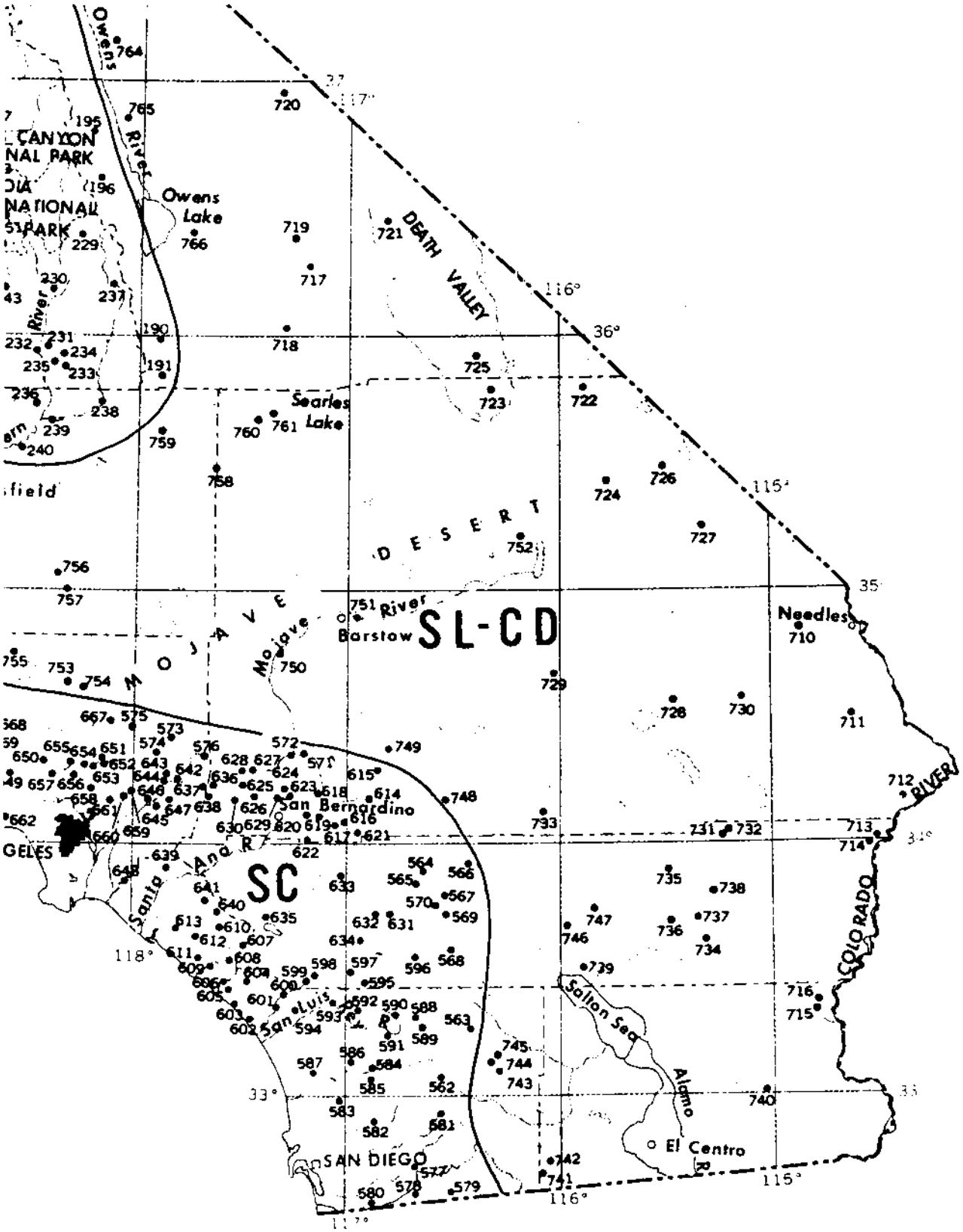


FIGURE 5.--Location of gaging stations and flood-frequency regions (map 3).

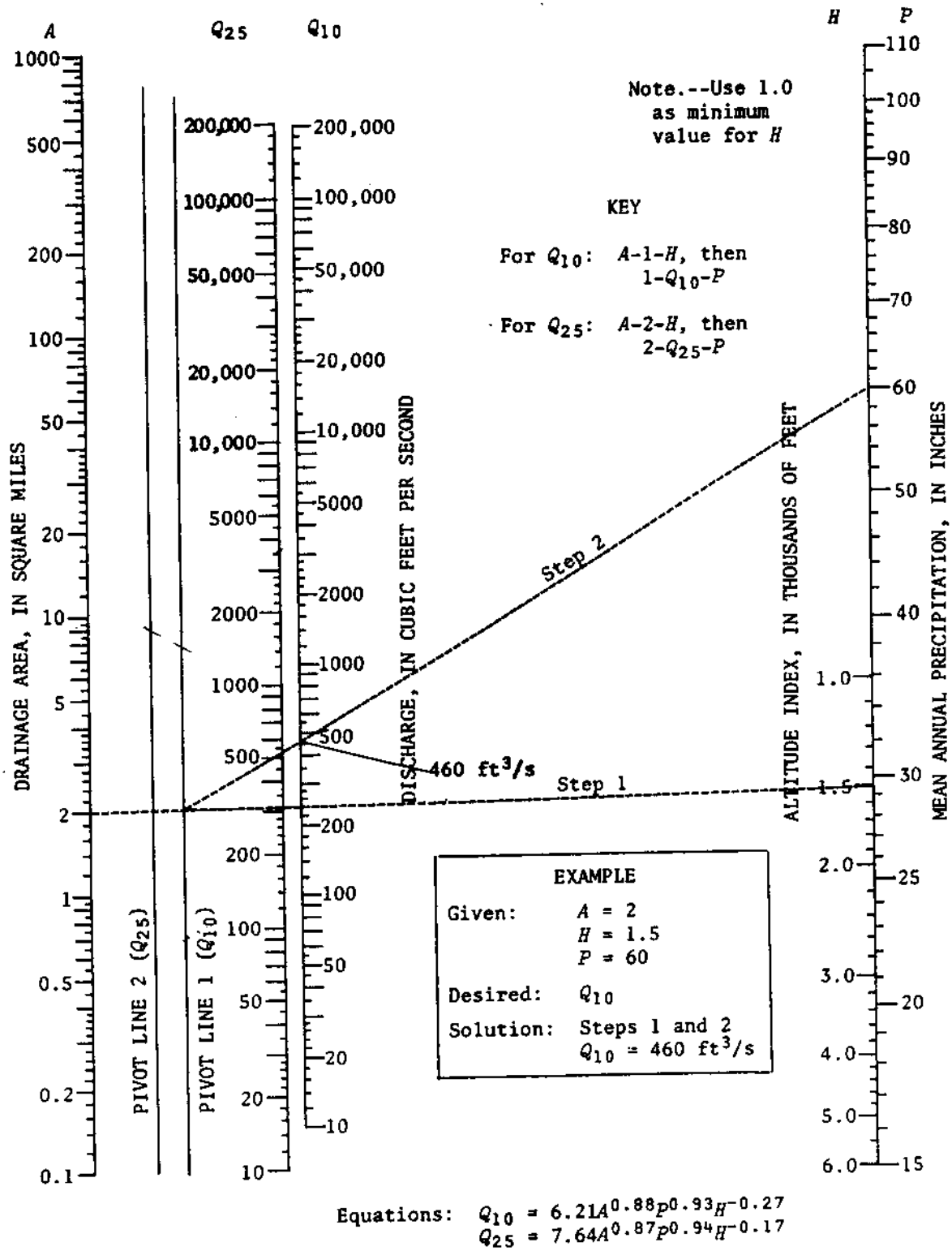


FIGURE 6.--Nomographs for computing 10- and 25-year flood discharge in the North Coast region.

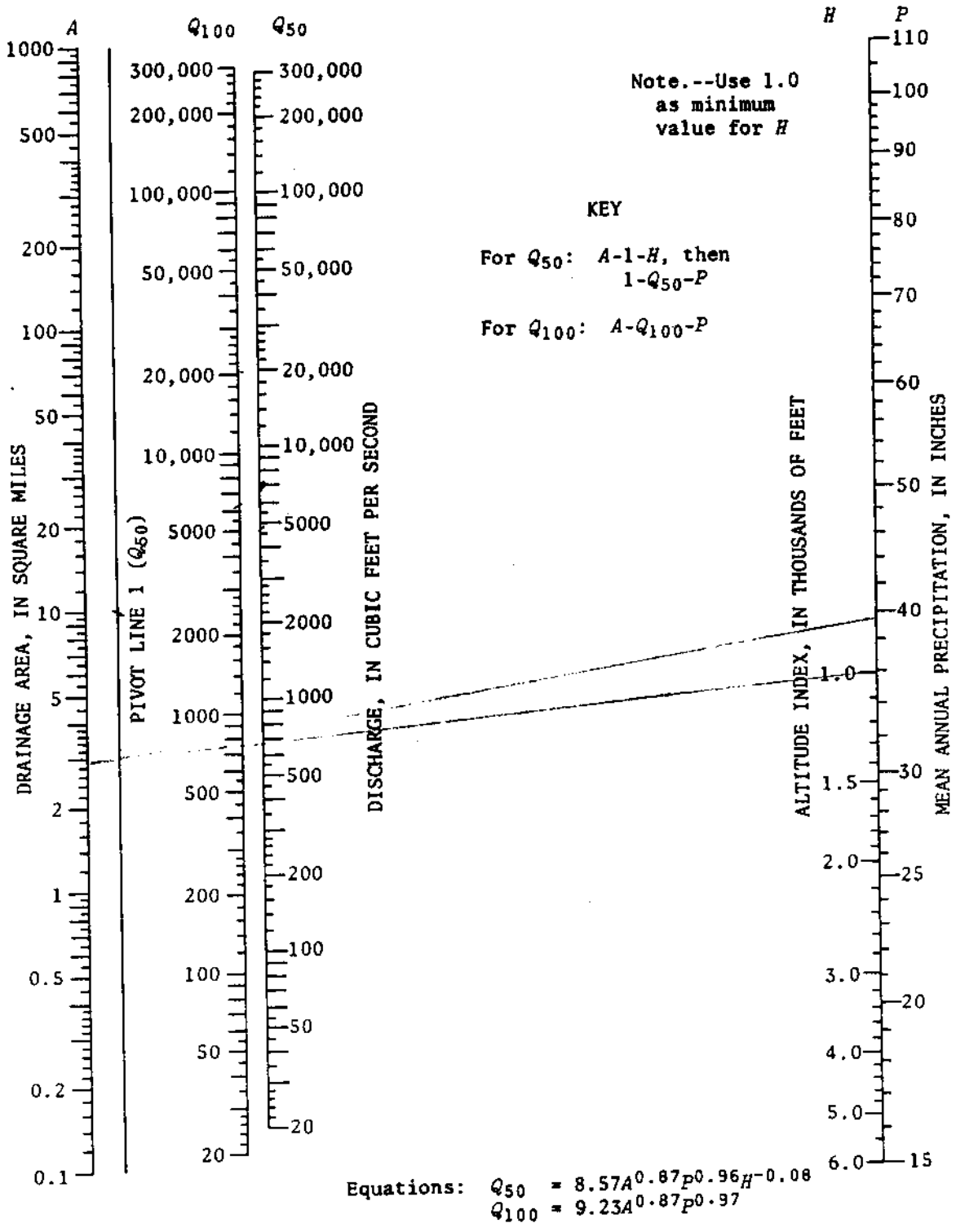


FIGURE 7.--Nomographs for computing 50- and 100-year flood discharge in the North Coast region.

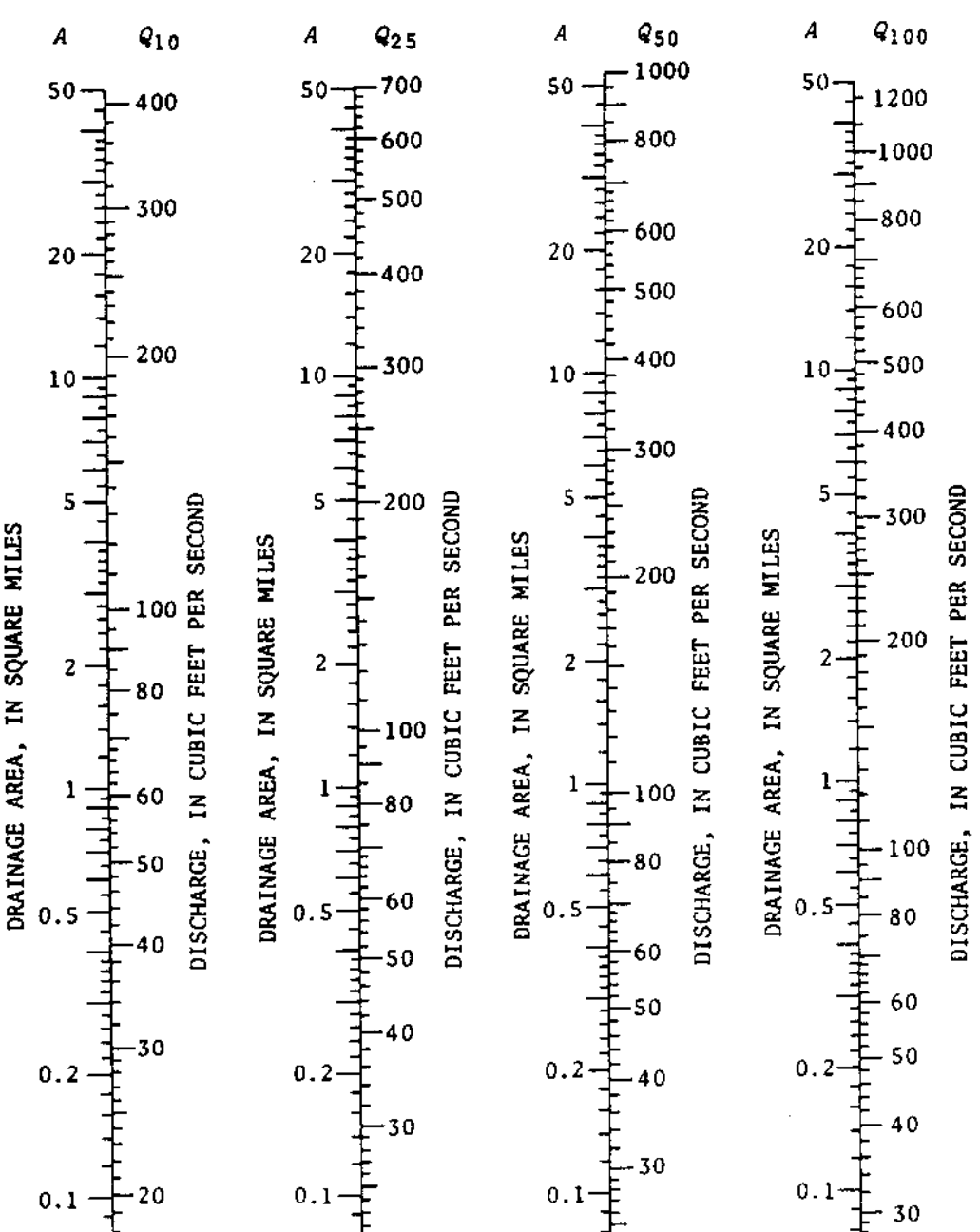
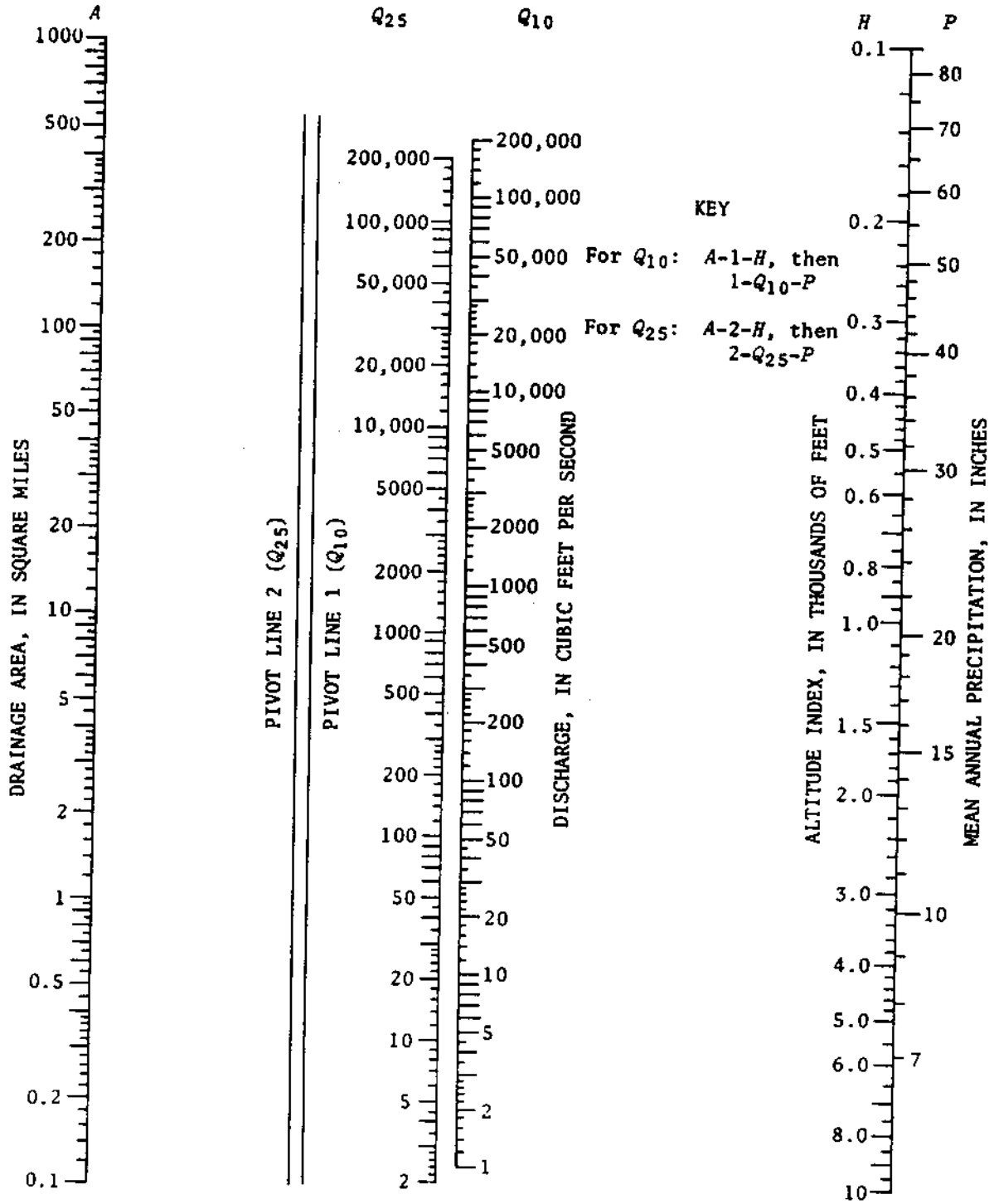


FIGURE 8.--Nomographs for computing 10-, 25-, 50-, and 100-year flood discharge in the Northeast region.



Equations: $Q_{10} = 2.63A^{0.80}P^{1.25}H^{-0.58}$
$Q_{25} = 6.55A^{0.79}P^{1.12}H^{-0.52}$

FIGURE 9.--Nomographs for computing 10- and 25-year flood discharge in the Sierra region.

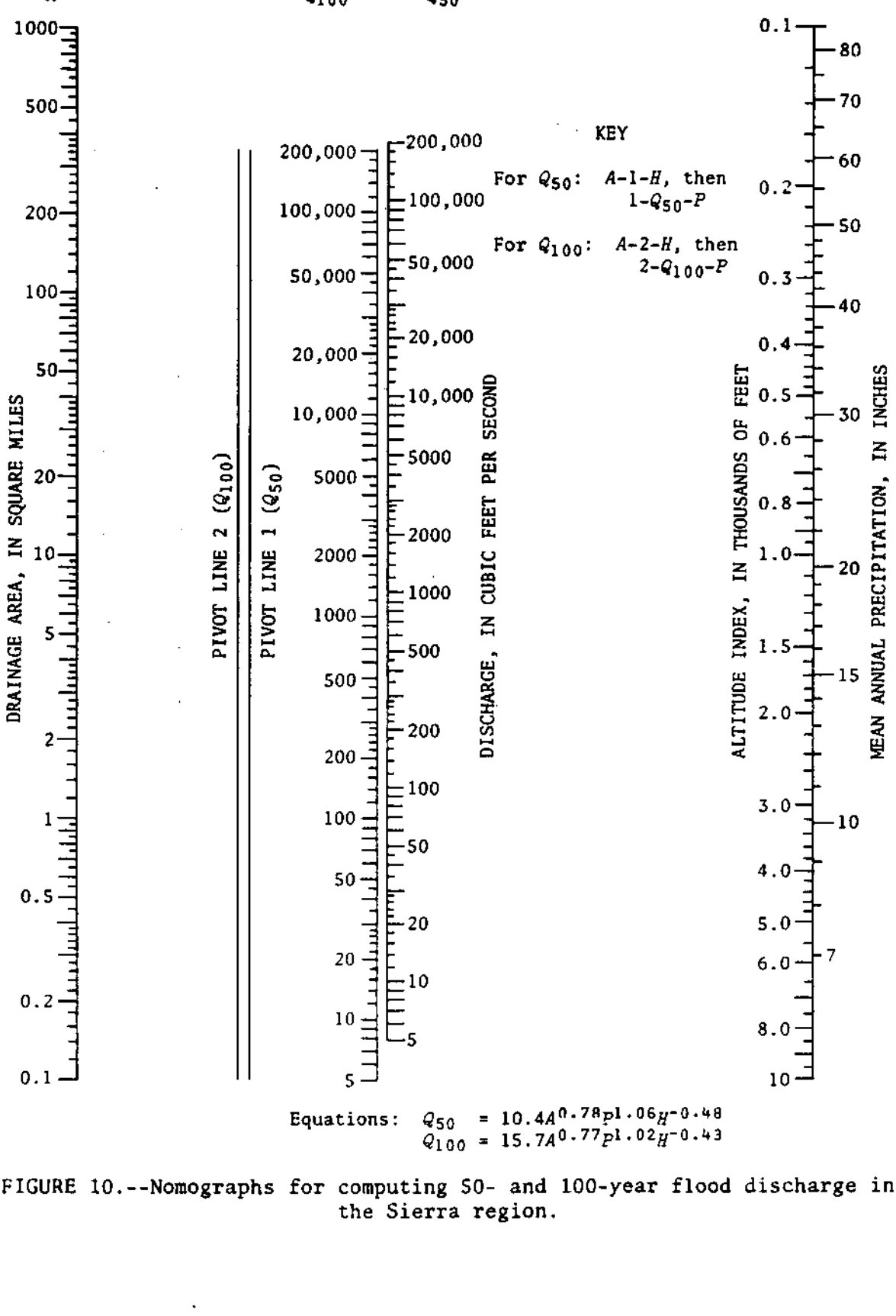


FIGURE 10.--Nomographs for computing 50- and 100-year flood discharge in the Sierra region.

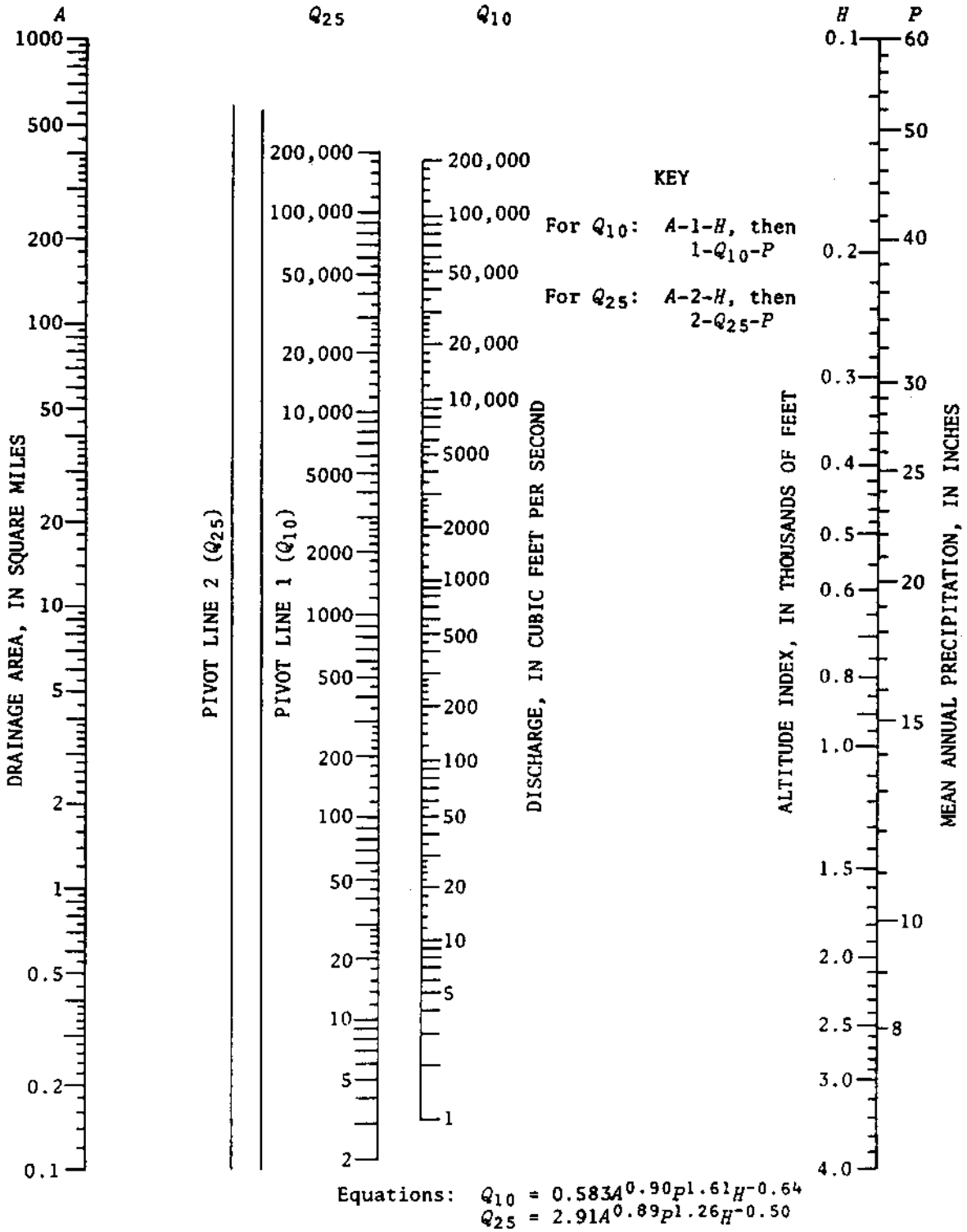


FIGURE 11.--Nomographs for computing 10- and 25-year flood discharge in the Central Coast region.

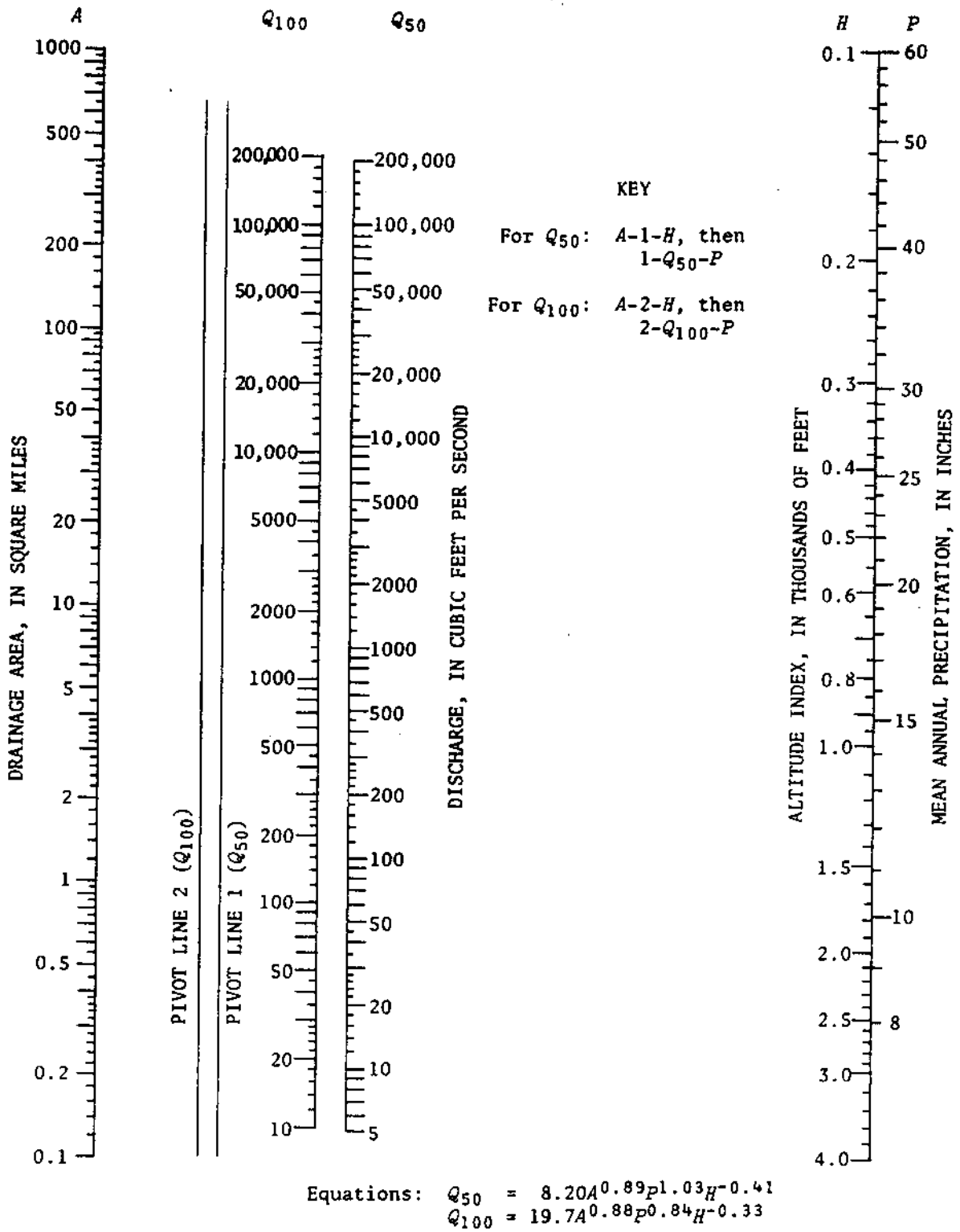


FIGURE 12.--Nomographs for computing 50- and 100-year flood discharge in the Central Coast region.

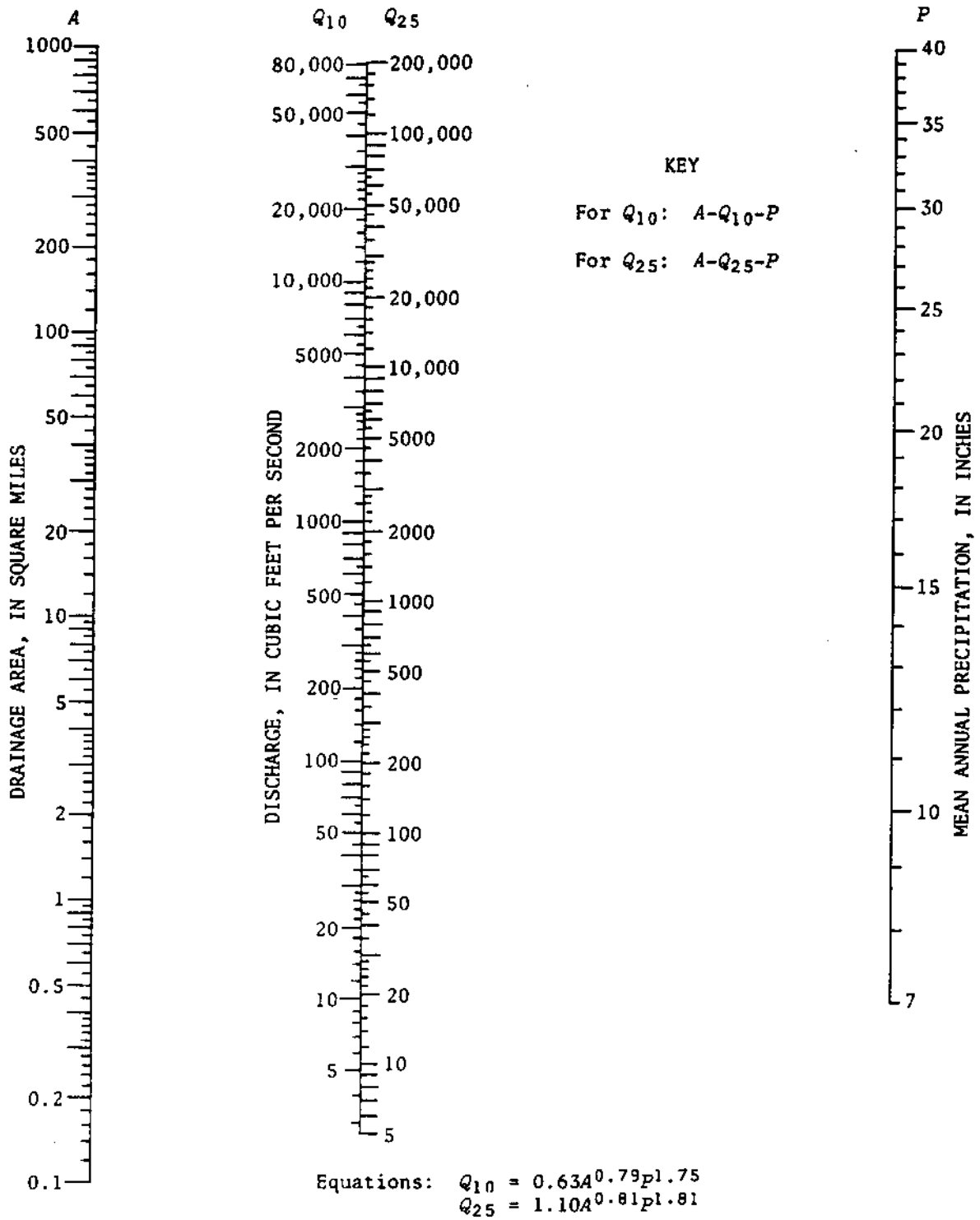


FIGURE 13.--Nomographs for computing 10- and 25-year flood discharge in the South Coast region.

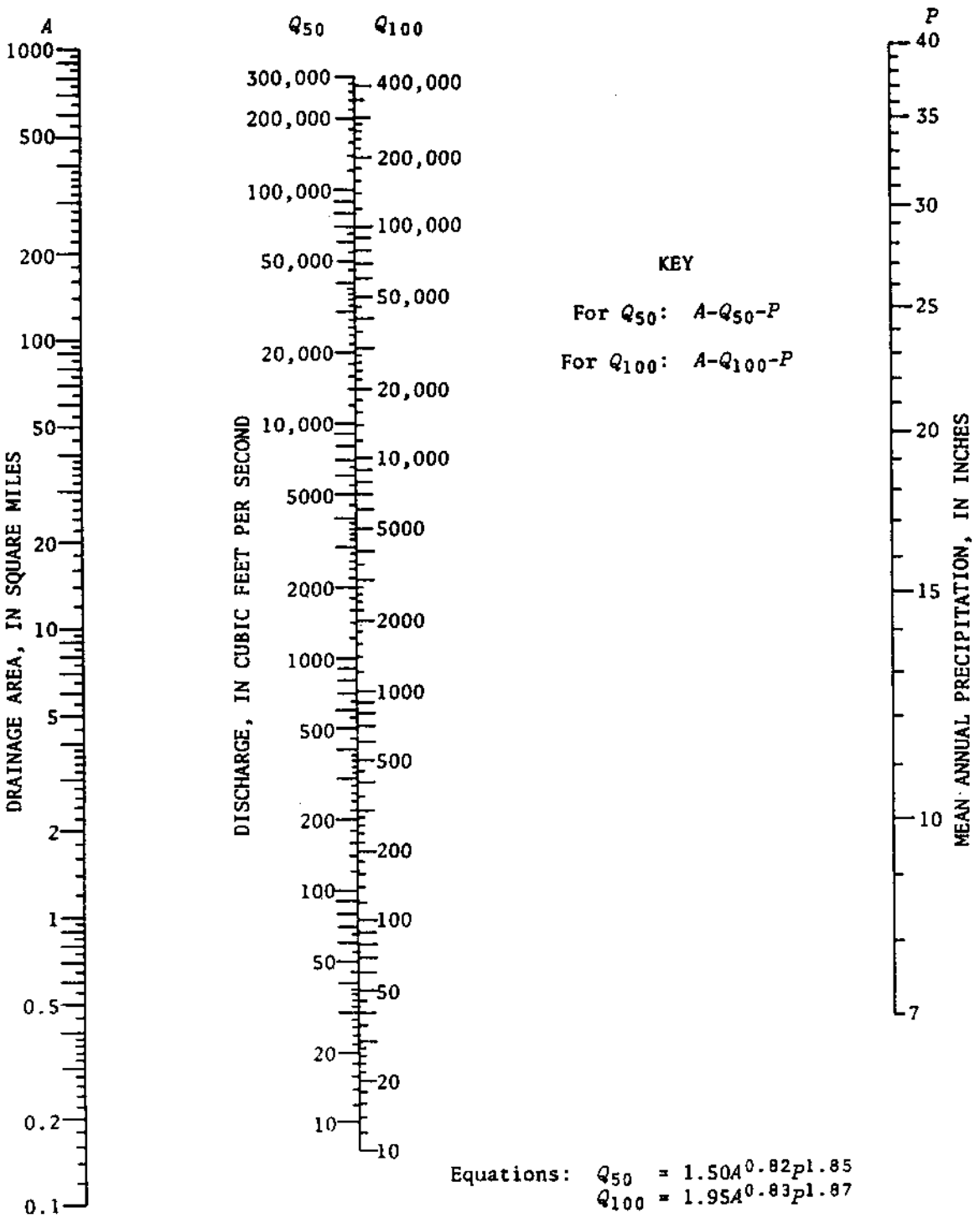


FIGURE 14.--Nomographs for computing 50- and 100-year flood discharge in the South Coast region.

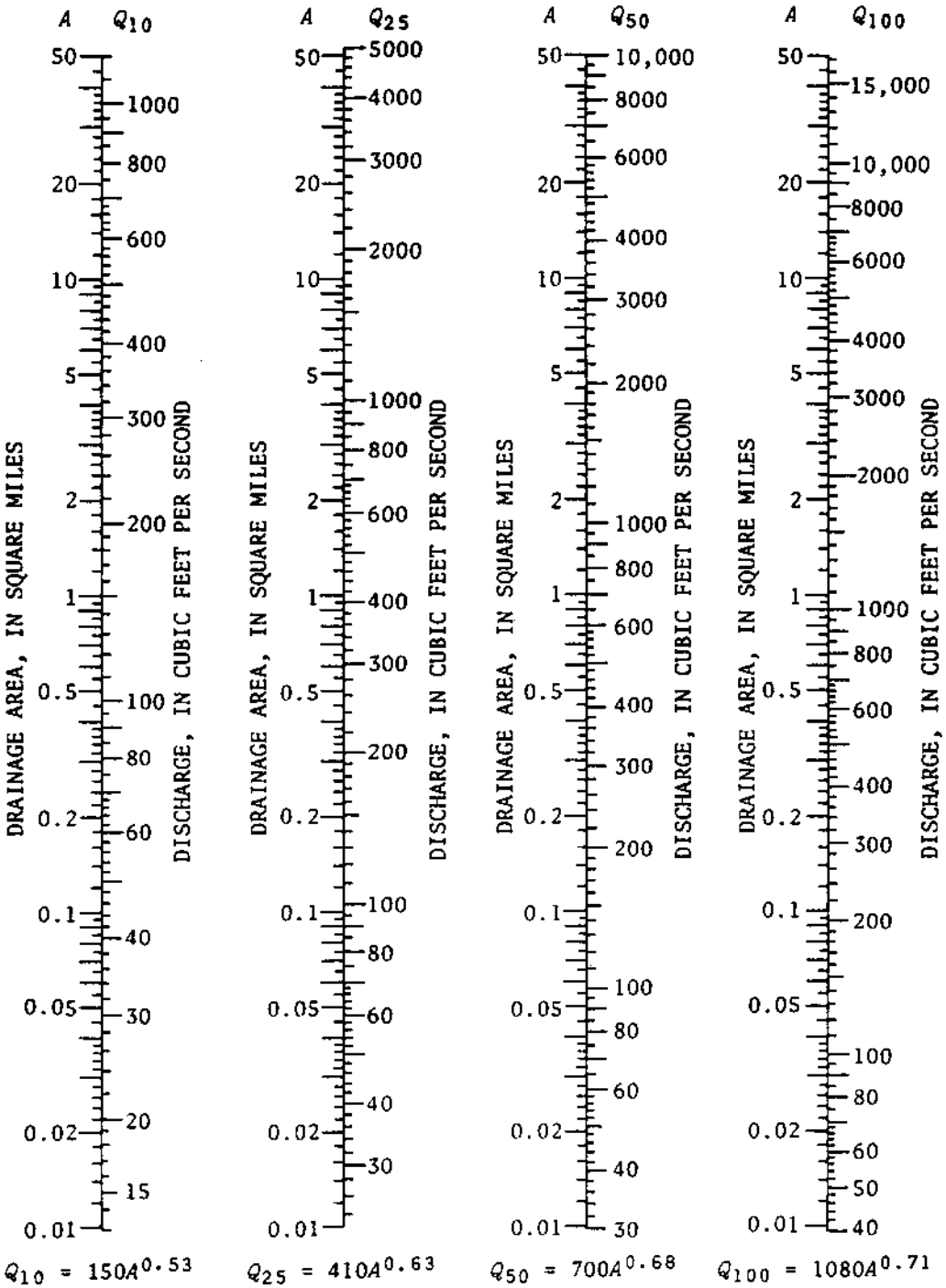


FIGURE 15.--Nomographs for computing 10-, 25-, 50-, and 100-year flood discharge in the South Lahontan-Colorado Desert region.

TABLE 5.--*Basin characteristics and flood*

Station name is given in table 6.

FFSDA site numbers are those used for crest-stage-gage stations included in program "Floods from Small Drainage Areas in California."

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
			NORTH COAST REGION						
1	11341550	26	6.57	65	5.6	46	963	4.6	3.3
2	11342000		425	62	5.5	44	83	49.5	2.8
3	11372000		228	56	3.5	48	63	48.7	2.1
4	11374400		249	41	2.8	48	58	43.5	1.6
5	11375600*	28	.07				513		1.0
6	11375830	29	1.09	28	2.7	50	164	1.7	1.6
7	11375950	30	.46	26	2.4	53	80	1.6	.7
8	11376000		927	40	3.0	50	57	64.5	1.8
9	11378700	33	.19	21	2.3	52	113	.7	.7
10	11379500		92.9	36	2.8	51	170	19.6	2.0
11	11380500		136	28	2.7	51	93	42.7	1.8
12	11381990	34	.65	24	2.4	50	414	1.0	.9
13	11382000		194	35	2.8	49	126	36.5	2.7
14	11384400*	119	2.52						
15	11384700	105	.49	23	2.3	51	652	1.5	1.6
16	11386200*	118	10.6						
17	11386300*	117	1.84						
18	11386400	106	.77	26	2.5	51	687	1.6	1.4
19	11386450	116	.52	19	2.3	52	125	1.7	1.0
20	11387900	107	.96	20	2.3	53	138	2.9	.6
21	11390680	108	13.0	24	2.2	52	132	8.8	.9
22	11448500		6.36	41	4.5	46	374	4.2	2.1
23	11448900	76	11.9	37	4.0	45	125	5.3	1.9
24	11449060	77	.16	33	3.3	47	419	.6	1.8
25	11449350		4.37	26	3.2	45	99	2.7	1.5
26	11449450		13.2	34	4.7	47	146	5.2	1.7
27	11449460		12.5	34	4.7	49	178	7.0	1.9
28	11451500		197	39	3.0	52	40	34.0	1.7
29	11451530	78	3.10	27	3.0	50	142	3.0	1.2
30	11451700	112	4.49	25	2.2	52	147	3.4	1.3
31	11453150	233	.25	55	4.5	50	917	.8	1.8
32	11453200		8.35	80	5.8	46	466	3.9	1.9
33	11453500		113	52	3.5	49	55	21.6	1.4
34	11453700	234	.87	25	3.2	49	476	2.0	1.1
35	11453800	115	.74	32	3.4	50	484	2.1	1.3
36	11454000		574	35	3.0	49	18	64.1	.7
37	11454020*	114	.05				1389	.2	.3
38	11455950	235	4.50	50	3.7	49	373	4.2	1.4
39	11456000		81.4	48	3.3	49	46	19.4	.5
40	11456400	236	1.04	35	3.7	49	575	2.2	1.1
41	11456500		52.1	35	3.3	49	140	14.3	1.0
42	11457000		17.4	35	3.3	49	72	10.8	1.2
43	11458200		9.79	30	2.4	46	258	8.9	1.1
44	11458400	237	6.07	38	3.5	46	407	4.0	1.7
45	11458500		58.4	35	3.0	46	82	17.3	.8
46	11459000		30.9	28	3.0	43	95	10.3	.4
47	11460000		18.1	42	3.0	42	125	7.5	.5
48	11460100		4.69	38	2.6	43	181	3.3	.3
49	11460150	203	6.38	40	4.0	40	382	4.5	.9
50	11460170*		7.83	30	2.6	42	73	7.3	.2

magnitude-frequency relations at gaging stations

Basin characteristics are described in text section "Drainage Basin Characteristics."
*Indicates stations not included in regression analysis.

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	Station number
NORTH COAST REGION--Continued								
0	100	701	1100	1370	1730	2000	2280	11341550
.23	93	17400	27000	33700	42400	49100	55900	11342000
0	99	7610	12800	16500	21600	25500	29600	11372000
	53	6310	10000	12600	16000	18600	21200	11374400
		6	11	15	19	23	27	11375600
0	100	56	88	110	139	161	183	11375830
0	80	17	32	44	60	74	88	11375950
.04	77	22000	37400	48600	63800	75700	88000	11376000
0	100	46	76	97	126	148	171	11378700
0	92	4180	7560	10200	13800	16700	19700	11379500
.01	84	6210	9350	11500	14200	16200	18200	11380500
0	40	58	81	95	113	126	138	11381990
0	98	6610	13600	19600	28400	35900	44100	11382000
0	90	19	37	52	72	90	109	11384400
								11384700
								11386200
0	95	16	40	63	100	134	174	11386300
2.	1	71						11386400
0	70	23						11386450
								11387900
0	80	279	641	974	1500	1970	2500	11390680
0	95	956	1330	1560	1850	2060	2270	11448500
0	85	1570	2360	2890	3570	4070	4570	11448900
0	5	38	107	178	302	421	565	11449060
0	90	250	490	686	972	1210	1470	11449350
1.	85	1600						
1.	85	845						11449450
0	96	7830	12800	16200	20600	23800	27000	11449460
0	99	128	238	324	447	547	653	11451500
0	85	214	471	700	1050	1360	1710	11451530
								11451700
0	85	30	45	55	69	78	88	11453150
0	100	1980	3010	3700	4600	5260	5930	11453200
.06	89	12300	20800	26700	34000	39400	44500	11453500
1.	95	124	222	292	388	463	542	11453700
0	100	148	211	252	303	340	377	11453800
.18	86	27800	48000	62900	83300	99400	116000	11454000
0	85	532	738	870	1030	1150	1260	11454020
.23	79	6550	9560	11500	13900	15700	17400	11455950
0	96	53	100	137	191	235	282	11456000
.25	87	2120	5290	8360	13400	18100	23500	11456400
0	29	1290	2590	3670	5270	6620	8080	11456500
0	98	1190	1310	1370	1440	1490	1530	11457000
0	48	1130	1750	2190	2750	3180	3600	11458200
.14	72	6180	7640	8500	9490	10200	10800	11458400
								11458500
.01	1	1180	1500	1690	1920	2070	2220	11459000
0	50	2260	2920	3320	3800	4130	4450	11460000
0	70	577						11460100
0	60	770	1310	1700	2240	2660	3090	11460150
1.	90							11460170

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
			NORTH COAST REGION--Continued						
51	11460440	204	1.74	45	3.5	42	197	2.5	0.8
52	11460900	205	.25	38	2.8	41	518	.8	.4
53	11460920		15.7	44	2.8	44	50	.8	.3
54	11460940		14.1	40	3.5	40	280	5.6	1.3
55	11461000		99.7	45	3.6	44	54	16.4	1.0
56	11461400	238	.15	40	3.7	45	900	.6	1.2
57	11462125	239	.57	45	3.7	43	546	1.0	1.5
58	11462500		362	40	4.1	44	28	31.8	.9
59	11463200		82.3	54	3.4	46	147	20.2	1.5
60	11463940		15.7	38	3.5	45	55	5.9	.5
61	11464000		793	47	5.4	44	9	80.0	.4
62	11464050	240	1.19	48	5.1	43	722	1.9	1.4
63	11464500		87.8	44	5.8	45	31	21.3	.6
64	11465050	241	2.24	41	6.2	44	184	2.4	.6
65	11465800		12.5	36	3.2	44	150	8.2	1.0
66	11467000		1340	42	4.5	43	9	94.9	.4
67	11467040*	206	.11				1570	.5	1.0
68	11467300	207	.19	65	4.4	40	850	1.0	.9
69	11467500		161	60	6.0	39	26	34.2	.4
70	11467560	208	.54	45	3.8	38	428	1.5	.4
71	11467850	209	1.53	55	4.3	42	284	1.9	1.8
72	11467880	210	.65	45	4.2	40	751	1.6	.6
73	11468000		303	50	5.0	40	24	56.6	.6
74	11468010		14.4	44	3.7	39	150	5.5	.3
75	11468020	211	.40	55	3.7	38	316	.8	.4
76	11468085	212	.43	55	3.5	38	970	1.0	.9
77	11468150	213	.61	38	3.2	37	162	1.3	.2
78	11468500		106	55	4.6	39	20	26.2	.7
79	11468540		12.5	51	3.3	37	90	7.5	.4
80	11468850	214	1.88	55	4.2	36	618	1.8	.8
81	11468880	3	.64	80	4.3	34	148	1.6	1.2
82	11469000		240	62	4.5	30	19	59.7	.6
→ 83	11469570	Cr. 4	.13	60	3.7	30	1340	.4	2.0
84	11469600*	90	1.49						
85	11469650*	92	6.18						
86	11469800*	91	.81						
87	11470700	79	1.39	45	3.6	46	1050	2.3	2.7
88	11472170	80	.71	48	4.2	42	720	1.1	1.8
89	11472200		161	62	5.0	43	25	29.5	1.3
90	11472700*	89	3.36						
91	11473000		367	60	3.5	48	132	34.8	2.8
92	11473530*		17.1	48	3.6	43	300	6.4	2.2
93	11473570	81	.26	50	3.6	44	1090	1.0	2.5
94	11473600		15.2	43	3.3	44	150	7.7	1.9
95	11473700		96.9	43	3.5	47	121	16.5	2.0
96	11473980	82	3.83	45	4.0	44	613	3.4	2.0
97	11474000		1484	60	3.5	47	28	77.0	1.8
98	11474430	83	.18	62	4.5	41	1300	.8	4.4
99	11474500		250	60	3.5	44	50	33.3	1.7
100	11474570	84	2.84	57	3.8	41	380	1.7	3.2
101	11475000		2107	65	5.0	43	18	120.2	1.3
102	11475500		43.9	78	4.0	40	33	16.9	1.7

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
NORTH COAST REGION--Continued								
0	40	371	482	550	630	686	740	11460440
0	10	30	51	66	87	103	119	11460900
0	50	1430	1990	2340	2740	3090	3390	11460920
1.	85	1850	2600	3080	3670	4100	4520	11460940
2.80	86	8980	13100	15900	19300	21800	24300	11461000
0	47	34	63	86	118	143	171	11461400
0	98	56	87	110	139	161	183	11462125
1.08	89	18900	30600	39100	50200	58800	67500	11462500
	99	9190	13100	15700	18900	21200	23500	11463200
1.	80	1770	3480	4870	6910	8600	10400	11463940
.79	88	33300	50500	62100	77000	88100	99200	11464000
0	82	131	216	278	361	426	492	11464050
0	78	8040	13500	17400	22600	26600	30600	11464500
0	85	229	305	353	410	450	489	11465050
0	90	1450	2160	2650	3260	3710	4170	11465800
.70	75	46400	68700	83600	102000	116000	130000	11467000
		24	40	53	69	82	95	11467040
0	100	69	139	197	283	356	435	11467300
.01	92	26000	38600	47100	57900	65800	73800	11467500
0	100	73	98	114	132	145	158	11467560
0	100	95	205	301	448	575	717	11467850
0	40	52	89	116	154	184	215	11467880
0	93	21100	38400	51800	70600	85800	102000	11468000
0	85	1300	2190	2850	3730	4430	5140	11468010
0	60	47	70	86	107	122	137	11468020
0	100	22						11468085
0	60	62	80	91	104	113	121	11468150
.03	100	8450	14600	19300	25600	30600	35800	11468500
0	80	1050						11468540
0	100	116	173	211	259	295	331	11468850
0	100	158	232	281	342	388	433	11468880
0	95	40300	56200	66500	79000	88100	96900	11469000
0	20	10	16	20	25	30	34	11469570
								11469600
								11469650
0	100	112						11469800
0	90	89	129	155	188	211	235	11470700
.01	82	17200	26900	33600	42300	48800	55500	11472170
								11472200
								11472700
.01	100	32500	60100	81700	112000	137000	164000	11473000
0	90							11473530
0	100	25	43	57	75	90	105	11473570
0	95	1510	2260	2770	3410	3890	4370	11473600
	56	7630	11200	13600	16600	18800	21000	11473700
0	90	469	830	1100	1480	1790	2100	11473980
1.02	87	100000	180000	242000	327000	396000	468000	11474000
0	100	15	34	50	75	98	123	11474430
0	97	27200	43600	55200	70400	82000	93900	11474500
0	90	207	342	440	571	673	778	11474570
.75	89	139000	231000	298000	386000	456000	530000	11475000
0	99	6540	11400	15000	20000	23900	28000	11475500

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	PFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
NORTH COAST REGION--Continued									
103	11475560*		6.50	80	4.3	36	420	5.0	2.4
104	11475690	85	2.90	68	5.2	40	378	3.7	1.9
105	11475700		50.3	72	5.0	41	27	14.2	1.6
106	11475900	86	.26	70	4.6	36	1320	.6	3.3
107	11476500		537	73	5.0	38	22	77.5	.9
108	11477000		3113	64	4.5	31	13	173.2	1.0
109	11477700		36.2	70	4.3	40	119	13.7	3.0
110	11477870	87	.39	68	3.8	38	1100	1.0	2.6
111	11478400	88	.71	52	3.7	36	955	1.2	.9
112	11478500		222	70	4.5	40	62	47.6	1.7
113	11478800	5	.53	60	4.3	36	703	1.2	3.0
114	11479700		44.2	54	3.3	30	113	15.2	.7
115	11480000		6.05	58	3.4	30	299	3.8	1.5
116	11480700	6	12.1	65	3.6	34	547	7.5	1.4
117	11481000		485	67	4.0	30	35	100.4	1.5
118	11481200		44.4	55	4.0	30	139	15.2	.9
119	11481300*	7	.10	60	3.6	30	539	.6	.1
120	11482400	8	.40	60	4.7	30	862	1.1	.9
121	11482500		278	68	5.0	32	31	61.4	.8
122	11517840	35	2.90	35	2.4	34	520	4.5	3.0
123	11518310	36	.99	22	3.1	39	482	1.5	3.4
124	11518400	37	.80	50	2.8	38	789	1.0	5.6
125	11518610	38	.42	26	1.8	36	1280	1.2	4.0
126	11519500		653	35	3.0	39	65	54.4	3.3
127	11520520	39	13.0	60	4.1	33	531	7.3	3.0
128	11521500		120	75	5.0	31	121	15.1	2.7
129	11522210	40	1.19	55	4.5	33	1180	1.6	1.8
130	11522260	41	9.46	70	5.3	33	677	6.0	4.6
131	11522300		252	58	3.5	36	268	30.7	3.3
132	11522430*	43	6.87	40	4.0	36	981	5.0	2.8
133	11522500		751	59	5.0	34	70	55.5	2.1
134	11522900	9	1.93	55	3.9	34	781	1.8	1.5
135	11523060	10	.90	50	3.8	34	1350	1.6	2.0
136	11523100	44	1.11	55	3.7	42	1290	1.7	5.7
137	11523200		149	60	3.8	42	203	23.0	4.4
138	11525300	45	2.30	55	3.4	44	594	3.7	3.5
139	11525500		719	61	4.0	43	39	54.4	2.8
140	11525650	46	2.53	45	2.9	46	544	2.5	2.6
141	11525900		71.6	55	2.8	46	108	21.8	2.6
142	11527010	47	6.09	40	3.3	40	742	3.9	2.6
143	11527550	48	5.66	60	3.6	39	633	5.5	2.8
144	11528090	25	5.19	61	3.5	44	175	3.2	3.4
145	11528110*	49	.57	62	4.5	44	544	2.9	4.0
146	11528480	50	.93	40	3.3	41	1060	1.5	2.9
147	11528500		378	40	3.6	44	48	51.0	2.6
148	11529000		898	58	4.0	42	44	74.8	2.0
149	11529950	11	6.90	55	3.6	35	509	6.7	1.9
150	11530000		2854	56	4.0	40	18	154.0	1.5

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	Station number
				NORTH COAST REGION--Continued				
0	100							11475560
0	80	549	791	949	1150	1290	1430	11475690
	85	9090	12100	13900	16200	17700	19200	11475700
0	40	35	60	78	103	122	142	11475900
.02	97	53100	87400	112000	146000	172000	199000	11476500
.49	92	161000	265000	341000	444000	525000	610000	11477000
	100	5730	8580	10500	12900	14700	16600	11477700
0	90	41	59	71	86	96	107	11477870
0	100	46	72	91	115	133	152	11478400
0	95	21700	29800	35000	41200	45700	50000	11478500
0	90	93	138	168	207	235	264	11478800
	100	2700	3190	3460	3770	3980	4170	11479700
0	100	757	1230	1570	2020	2360	2720	11480000
0	100	1390	2540	3440	4690	5700	6780	11480700
.02	96	34800	52400	64200	79300	90600	102000	11481000
0	94	5690	8140	9740	11700	13200	14600	11481200
0	90	2	6	9	15	20	26	11481300
0	100	33	59	80	108	131	155	11482400
.02	96	25600	36900	44400	53600	60400	67100	11482500
0	100	12	28	41	63	81	102	11517840
0	100	23	63	105	179	249	333	11518310
0	100	55	110	155	223	280	341	11518400
0	100	3	6	9	13	17	22	11518610
.18	81	7710	16100	23300	34200	43600	54100	11519500
0	100	521	1030	1460	2080	2600	3160	11520520
.10	95	7860	14100	18900	25600	31000	36700	11521500
0	100	35	66	90	124	152	182	11522210
0	100	408						11522260
.26	97	8070	14000	18400	24400	29100	34100	11522300
0	100							11522430
.23	96	20200	37400	51000	70700	86800	104000	11522500
0	95	139	499	944	1830	2770	3990	11522900
0	100	56	106	145	201	248	297	11523060
0	100	53	98	134	184	226	270	11523100
	93	6260	11400	15400	21100	25600	30400	11523200
0	100	120	220	297	406	493	586	11525300
.23	94	14900	26900	36200	49200	59800	70900	11525500
0	100	16	36	52	78	101	125	11525650
	99	1610	2640	3380	4360	5130	5910	11525900
0	100	489	1160	1780	2790	3690	4720	11527010
0	100	218						11527550
0	100	176						11528090
0	100							11528110
1.	100	40	71	95	128	154	182	11528480
.01	98	11700	19900	26000	34300	40800	47600	11528500
.01	99	29100	46400	58700	74700	87000	99400	11529000
0	100	629	1050	1350	1760	2080	2410	11529950
.09	99	52900	89900	117000	154000	183000	212000	11530000

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
NORTH COAST REGION--Continued									
151	11530150	12	3.56	55	3.8	32	1250	2.1	2.3
152	11530850	13	.29	80	6.2	30	1740	1.1	2.2
153	11530950	14	.77	90	6.0	29	1650	1.1	1.2
154	11531000		130	104	6.0	29	132	24.2	1.7
155	11532000		291	100	6.0	30	130	37.3	1.6
156	11532500		609	101	6.0	30	84	39.5	1.5
→ 157	11533000	Lopez Cr. 15	.92	80	4.8	28	375	2.0	.6
NORTHEAST REGION									
158	10353985	180	1.53	10	1.2	42	166	2.9	5.1
159	10354700	179	2.26	20	2.4	42	705	3.2	5.2
160	10356300	177	.83	28	2.1	41	610	1.7	5.3
161	10357000		7.20	28	2.0	42	585	4.8	5.6
162	10358470	52	3.08	16	2.0	43	353	3.7	5.6
163	10359100	178	5.63	11	1.4	42	358	5.2	4.9
164	10359250		24.8	49	2.2	42	144	12.0	6.4
165	10359270	72	4.70						
166	10359290	75	4.70						
167	10359320*	71	1.49						
168	10359350	51	.91	18	1.3	44	307	2.0	5.6
169	10359490	53	.06						
170	10359510	54	4.56	13	1.1	44	122	5.2	6.0
171	10360230		6.36	20	1.2	44	835	5.1	6.5
172	11342945	55	1.06	25	1.6	46	589	2.0	7.1
173	11342960	56	2.36	16	1.5	45	135	5.3	4.9
174	11345800	70	1.59	14	1.3	45	250	3.2	4.9
175	11348080	58	2.54	16	1.2	45	96	2.2	5.0
176	11348560	59	.97	17	1.2	45	11	1.3	4.9
177	11349030	60	.47	16	1.4	45	247	.9	4.3
178	11349850	61	.66	20	1.2	45	364	1.5	4.8
179	11350850	62	9.51	15	1.2	45	261	4.8	6.0
180	11352620	63	.31	15	1.7	45	180	.7	3.8
181	11352900	73	23.2						
182	11353600	64	6.46	36	2.3	45	216	5.2	4.6
183	11355100	65	5.15	26	2.4	43	247	6.7	6.0
184	11355400	74	.62						
185	11359800	66	.16	44	2.5	45	192	.9	3.2
186	11488700	67	1.74	17	1.1	45	48	2.7	4.2
187	11489350	68	9.98	16	1.8	42	56	5.8	5.3
188	11489500		18.6	28	1.7	44	95	9.4	5.6
189	11513500[1]		12.9	35	1.4	38	620	4.6	4.2
SIERRA REGION									
190	10264870	380	8.60	10	1.6	40	696	7.1	5.8
191	10264878		10.4	7	1.7	48	452	5.2	4.4
192	10265200		18.2	27	2.5	36	595	9.2	9.2
193	10265700		35.8	27	2.3	37	266	13.6	9.2
194	10267000		36.4	31	2.4	37	612	11.6	8.3

See footnotes at end of table.

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	Station number
NORTH COAST REGION--Continued								
0	95	201	335	434	566	669	776	11530150
0	100	40	60	74	91	104	117	11530850
0	100	123	215	284	379	454	533	11530950
.02	95	14600	21100	25500	30800	34800	38700	11531000
	98	48900	80400	103000	133000	157000	181000	11532000
.02	100	79600	117000	142000	174000	198000	222000	11532500
0	98	152	286	393	546	671	805	11533000
NORTHEAST REGION--Continued								
0	1	2						10353985
0	95	10	25	43	76	111	158	10354700
0	80	25	61	100	170	242	334	10356300
0	85	79						10357000
1.	100	40	80	117	176	231	297	10358470
0	1	18	180	367	671			10359100
1.	98	78	139	192	272	342	423	10359250
		4						10359270
		87						10359290
								10359320
0	50	10	19	28	43	57	74	10359350
		4	6	8	11	13	16	10359490
0	15	66	93	112	137	157	178	10359510
0	50	48						10360230
0	20	58	84	102	127	147	168	11342945
0	15	55	99	135	191	241	297	11342960
0	10	29						11345800
0	70	108	141	164	192	214	236	11348080
0	50	21	32	40	51	61	71	11348560
0	20	32	45	53	64	73	82	11349030
0	80	33	58	80	113	143	176	11349850
0	60	14	29	40	57	72	90	11350850
0	30	14						11352620
		130						11352900
0	100	88	244	424	778	1160	1660	11353600
0	60	3	9	13	20			11355100
		55						11355400
0	100	11	18	23	31	38	45	11359800
0	5	47	114	186	317	451	622	11488700
0	90	48	119	193	331	472	654	11489350
0	90	282	528	742	1080	1380	1740	11489500
0	90	123						11513500
SIERRA REGION--Continued								
0	40	3						10264870
0	40	24	104	209	420	644	931	10264878
5.	20	102	156	195	247	289	332	10265200
.70	65	114	172	215	271	316	363	10265700
.63	24	229	326	387	461	513	564	10267000

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic: Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
			SIERRA REGION--Continued						
195	10281800		18.1	23	1.9	37	991	7.1	8.0
196	10284800	381	1.54	20	2.2	36	1760	3.5	8.7
197	10287210	386	13.1	19	1.7	39	182	6.4	7.6
198	10287400		51.3	33	2.8	33	382	12.6	9.5
199	10287900		34.9	31	2.5	34	313	11.5	9.5
200	10290000		8.26	35	2.2	36	1130	3.8	8.5
201	10291500		44.1	41	2.5	35	190	15.3	9.2
202	10292000		52.8	25	2.1	38	260	11.8	8.4
203	10292300	387	.79	9	1.6	36	323	2.0	6.9
204	10295450	391	.97	22	2.2	35	752	2.8	8.3
205	10295500		63.0	35	2.4	35	230	13.7	8.8
206	10296000		180	41	2.5	33	84	25.4	8.8
207	10296800*	389	.14				445	1.0	6.0
208	10299120[2]		5.05	7	2.0	42	552	3.8	6.6
209	10304000		11.7	51	2.8	34	365	4.2	7.9
210	10304500		19.6	46	3.1	30	456	6.2	7.5
211	10306000		14.3	45	3.5	32	284	7.5	7.2
212	10308100	390	5.10	30	2.7	34	629	6.4	7.2
213	10309000[3]		341	34	2.8	34	66	48.0	6.5
214	10310000		65.6	41	3.4	32	103	17.5	6.9
215	10310500[4]		15.5	23	2.3	40	493	8.0	6.7
216	10311000[5]		876	24	2.4	36	37	78.0	5.7
217	10311450[6]		12.7	13	1.2	40	208	6.4	5.4
218	10336635	151	.64	50	3.6	35	1090	1.4	7.0
219	10336660		11.2	68	3.7	34	201	5.4	6.7
220	10337900	184	1.05	40	1.4	36	430	3.1	6.4
221	10339200	185	2.80	37	1.3	37	418	3.4	6.9
222	10339900		7.47	37	1.4	34	222	7.0	6.5
223	10340500		53.6	45	3.9	36	78	14.7	6.7
224	10342000		36.5	56	3.8	36	50	14.4	7.2
225	10343500		10.8	53	3.8	36	381	4.9	7.1
226	10344400		146	40	3.1	38	48	30.4	6.2
227	10347600[7]		11.5	20	2.0	36	565	7.0	6.8
228	10348900[8]		8.50	23	2.3	40	578	7.4	7.4
229	11185300		23.6	25	2.2	33	161	8.2	9.6
230	11185400		132	37	3.9	36	198	23.8	6.9
231	11185600	351	4.05	19	2.2	42	1120	4.2	5.6
232	11186000		846	33	3.0	35	84	63.8	6.0
233	11186340		.46	23	1.9	42	930	1.0	7.7
234	11186360		.30	22	1.9	42	1200	.7	7.6
235	11186380		.23	21	1.9	42	1090	.7	7.6
236	11187200	352	.27	17	2.0	45	1540	.8	4.2
237	11188200		146	26	2.2	34	51	30.2	8.4
238	11189500		530	22	1.7	36	74	75.0	6.6
239	11190000		982	18	1.6	39	76	95.5	5.8
240	11191800	353	1.24	15	1.8	51	1690	2.1	4.5
241	11199300	354	10.8	17	1.6	54	181	6.8	1.7
242	11199500		92.9	22	2.6	54	218	23.2	2.7
243	11202450	355	.30	37	2.7	45	2520	.7	4.3
244	11203300*	366	.46						
245	11203500		253	34	3.0	46	246	30.8	3.6
246	11204500		109	31	3.0	49	314	17.6	2.8

See footnotes at end of table.

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
				SIERRA REGION--Continued				
1.	50	49	90	124	175	219	268	10281800
0	40	6	20	37	72	111	164	10284800
0	25	9						10287210
	42	227	366	493	702	902	1150	10287400
	31	299	420	497	590	673		10287900
1.	25	34						10290000
.14	29	408	590	717	885	1020	1150	10291500
.03	29	83	225	393	728			10292000
0	60	4	27	79	248	520	1020	10292300
0	10	2						10295450
.20	31	340	547	706	932	1120	1320	10295500
.42	50	1890	2860	3580	4560	5350	6190	10296000
		2	25	96	407	1040		10296800
1.	95							10299120
0	90	237						10304000
0	38	460	805	1080	1490	1830	2210	10304500
0	60	424	694	901	1190	1430	1690	10306000
0	80	50	128	212	363	515	708	10308100
.16	61	2490	4530	6570	10200	14000	18900	10309000
.32	64	851	1510	2080	2980	3810	4780	10310000
0	80	43	82	116	168	212		10310500
.68	52	2050	6100	12000	24000	36000	48000	10311000
0	70	3	19	48	131	252	457	10311450
0	100	8	17	24	36	47	60	10336635
0	98	540	1120	1650	2500	3280	4190	10336660
0	100	18	58	107	205	314	462	10337900
0	98	20	42	63	97	129	166	10339200
0	90	97	237	380	631	879	1190	10339900
.27	83	931	2000	3000	4640	6170	7980	10340500
1.11	84	1030	2380	3710	5980	8170	10800	10342000
0	87	126	277	420	658	881	1150	10343500
1.03	86	1220	2570	3870	6080	8220	10800	10344400
0	30	44		501	1563	3590		10347600
0	40							10348900
1.	77	86	157	217	306	384	471	11185300
	93	907	2520	4350	7820	11500	16200	11185400
0	90	12	80	221	660	1340	2560	11185600
.47	80	2970	6770	10900	18600	26800	37700	11186000
0	100	2						11186340
0	100	1						11186360
0	100	1						11186380
0	100	4	28	38				11187200
	79	378	957	1570	2660	3760	5140	11188200
0	87	727	2050	3610	6700	10100	14700	11189500
0	69	576	1830	3380	6550	10100	14900	11190000
0	100	1	15	52	198	478	1060	11191800
0	80	1	17	131	1210	5150	19100	11199300
0	78	222	911	1930	4310	7290	11700	11199500
0	100	1	12	36	118	257		11202450
								11203300
.04	91	2450	6640	11200	19500	27900	38500	11203500
0	95	843	2440	4290	7880	11700	16800	11204500

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SIERRA REGION--Continued									
247	11204950	356	1.13	14	1.5	54	396	1.4	1.2
248	11206500		102	44	5.0	42	383	18.7	5.1
249	11208000		51.4	44	5.5	42	618	13.6	5.8
250	11208500	357	1.90	24	2.5	42	967	2.8	3.5
251	11208630*	367	.66						
252	11208730		85.8	47	4.0	37	375	17.5	5.7
253	11209000	358	6.11	42	2.9	42	570	4.2	8.1
254	11209500		129	36	6.0	40	302	22.6	4.5
255	11210500		519	39	5.0	39	260	32.8	4.0
256	11212000		31.6	19	3.0	51	133	10.9	1.1
257	11212450	359	9.73	35	5.0	30	903	6.6	8.0
258	11213500		952	41	5.0	32	202	52.5	5.2
259	11214000		37.7	55	3.0	30	329	9.6	9.5
260	11214200		15.0	45	4.0	30	358	7.8	9.1
261	11214500		34.7	42	3.0	30	143	8.9	8.5
262	11215000		181	48	3.4	32	193	21.0	7.9
263	11215500		21.3	45	3.8	30	337	6.6	7.5
264	11215800		.86	50	3.8	35	681	1.8	7.3
265	11215820		.85	50	3.8	35	627	1.7	7.4
266	11215830		.27	50	3.8	35	844	1.2	7.3
267	11215840		.77	50	3.8	35	713	2.0	7.1
268	11216000		229	47	3.7	32	202	26.6	7.1
269	11216800		7.60	48	3.5	30	311	4.9	6.9
270	11217000		50.7	46	4.2	33	315	14.2	7.2
271	11217500		19.0	50	3.7	30	403	7.5	7.8
272	11218000		132	42	3.8	35	330	27.1	5.3
273	11220000		70.0	35	3.5	43	302	17.6	3.1
274	11220500		56.1	28	3.5	49	269	12.6	2.5
275	11221700		127	26	2.5	49	141	31.2	2.3
276	11222000		1687	38	4.0	37	111	78.7	4.0
277	11222600	360	.14	17	1.4	53	1460	1.0	2.3
278	11226000		35.5	60	3.0	38	449	8.9	8.7
279	11226500		249	46	2.6	38	190	25.2	6.6
280	11230500		52.5	35	2.7	31	325	14.3	9.3
281	11231500		92.5	39	2.7	32	229	17.5	9.1
282	11232500		12.1	50	4.0	30	403	5.9	7.8
283	11234500		60.1	45	5.4	32	376	12.2	6.6
284	11235300	361	.68	45	3.7	31	800	1.3	9.0
285	11237200	362	1.24	45	3.5	33	449	1.2	7.5
286	11237500		22.9	50	3.5	30	247	7.7	7.8
287	11242400		16.9	64	4.8	30	426	7.0	6.4
288	11247200	363	.46	22	1.6	50	1080	1.4	2.5
289	11248000		92.6	25	3.5	51	118	17.6	1.6
290	11250500		35.7	17	1.8	54	101	10.8	.9
291	11251500		57.8	16	1.8	52	36	16.9	.6
292	11257100		10.6	41	3.5	36	329	7.7	4.5
293	11257500		133	34	5.6	48	110	28.2	2.3
294	11257700	364	8.17	26	1.7	49	200	5.2	2.4
295	11257800*	365	.05						
296	11258000		258	26	3.0	50	43	42.3	1.1
297	11258800		57.8	37	4.1	50	160	17.6	2.1
298	11258900		33.6	34	3.9	51	175	14.0	2.7
299	11258920		13.6	28	2.6	42	122	11.7	3.0

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
				SIERRA REGION--Continued				
0	0	1						11204950
.43	73	1760	5420	9850	18700	26500	41600	11206500
.25	76	976	2470	4030	6650	9670	13200	11206000
0	95	21	108	261	670	1240	2160	11208500
								11208630
	84	1050	2300	3490	5470	7330	9550	11208730
0	100	107	350	657	1290	2010	3000	11209000
0	97	1800	4640	7670	13100	18700	25600	11209500
.16	87	5210	11300	17600	28600	39800	53900	11210500
0	96	172	718	1530	3460	5480	9510	11212000
0	70	65	153	240	390	535	712	11212450
.58	58	9430	16900	23300	33300	42200	52600	11213500
1.24	52	803	1200	1490	1880	2180	2500	11214000
3.	50	319	469	576	718	829	945	11214200
.50	95	813	1590	2260	3320	4250	5320	11214500
.60	74	3950	5970	7430	9420	11000	12600	11215000
1.	95	268	408	510	647	756	871	11215500
0	100	13	36	60	104	150	208	11215800
0	100	10	25	41	70	99	136	11215820
0	100	5	15	27	50	75	109	11215830
0	100	14	39	69	127	188	269	11215840
.52	79	4940	8560	11500	15700	19200	23100	11216000
0	100	404	928	1440	2320	3160	4160	11216800
.48	97	1050	1780	2350	3170	3850	4590	11217000
0	100	364	651	885	1230	1530	1860	11217500
.20	99	1940	3190	4140	5500	6620	7830	11218000
0	100	1810	4670	7700	13200	18800	25800	11220000
0	87	1470	3810	6290	10800	15400	21200	11220500
	97	894	4350	10000	24800	44600	75800	11221700
.41	73	15800	27700	37900	53800	68000	84500	11222000
0	80	2	7	15	35	59	97	11222600
1.02	14	1370	1980	2420	2990	3440	3900	11226000
1.47	77	4340	6650	8350	10700	12500	14500	11226500
2.50	49	724	1030	1230	1500	1710	1920	11230500
1.24	59	1020	1360	1570	1840	2030	2230	11231500
1.	95	252	437	585	802	984	1180	11232500
.10	96	901	1970	2980	4660	6230	8110	11234500
0	60	14	36	59	99	138	188	11235300
0	100	17	37	57	90	121	158	11237200
1.	96	506	995	1440	2150	2810	3590	11237500
0	100	497						11242400
0	100	7	22	39	74	113	165	11247200
.02	98	1740	4590	7670	13300	19100	26400	11248000
.08	84	65	270	573	1290	2180	3520	11250500
0	77	346	868	1410	2390	3360	4580	11251500
0	100	189	464	748	1250	1750	2370	11257100
.07	99	1460	3610	5740	9360	12800	16900	11257500
3.	90	67	269	559	1230	2060	3280	11257700
								11257800
.09	99	2280	6840	12200	22700	33900	48700	11258000
	92	1500	3360	5140	8130	11000	14400	11258800
	94	873	3050	5930	12100	19300	29400	11258900
0	100	543	1230	1900	3020	4100	5400	11258920

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SIERRA REGION--Continued									
300	11258940		17.1	25	2.2	42	146	7.3	1.6
301	11259000		235	26	3.2	52	74	37.7	1.4
302	11260200		24.9	26	2.4	48	100	10.9	1.7
303	11260210	101	1.23	18	2.2	54	265	1.8	1.5
304	11264500		181	54	3.5	32	144	19.8	7.2
305	11265000		46.9	55	3.5	31	490	13.4	6.6
306	11266500		321	53	3.8	33	235	28.6	6.4
307	11267700	126	1.05	55	4.9	42	909	2.7	7.0
308	11268000		241	56	5.0	43	207	42.5	4.9
309	11268500		911	49	4.5	42	125	62.4	4.0
310	11269300		17.0	32	3.0	50	169	6.7	2.4
311	11269350	127	2.27	27	2.8	52	395	2.3	2.3
312	11271300	102	3.88	18	2.0	59	128	3.5	.8
313	11274730	152	2.94	41	3.3	30	638	2.8	9.7
314	11275000		46.0	60	3.0	38	164	21.2	7.5
315	11277000		111	58	3.2	42	223	25.7	7.0
316	11279300	153	.68	50	4.2	42	465	1.0	7.5
317	11281000		87.0	48	4.2	46	242	24.5	5.1
318	11282000		73.5	47	4.0	46	216	29.7	5.4
319	11283100		11.9	53	3.8	36	206	7.1	8.0
320	11283200		9.11	48	4.0	36	395	6.1	7.4
321	11284500		25.0	38	3.9	49	43	9.1	2.8
322	11284700		23.1	48	5.2	43	127	12.9	5.5
323	11284800	128	1.38	48	5.0	44	132	2.8	5.3
324	11286300	129	.26	29	3.5	47	456	.9	2.9
325	11292500		67.5	47	2.8	30	252	17.2	5.4
326	11292680	154	4.97	49	3.5	40	561	3.5	7.1
327	11293300*	155	.09				1818	.4	8.3
328	11293500		27.8	60	3.6	36	136	9.3	5.0
329	11294500		163	54	4.0	44	123	35.9	5.4
330	11305500		48.0	32	3.5	46	150	28.5	2.7
331	11306000		118	32	2.3	47	116	31.7	2.2
332	11306500		53.0	34	2.5	46	92	22.8	1.8
333	11307000		16.6	37	3.3	46	132	11.9	2.2
334	11307500		34.6	31	3.4	46	136	16.5	2.0
335	11308000		85.2	34	2.5	46	82	24.2	1.6
336	11308300	130	1.97	34	3.1	46	200	2.8	2.5
337	11308500		23.6	32	3.1	47	189	6.8	1.7
338	11309000		21.1	23	2.2	47	55	11.0	.8
339	11311400	103	.15	22	2.2	47	340	.3	.8
340	11312000		47.6	18	2.0	48	17	23.0	.2
341	11315000		20.4	60	4.0	37	228	10.5	7.2
342	11316650	131	1.48	44	3.8	45	298	2.5	4.1
343	11316800		20.8	45	4.0	43	156	15.4	4.4
344	11317000		68.4	45	3.5	43	168	22.0	3.9
345	11318500		75.1	43	3.5	44	166	24.0	3.6
346	11327000		48.1	36	3.5	45	135	19.9	2.3
347	11327800	104	3.30	20	2.2	48	89	2.4	.4
348	11329000		8.44	18	2.1	47	23	6.4	.2
349	11329500		329	27	2.5	47	50	53.8	1.1

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
				SIERRA REGION--Continued				
0	100	315	985	1800	3450	5270	7730	11258940
.03	93	3550	10500	18400	33000	48000	66900	11259000
0	100	1490	3120	4620	7050	9290	11900	11260200
0	60	29	123	268	621	1070	1760	11260210
.83	66	2660	4060	5140	6680	7950	9350	11264500
1.28	64	1060	1740	2300	3150	3890	4740	11265000
.87	70	4580	7660	10300	14200	17700	21800	11266500
0	95	14	29	42	64	83	105	11267700
.25	87	4760	11100	17300	28000	38300	50900	11268000
.33	85	12000	25200	37700	58400	78000	102000	11268500
0	100	595	1710	2990	5470	8100	11600	11269300
0	100	217						11269350
0	50	376	813	1230	1900	2540	3290	11271300
0	50	105	133	152	174	190	206	11274730
3.26	56	1220	2080	2840	4090	5270	6680	11275000
1.98	80	4090	6380	8140	10600	12700	15000	11277000
0	100	23	56	89	148	205	275	11279300
0	97	1450	3240	4940	7740	10300	13400	11281000
0	93	770	1390	1910	2720	3430	4250	11282000
3.	100	709	1200	1580	2130	2580	3080	11283100
0	98	360	621	830	1130	1390	1670	11283200
0	90	797	2550	4710	9140	14100	20800	11284500
0	95	451	1090	1740	2880	3990	5370	11284700
0	95	66	100	125	157	183	211	11284800
0	95	25	46	63	89	111	136	11286300
0	61	1230	2000	2590	3410	4090	4810	11292500
0	100	147	319	482	752	1000	1300	11292680
		8	15	21	31	40	51	11293300
	90	767	1340	1800	2470	3040	3660	11293500
	82	4480	9500	14500	23300	32000	42900	11294500
	98	991	1710	2280	3120	3820	4590	11305500
.18	97	4310	9040	13400	20500	27000	34600	11306000
.12	91	1130	3030	5090	8920	12900	17900	11306500
0	90	1010	1730	2300	3130	3820	4590	11307000
	92	1070	2420	3740	5980	8100	10700	11307500
.13	92	2210	3810	5080	6930	8480	10200	11308000
0	80	64	114	155	216	268	326	11308300
0	90	378	1040	1770	3150	4590	6440	11308500
0	37	1040	1720	2220	2890	3410	3950	11309000
0	40	7	18	29	49	68	92	11311400
.84	17	861	1450	1880	2470	2940	3420	11312000
1.	98	1120	2090	2950	4330	5590	7060	11315000
0	100	22	45	65	96	125	158	11316650
0	98	371	953	1570	2690	3820	5240	11316800
.12	93	742	1610	2380	3600	4680	5910	11317000
.02	93	1330	2880	4320	6670	8840	11400	11318500
0	97	882	2350	3950	6920	9960	13900	11327000
0	90	60	169	291	523	766	1080	11327800
1.	0	244						11329000
.27	61	3450	9180	15200	25700	35900	48500	11329500

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
			SIERRA REGION--Continued						
350	11332500		18.2	52	4.0	48	167	11.4	4.0
351	11333500		205	45	4.7	44	126	45.6	3.1
352	11334200		107	49	4.1	43	149	31.9	3.5
353	11334300		64.3	38	3.5	45	123	22.8	2.5
354	11335000		536	41	4.0	45	97	64.3	2.7
355	11335650	132	6.62	29	2.7	47	93	4.0	1.4
356	11364550	27	2.61	51	4.3	47	369	3.5	2.8
357	11365500		64.0	74	5.8	46	79	21.0	1.8
358	11367500		358	55	4.0	44	102	34.6	4.4
359	11369000		673	34	4.8	45	54	77.0	2.6
360	11372060		11.9	50	4.1	48	66	6.2	.8
361	11372200		77.3	42	2.5	47	185	26.2	2.5
362	11373200		11.0	45	3.4	48	180	8.5	2.2
363	11374000		425	45	5.2	48	101	40.5	2.0
364	11374060	32	3.25	35	2.5	47	328	4.8	2.8
365	11376100*	24	3.67						
366	11376200	31	1.80	60	4.5	43	316	2.3	6.1
367	11376550		357	37	5.0	46	143	39.0	2.6
368	11377500		92.7	31	5.8	49	122	31.8	1.9
369	11378000		9020	37	4.5	46	17	298	2.4
370	11379000		123	36	5.0	47	146	35.1	2.3
371	11381500		131	43	3.8	47	115	50.9	2.8
372	11382950*	164	1.26						
373	11383500		208	47	5.5	45	104	54.6	2.8
374	11384000		72.4	63	5.0	46	139	31.6	2.3
375	11389650*	163	3.76						
376	11390045	133	.62	65	3.0	47	292	1.4	2.5
377	11390200	109	1.31	26	2.5	47	32	1.8	.2
378	11391423	182	7.08	33	5.0	37	169	5.7	6.4
379	11391460		7.60	50	6.0	40	450	4.5	6.0
380	11391480	181	.33	17	3.0	41	412	1.4	5.3
381	11391500		45.5	22	3.7	39	16	15.0	5.8
382	11392300	156	1.08	27	3.0	39	332	2.2	5.2
383	11392500		686	20	2.8	39	26	53.1	5.1
384	11394500		1062	37	6.0	40	38	105	3.4
385	11394620		9.89	85	6.0	44	210	8.4	4.8
386	11394800		8.09	69	5.0	41	250	6.4	5.7
387	11395300		14.1	80	5.5	43	150	9.1	4.2
388	11396400		18.7	58	6.0	45	327	10.0	2.5
389	11397000		132	62	6.0	43	141	39.9	3.0
390	11397500		1341	41	6.0	40	46	125	2.7
391	11397900*	165	7.67						
392	11397970	157	1.66	36	4.5	41	452	2.8	5.1
393	11400000		69.0	54	5.0	42	85	16.7	5.0
394	11401460	176	3.79	44	3.8	41	1180	3.2	5.2
395	11401500		739	30	2.5	40	54	58.0	4.7
396	11401940	158	6.72	45	4.0	40	601	4.5	5.0
397	11402000		184	68	4.0	40	83	20.6	3.9
398	11402700	159	1.36	50	4.3	41	1020	1.9	3.9
399	11403000		1025	37	5.0	40	47	80.0	4.3

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
				SIERRA REGION--Continued				
0	100	296						11332500
.26	99	2770	6290	9520	14700	19300	24500	11333500
	95	2100	5440	9020	15500	22200	30500	11334200
	98	1520	2870	4030	5800	7360	9120	11334300
.14	87	9410	20700	30300	44200	55700	68100	11335000
0	50	608	992	1280	1700	2040	2400	11335650
0	90	434	607	724	877	993	1110	11364550
	100	6540	10700	13800	18200	21700	25600	11365500
	82	2440	4530	6350	9220	11800	14800	11367500
.01	96	13600	23800	32000	44100	54300	65600	11369000
0	95	1440						11372060
	97	4220	5470	6280	7290	8030	8760	11372200
0	95	1120	1760	2230	2880	3400	3950	11373200
.07	91	22700	32200	38700	47200	53700	60300	11374000
0	90	138	236	315	428	523	627	11374060
								11376100
0	100	40	89	134	210	282	367	11376200
.21	86	6900	12200	16400	22600	27700	33400	11376550
.05	71	4120	6830	8930	11900	14400	17000	11377500
.58	71	110000	168000	207000	256000	292000	323000	11378000
.02	96	5360	9070	12000	16100	19400	23100	11379000
.07	90	5160	9170	12400	17100	21000	25300	11381500
								11382950
.09	98	5210	9780	13500	19100	23800	29000	11383500
.01	97	3530	6070	7950	10500	12500	14500	11384000
								11389650
0	90	22	42	58	82	103	127	11390045
0	1	120	179	220	277	321	367	11390200
0	100	42	84	122	181	235	297	11391423
0	100	110	270	436	730	1020	1380	11391460
0	1	13						11391480
.02	77	467	1200	1470	3350	4750	6500	11391500
0	60	22	45	67	102	134	172	11392300
.02	54	3230	6980	10500	16100	21300	27400	11392500
.17	65	17300	35300	51400	77200	101000	128000	11394500
0	95	630	1400	2130	3350	4500	5890	11394620
0	100	517	1300	2110	3560	5020	6830	11394800
0	98	1300	2910	4450	7050	9520	12500	11395300
0	100	755	1340	1820	2520	3120	3790	11396400
.11	96	4690	9470	13600	19800	25200	31200	11397000
.15	71							11397900
		18400	38900	57900	88900	117000	151000	11397500
0	100	33	78	122	197	270	358	11397970
.01	95	563	1080	1530	2220	2830	3530	11400000
.10	70	59	137	214	345	471	624	11401460
0	80	4740	10400	15800	24800	33100	43000	11401500
0	97	189	431	668	1070	1450	1920	11401940
.16	86	4850	9940	14300	21000	26800	33300	11402000
0	100	47	134	234	426	630	897	11402700
.08	82	13000	25100	35600	51900	66400	82900	11403000

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SIERRA REGION--Continued									
400	11403340	160	0.79	70	5.8	44	2180	1.7	4.2
401	11404000		5.20	80	6.0	42	89	3.0	5.3
402	11407000		3624	46	6.0	42	51	125	3.1
403	11407400	110	1.72	21	2.0	47	8	2.1	.1
404	11407500		30.6	41	4.7	46	149	10.7	1.3
405	11409300*		23.0	64	6.2	45	156	16.0	3.6
406	11409500		34.4	60	6.0	42	171	20.7	3.1
407	11410400		18.2	70	4.5	38	130	7.7	6.7
408	11410500		94.7	50	4.5	38	260	14.0	5.6
409	11412000		8.98	70	6.0	40	638	5.7	4.1
410	11412500		12.9	75	4.5	40	521	6.9	4.1
411	11412700	135	.24	70	6.0	40	1840	1.5	4.3
412	11413000		250	60	4.5	38	168	32.0	4.4
413	11413600	136	2.68	42	4.0	45	179	2.8	2.2
414	11413900		3.96	67	4.5	50	350	3.6	7.4
415	11413950	161	.92	72	5.0	36	350	2.0	6.3
416	11417100		23.1	65	6.0	38	345	11.7	4.3
417	11420000		20.4	55	5.5	45	217	4.5	2.5
418	11420300	137	1.95	39	4.0	44	272	2.3	2.3
419	11420500		71.3	50	5.0	45	87	19.4	1.7
420	11423050	138	5.65	38	3.6	44	107	4.7	1.7
421	11424600	111	.59	26	3.2	44	253	1.3	.7
422	11426110		.65	62	4.5	36	778	1.4	6.7
423	11426120		.39	61	4.5	36	1010	1.2	6.8
424	11426130		.48	62	4.5	36	1180	1.1	6.7
425	11426140		.19	61	4.5	36	757	1.1	6.6
426	11426150		3.58	61	4.5	36	525	2.6	6.4
427	11426160		.80	61	4.5	36	707	1.9	6.7
428	11426400		9.10	55	4.5	43	152	4.2	3.8
429	11427000		342	62	5.0	40	101	59.4	4.0
430	11427500		47.9	65	4.5	36	45	15.2	5.8
431	11427700		9.94	70	5.0	36	142	5.0	6.0
432	11431000		195	56	4.0	36	136	34.4	5.4
433	11432500		15.1	58	4.8	41	114	10.5	4.6
434	11433100		18.0	62	5.5	40	260	10.6	5.3
435	11433400		12.5	45	4.0	44	160	7.1	7.4
436	11433500		612	59	4.8	39	91	78.8	3.4
437	11434000		997	60	3.2	40	79	90.4	3.3
438	11437560	162	3.62	52	4.0	36	205	3.1	8.3
439	11440000		22.1	52	5.1	40	264	11.7	5.5
440	11440500		7.32	50	5.0	41	259	5.6	4.7
441	11440850	139	.49	62	5.3	36	220	1.1	5.2
442	11441000		83.0	59	4.2	37	168	19.9	6.0
443	11441500		27.5	58	4.2	37	208	15.3	6.5
444	11442000		177	58	4.2	39	128	42.8	4.6
445	11443500		493	56	4.5	38	98	50.5	3.7
446	11446000		97.6	54	4.5	45	94	29.8	1.8
447	11446500		1888	53	4.7	41	56	109	2.5
448	11447300	113	.39	20	2.2	48	56	.8	.1

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	Station number
				SIERRA REGION--Continued				
0	70	24	52	78	121	162	209	11403340
0	90	476	894	1250	1790	2260	2800	11404000
	80	50300	99900	138000	192000	234000	277000	11407000
0	10	46	94	138	208	271	345	11407400
	94	2810	5360	7540	10900	13800	17200	11407500
0	100							11409300
0	98	1370	2570	3560	5050	6340	7770	11409500
0	95	446						11410400
.53	95	1940	3920	5690	8510	11100	14000	11410500
0	76	293	550	768	1100	1390	1720	11412000
0	86	448	856	1210	1750	2220	2760	11412500
0	100	19	44	69	111	152	201	11412700
.16	97	7010	13300	18700	27000	34400	42700	11413000
0	95	245	437	593	824	1020	1240	11413600
0	80	173						11413900
0	95	155	313	454	678	880	1110	11413950
0	100	1080	2370	3610	5670	7610	9930	11417100
1.	95	879	1360	1710	2200	2590	2990	11420000
0	85	150	219	267	331	381	432	11420300
0	95	4750	7990	10500	14200	17200	20500	11420500
1.	80	345	702	1020	1530	2000	2530	11423050
0	90	131	263	380	566	734	928	11424600
0	95	12						11426110
0	80	14						11426120
0	100	14						11426130
0	100	4						11426140
0	90	173	458	767	1340	1920	2660	11426150
0	95	17						11426160
1.	98	449	931	1370	2080	2720	3480	11426400
	90	13400	28300	41800	63700	83600	107000	11427000
0	89	840	3500	7460	16800	28600	46300	11427500
1.	100	556	1300	2030	3290	4510	6000	11427700
.78	72	8140	17400	26100	40300	53500	69100	11431000
0	82	385	939	1510	2510	3490	4710	11432500
0	100	629	1720	2930	5200	7560	10600	11433100
0	95	705	1050	1290	1620	1880	2140	11433400
.25	87	15300	33200	51000	81900	113000	151000	11433500
.25	88	25000	49600	71500	106000	137000	172000	11434000
1.	80	145	224	282	362	425	492	11437560
0	100	452	1130	1860	3190	4560	6300	11440000
0	100	154	380	613	1030	1440	1950	11440500
0	100	25	60	96	159	221	298	11440850
.31	87	2790	5280	7420	10700	13600	17000	11441000
1.02	81	727	1160	1530	2080	2560	3110	11441500
.28	92	4170	8550	12600	19300	25500	32900	11442000
.70	84	7340	16100	24400	37800	50200	64800	11443500
.20	83	4090	6800	8910	11900	14400	17100	11446000
.25	85	32500	72100	108000	164000	214000	271000	11446500
0	1	48	82	109	148	181	217	11447300

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
CENTRAL COAST REGION									
449	11141150*		13.5	21	2.7	43	91	5.1	0.8
450	11141160*		3.11	21	2.7	43	367	4.1	1.2
451	11141280*		21.6	21	2.8	41	113	11.1	1.0
452	11141400*		18.2	18	2.3	42	69	7.9	.4
453	11141500		102	20	3.5	46	74	23.0	.8
454	11141600*		15.0	17	2.3	42	89	7.5	.6
455	11142150	414	1.33	25	3.4	43	338	1.9	.6
456	11142200		12.5	27	3.4	42	132	7.0	1.0
457	11142500		41.2	31	3.5	41	60	16.0	.4
458	11142600	278	1.31	33	2.4	41	1200	2.1	2.0
459	11142800	279	.82	35	4.6	40	1530	1.8	1.4
460	11143000		46.5	51	2.9	40	159	14.8	1.4
461	11143050	280	2.75	25	2.9	39	603	4.0	1.2
462	11143190	281	2.14	18	2.2	41	472	3.5	1.0
463	11143300*		14.3	15	1.8	40	59	7.2	.2
464	11143500		73.8	19	3.5	48	34	15.3	1.6
465	11144000		9.56	17	2.9	50	197	6.4	1.9
466	11145200	415	.34	19	2.6	47	371	1.0	1.5
467	11147000		25.3	34	4.0	44	96	8.3	1.3
468	11147040*		2.95	33	3.9	44	99	4.3	1.4
469	11147070		18.2	28	3.2	44	50	11.2	1.2
470	11147630	416	.59	23	2.8	44	228	1.4	1.1
471	11147700	326	9.26	13	2.1	52	156	5.2	1.5
472	11147750	327	4.80	12	2.1	51	104	6.7	1.5
473	11148500		922	13	1.9	50	18	76.3	1.3
474	11148550*	303	.13				133	.5	1.7
475	11148800		140	30	3.2	44	31	30.2	1.2
476	11148820	282	.76	21	3.6	41	253	1.9	1.2
477	11149500		343	29	3.8	42	16	61.2	1.0
478	11149650	283	5.16	18	3.2	41	204	5.8	1.5
479	11150000		284	21	3.0	44	27	41.8	1.2
480	11150020*	304	.50				340	1.0	1.0
481	11150700	305	3.00	12	2.3	42	98	4.2	.6
482	11150800	306	4.80	14	1.8	45	409	3.9	1.9
483	11150950	307	3.24	14	1.8	43	303	4.0	1.2
484	11151600	308	4.25	18	1.8	43	239	4.5	1.6
485	11151950	284	14.8	16	3.8	41	321	8.6	1.9
486	11152000		244	34	3.2	42	72	31.2	1.2
487	11152500		4156	17	2.0	41	10	183.2	.8
488	11152700*	285	.11				167	.6	.1
489	11152900		12.8	19	3.2	45	165	8.6	1.0
490	11153050	309	.17	19	3.8	43	742	.6	.4
491	11153800	310	.91	45	6.0	42	1110	1.6	1.8
492	11153900		21.0	42	5.0	42	172	8.8	1.1
493	11154000		30.4	37	4.8	42	123	11.5	1.0
494	11154100		7.40	29	4.5	41	145	5.6	.8
495	11156450	311	1.24	14	1.7	43	337	2.7	1.4
496	11156500		249	18	2.0	44	36	62.8	2.0
497	11156680	312	9.67	17	2.5	42	389	4.8	1.7
498	11157500		206	18	1.8	44	83	31.6	1.7
499	11158500		586	18	1.8	44	31	89.4	1.6
500	11159150		10.6	30	5.5	42	284	5.0	1.0

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
CENTRAL COAST REGION--Continued								
0	85							11141150
0	100							11141160
0	100							11141280
0	80							11141400
0	79	459	1670	3030	5420	7650	10200	11141500
0	75							11141600
0	10	104	198	266	354	419	484	11142150
0	50	1050	2100	2890	3940	4740	5540	11142200
0	71	7590	14600	19800	26600	31700	36700	11142500
0	100	148	277	369	488	576	662	11142600
0	85	11	24	33	46	56	65	11142800
.02	100	2340	3890	4910	6160	7050	7900	11143000
0	90	11	28	43	66	84	104	11143050
0	30	1	16	51	157	304	533	11143190
1.	30							11143300
.05	76	998	3860	7220	13300	19100	26000	11143500
0	80	38	153	292	548	795	1090	11144000
0	90	10	32	53	88	119	153	11145200
.01	67	1670	3320	4560	6210	7450	8690	11147000
0	60							11147040
0	70	1440	3190	4600	6560	8110	9690	11147070
0	60	5	28	63	139	223	332	11147630
0	5	1	49	254	1260	3240		11147700
0	40	1	14	84	507			11147750
	31	387	2810	7020	17000	28800	44900	11148500
		5	12	18	28	36	44	11148550
	83	13600	25900	34900	46500	55200	63700	11148800
0	95	6	28	58	119	181	259	11148820
0	89	22200	39000	50700	65300	75900	86100	11149500
1.	100	68	183	290	454	591	739	11149650
0	85	3020	9240	15400	25100	33500	42600	11150000
								11150020
0	25	5	23	48	95	143	202	11150700
1.	50	27	158	358	789	1260	1870	11150800
0	20	3	18	32	52			11150950
1.	80	3	19	45	104	169	256	11151600
0	90	5	26	58	123	193	281	11151950
.01	94	7240	14200	19500	26500	31900	37200	11152000
.07	70	7660	26600	47200	82100	114000	150000	11152500
		2	10	22	47	73	106	11152700
0	90	530	1350	2070	3150	4030	4970	11152900
0	1	1	5	8	14	20	27	11153050
0	100	62	185	307	503	673	861	11153800
0	85	2540	4430	5720	7340	8500	9620	11153900
	88	2570	5240	7280	10000	12100	14200	11154000
0	90	320	763	1140	1680	2120	2570	11154100
1.	70	1	8	23	67	126	213	11156450
.35	81	1120	2850	4390	6650	8520	10500	11156500
1.	95	5	20	39	76	112	157	11156680
1.89	9	613	2500	4780	8910	12900	17500	11157500
1.07	45	983	3790	7070	12900	18500	25000	11158500
0	95	486	1260	1950	2990	3840	4750	11159150

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
CENTRAL COAST REGION--Continued									
501	11159200		27.8	35	3.5	41	80	11.7	0.5
502	11159400	286	7.05	28	3.6	42	142	6.8	.5
503	11159700		12.3	35	3.5	40	180	9.8	.6
504	11159770	287	.93	40	6.0	41	342	1.9	1.8
505	11159800		12.2	45	6.0	41	175	7.8	.9
506	11160000		40.2	40	3.5	40	121	17.0	.8
507	11160020*		6.17	52	3.5	40	450	4.2	1.4
508	11160030	288	.26	50	5.5	40	815	.7	.8
509	11160300		11.1	50	6.2	40	200	6.7	.9
510	11160500		111	48	3.6	41	41	20.6	.5
511	11161500		17.3	40	3.5	40	81	8.9	.3
512	11162470	289	.22	35	3.8	40	981	.8	.5
513	11162500		45.9	38	5.0	40	46	20.6	.5
514	11162540		18.3	38	4.5	40	126	11.2	.6
515	11162600		4.83	38	3.4	40	336	3.8	.9
516	11162720		10.8	23	2.3	41	55	4.2	.1
517	11162800		1.82	18	3.1	41	164	2.8	.3
518	11163200		.42	22	3.4	41	220	1.1	.3
519	11164500		37.4	29	3.0	41	154	7.8	.6
520	11166000*		7.24	19	3.0	42	89	6.5	.3
521	11166700	313	.17	25	3.0	43	162	.7	.6
522	11167660		5.72	22	4.8	42	91	4.1	.4
523	11169500		9.22	45	5.0	41	335	5.6	1.3
524	11170000		196	25	2.6	42	39	36.4	1.0
525	11173550	226	.47	20	3.0	47	1030	1.9	1.4
526	11173560	227	.35	24	2.7	46	1160	1.4	1.3
527	11174000		37.0	23	2.5	44	166	14.1	1.4
528	11174450	228	1.13	22	3.2	46	371	3.0	.9
529	11176000		38.2	16	3.5	45	89	18.8	1.8
530	11176500		147	16	3.5	45	32	42.1	1.2
531	11176550	229	3.58	18	3.5	46	227	5.1	.7
532	11179005	230	.28	18	2.4	46	1060	1.1	.6
533	11180500		9.41	22	2.9	43	233	5.1	.6
534	11181000		37.5	24	2.3	42	68	10.6	.4
535	11181400		8.69	16	2.7	43	108	10.5	.5
536	11182030		1.09	15	2.7	43	85	2.5	.1
537	11182100		10.0	22	2.5	42	83	6.1	.4
538	11182300	232	.80	22	2.8	45	177	1.3	.7
539	11182400		15.1	22	2.3	44	99	6.6	.3
540	11182500		5.89	23	2.3	45	102	5.7	.8
541	11183000		50.8	20	2.3	43	47	17.5	.5
542	11183500		79.2	20	2.3	43	44	19.2	.5
543	11185000		1.96	20	4.0	45	260	2.8	.4
544	11185150	251	.20	17	2.1	47	1730	1.2	1.4
545	11224500		95.8	16	2.1	49	79	18.3	1.7
546	11225050*	336	.13				288	.8	1.6
547	11225075*	337	.01						
548	11255500		293	14	2.0	46	45	29.3	1.1
549	11255550	252	.33	10	1.5	47	453	.5	1.2
550	11255600	253	14.8	8	1.2	49	123	9.7	1.0
551	11258700	254	6.96	8	1.2	48	146	4.5	.6
552	11262950	255	2.82	10	1.5	45	348	3.2	.9
553	11263000		84.6	13	2.0	46	52	19.1	.8

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
CENTRAL COAST REGION--Continued								
	87	1030	2450	3660	5390	6780	8230	11159200
0	70	281	617	886	1260	1550	1850	11159400
0	97	402	1200	1980	3230	4320	5510	11159700
0	90	88	236	371	576	748	932	11159770
0	90	1010	2580	3990	6070	7800	9620	11159800
.02	94	2550	5850	8580	12400	15500	18600	11160000
0	100							11160020
0	95	14	45	77	129	176	228	11160030
0	90	865	2500	4070	6540	8660	11000	11160300
.02	96	5970	13100	18800	26700	32800	39200	11160500
0	90	1620	3180	4330	5850	7000	8140	11161500
0	95	6	15	24	36	47	58	11162470
.04	94	1960	4490	6580	9540	11900	14300	11162500
0	90	925	1380	1660	1990	2210	2420	11162540
0	98	89	188	266	373	455	538	11162600
0	5	1230	1690	1970	2270	2470	2650	11162720
0	40	219	456	641	890	1080	1280	11162800
0	0	24						11163200
	69	1560	2830	3700	4800	5590	6360	11164500
0	40	317	714	1040	1500	1860	2230	11166000
0	0	18	40	57	80	98	117	11166700
0	30	492	639	721	810	868	920	11167660
0	90	441	889	1250	1750	2150	2570	11169500
.08	78	4450	9240	13000	18000	21900	25700	11170000
0	85	6	16	26	42	56	71	11173550
0	75	3	8	12	17	21	26	11173560
	31	309	762	1150	1730	2190	2680	11174000
0	40	8						11174450
	72	168	649	1210	2220	3180	4300	11176000
	87	980	4550	9240	18400	27600	38900	11176500
0	15	26	78	129	209	278	355	11176550
0	20	2	15	36	83	137	207	11179005
0	40	136	568	1100	2090	3050	4200	11180500
.04	34	1110	2950	4630	7190	9330	11600	11181000
1.	40	432	725	920	1160	1330	1490	11181400
0	0	297	375	417	463	493	519	11182030
0	20	421	777	1030	1370	1620	1870	11182100
0	15	109	175	216	267	302	335	11182300
0	50	499	1340	2110	3280	4270	5320	11182400
0	15	292	702	1050	1560	1960	2390	11182500
.06	22	1480	4250	6900	11100	14600	18500	11183000
.31	25	2660	6370	9520	14000	17700	21500	11183500
0	50	71						11185000,
0	70	9	20	29	43	54	65	11185150
.01	69	279	928	1620	2790	3860	5080	11224500
		2	12	27	60	96	142	11225050
								11225075
	32	290	1670	3750	8220	13100	19400	11255500
0	0	4	18	36	70	104	145	11255550
0	15	35	76	109	154	189	225	11255600
0	1	11	131	405	1210	2330	4030	11258700
0	50	15	71	146	295	447	636	11262950
	22	937	2360	3610	5460	6980	8580	11263000

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
CENTRAL COAST REGION--Continued									
554	11274500		134	16	2.2	46	43	31.0	0.8
555	11274600	256	.71	13	2.8	45	1140	1.6	2.4
556	11274610*	257	.02	10	2.4	46	116	.3	1.2
557	11274620	258	.99	10	2.4	46	340	2.3	1.2
558	11312925	260	11.7	11	1.5	48	198	6.2	.8
559	11312950	259	.27	12	2.0	47	393	.9	.7
560	11313100	261	1.09	11	1.7	47	305	2.2	.6
561	11337500		42.6	16	2.3	35	64	20.4	.7
SOUTH COAST REGION									
562	10255650	503	7.95	27	3.0	54	292	5.9	3.8
563	10255810		21.8	13	1.7	58	470	9.4	3.2
564	10256000		57.4	26	3.3	59	418	17.4	4.5
565	10256500		10.8	29	3.5	58	1670	4.3	5.0
566	10257800		19.4	7	1.7	63	284	8.5	2.7
567	10258000		16.8	24	3.0	59	878	9.3	4.9
568	10258100	504	.47	12	1.7	60	577	1.5	4.9
569	10258500		93.3	10	1.9	63	231	20.8	4.2
570	10259000		8.61	14	2.3	60	857	6.7	3.3
571	10260500		136	24	5.1	72	183	24.8	6.0
572	10261000		74.7	24	4.8	72	81	12.9	5.5
573	10263500		22.9	18	4.5	72	341	6.7	5.0
574	10263900	428	.48	25	4.0	64	1210	1.3	7.6
575	10264000		49.0	21	2.9	72	224	14.7	5.5
576	10264680*	429	.06				702	.4	7.4
577	11010900	505	.61	22	1.8	50	794	1.9	2.8
578	11011900	506	.78	18	2.0	50	1310	1.3	2.3
579	11012500		85.0	17	2.0	55	96	20.2	3.0
580	11013850	479	6.66	18	1.7	48	290	5.8	1.5
581	11014850	508	2.40	28	4.0	54	434	3.0	4.7
582	11021100	509	.82	15	2.2	48	670	1.3	1.5
583	11023300	480	3.74	15	2.0	47	302	4.6	1.1
584	11025500		112	27	2.8	51	182	20.2	2.3
585	11025800	510	.45	19	2.0	48	468	1.0	1.4
586	11027000		22.5	20	2.3	49	137	11.3	2.0
587	11029800	481	.18	15	1.8	47	400	.9	.7
588	11031500		19.0	18	3.1	55	251	8.7	3.8
589	11032100*	511	.05				280	.6	3.1
590	11033000		25.5	23	4.0	51	22	10.5	3.8
591	11035300	519	1.40	33	3.0	54	811	2.1	3.2
592	11037700		11.0	38	2.9	50	661	6.2	3.1
593	11039100	512	1.01	21	2.5	49	360	2.0	.6
594	11040400	482	.36	18	1.8	47	248	1.2	.6
595	11042400		131	17	3.8	52	152	20.7	2.5
596	11042430	513	4.90	16	2.8	54	378	4.8	4.6
597	11042520		320	16	3.0	52	142	21.2	2.8
598	11043000		222	15	3.0	51	75	28.0	1.8
599	11044000		588	16	3.0	50	110	35.8	2.6
600	11044600	483	.52	18	2.2	48	484	1.4	2.1
601	11044900		47.5	21	2.0	50	155	13.2	1.0

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
CENTRAL COAST REGION--Continued								
0	80	1070	3320	5640	9440	12800	16700	11274500
0	95	5	13	21	34	45	57	11274600
0	0							11274610
0	0	1	3	4	7			11274620
0	0	25	54	78	111	137	163	11312925
0	0	1	3	5	9	12	15	11312950
0	50	5	17	28	46	62	80	11313100
.03	82	459	1650	2970	5250	7370	9810	11337500
SOUTH COAST REGION--Continued								
0	90	13	77	199	547	1050	1900	10255650
0	84	11	58	138	350	638	1100	10255810
	84	543	2410	5270	12100	20800	33700	10256000
0	88	363	1370	2760	5820	9430	14600	10256500
0	50							10257800
0	89	68	394	989	2640	4970	8780	10258000
0	99	6	13	21	33	45	59	10258100
	44	248	838	1570	3050	4670	6830	10258500
0	72	73	232	427	819	1250	1820	10259000
	22	2890	10700	20400	39800	60300	86900	10260500
	89	1850	6760	13300	27700	44400	68000	10261000
0	95	168	670	1380	3010	4970	7800	10263500
0	95	13	44	85	171	271	408	10263900
	81	564	2010	3870	7700	12000	17700	10264000
		1	3	10	32	67	133	10264680
0	100	13	51	102	218	356	553	11010900
0	0	2	29	116	517	1360		11011900
.06	35	6	70	243	905	2100	4460	11012500
0	70	1	56	186	672			11013850
0	100	8	37	82	191	329	538	11014850
0	98	7	23	42	80	122	176	11021100
0	80	17	48	82	146	212	297	11023300
.89	29	809	3280	6850	15000	25000	39600	11025500
0	70	13	26	37	55	71	90	11025800
0	50	63	385	995	2740	5280	9520	11027000
0	70	13	23	30	40	48	57	11029800
0	95	66	274	579	1290	2160	3440	11031500
		1	3	5	11	17	26	11032100
	88	269	1060	2190	4750	7840	12300	11033000
0	90	15	55	108	224	358	546	11035300
0	70	143	547	1100	2340	3810	5920	11037700
0	10	5	12	18	28	37	48	11039100
0	80	13	39	70	132	198	286	11040400
	98	242	860	1670	3400	5390	8160	11042400
0	70	9	33	64	130	205	309	11042430
.54	8	411	1980	4500	10900	19200	32200	11042520
0	5	710	3520	8000	19000	33100	54200	11043000
.29	7	945	5510	13900	37300	70900	126000	11044000
0	90	7	25	49	102	164	251	11044600
.05	85	355	1590	3510	8150	14100	23000	11044900

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SOUTH COAST REGION--Continued									
602	11046100		26.6	15	2.0	47	77	11.4	0.4
603	11046200		34.6	15	2.0	47	190	9.8	.9
604	11046300		80.8	20	2.0	48	119	16.8	1.3
605	11046320	484	.65	14	2.3	46	232	2.0	.4
606	11046350		29.0	15	2.0	48	117	10.1	.6
607	11046390	485	.39	20	2.5	47	1200	1.1	2.0
608	11046410	486	.15	15	2.6	46	333	.8	.6
609	11046500		106	19	2.3	48	119	23.2	1.3
610	11046700	487	1.31	18	2.7	48	318	2.4	1.3
611	11047000		35.7	20	2.3	48	130	19.4	1.2
612	11047500		7.91	16	2.3	47	123	8.0	.8
613	11048500		40.3	14	2.5	47	91	11.3	.6
614	11048800	430	2.82	35	2.0	74	1350	3.6	8.2
615	11048900	431	7.02	21	4.0	74	142	6.3	7.2
616	11054000		42.4	30	4.5	59	420	16.6	6.0
617	11054300	514	2.01	21	2.8	62	642	3.8	3.8
618	11055300	432	1.73	32	3.5	60	775	3.4	4.7
619	11055500		16.9	30	4.5	58	478	8.5	3.4
620	11055800		19.6	30	3.0	58	224	7.6	3.2
621	11056500		3.23	30	4.0	57	1040	3.0	5.7
622	11057000		119	17	4.5	55	210	19.0	2.9
623	11058500		8.80	27	4.5	60	764	5.3	3.6
624	11058600		4.65	35	5.0	60	622	3.6	3.0
625	11061600	433	.53	40	4.0	56	556	1.2	.5
626	11062000		46.3	33	6.0	72	335	15.1	4.4
627	11063000		40.6	19	6.0	72	174	13.6	3.7
628	11063500		15.1	19	6.0	72	366	11.0	4.4
629	11063680		5.61	26	6.0	60	801	3.9	3.2
630	11067000		4.56	35	6.0	57	1470	4.2	5.2
631	11069300	515	2.20	22	3.8	54	921	4.6	4.4
632	11070000		39.4	17	3.5	54	181	11.5	3.2
633	11070190	516	7.57	15	1.9	54	161	4.8	1.9
634	11070380	517	.37	14	3.0	53	352	1.1	2.4
635	11071300	518	.36	13	2.3	49	565	1.7	1.7
636	11072400	434	4.45	35	4.0	60	1000	3.3	5.9
637	11073000		16.5	34	5.8	58	722	6.1	5.4
638	11073470		10.1	35	5.5	57	810	5.6	4.3
639	11075740		20.1	18	2.9	50	63	10.0	.7
640	11075800		12.5	23	2.5	50	346	8.0	2.4
641	11075900	488	4.65	22	2.5	50	447	4.1	2.0
642	11080500		84.6	31	6.0	72	330	16.6	3.6
643	11081200	435	6.79	30	6.0	72	961	4.6	5.0
644	11081500		18.6	37	6.0	66	615	8.4	3.4
645	11084000		6.64	30	7.0	57	375	5.8	1.8
646	11084500		6.36	30	6.0	56	511	6.0	2.8
647	11086500		2.72	29	6.0	57	524	3.6	2.2
648	11090500		120	15	2.8	50	38	26.3	.4
649	11091950	401	3.41	21	3.0	52	429	4.1	1.7
650	11093000		28.3	25	5.0	59	157	21.4	3.2
651	11093490	402	5.80	30	3.0	58	453	5.3	3.9

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
				SOUTH COAST REGION--Continued				
.05	35	111	523	1180	2800	4910	8150	11046100
0	42	410	1710	3610	8030	13500	21500	11046200
0	89	834	3160	6350	13400	21800	33600	11046300
0	1	7	43	110	300	574	1030	11046320
.09	35	314	1050	1960	3860	5970	8850	11046350
0	100	4	54	215	947	2470		11046390
0	10	8	16	21	30	38	46	11046410
0	61	331	2060	5300	14400	27300	48300	11046500
0	90	66	153	237	380	515	678	11046700
0	67	106	751	2100	6290	12800		11047000
0	50	193	618	1120	2120	3180	4570	11047500
.35	13	988	2050	3010	4530	5910	7500	11048500
0	100	25	146	367	988	1870	3340	11048800
0	70	12	77	203	576	1130	2080	11048900
0	98	312	1640	4040	10800	20700	37600	11054000
0	100	15	49	94	186	290	432	11054300
0	100	90	283	517	983	1490	2170	11055300
0	100	361	1160	2140	4120	6300	9240	11055500
0	100	407	1170	2050	3770	5610	8040	11055800
0	95	12	118	399	1470	3420	7330	11056500
0	66	449	1570	3030	6170	9780	14800	11057000
0	100	183	554	992	1850	2780	4000	11058500
0	100	115	309	523	920	1330	1860	11058600
0	100	12						11061600
0	94	574	2200	4550	10000	16900	27100	11062000
0	99	654	2220	4200	8320	12900	19300	11063000
0	100	187	576	1040	1950	2940	4240	11063500
0	100	59	233	501	1170	2070	3490	11063680
0	100	141	487	955	1990	3240	5040	11067000
0	100	9	23	38	65	92	126	11069300
.02	96	47	266	664	1760	3320	5870	11070000
0	10	184	723	1480	3190	5240	8200	11070190
0	100	1	5	10	21	34	53	11070380
0	60	3	14	30				11071300
0	90	100						11072400
0	95	77	420	1070	3000	5960	11200	11073000
0	100	232	813	1590	3280	5280	8130	11073470
0	50	152	600	1240	2670	4410	6920	11075740
0	100	261	1060	2230	4900	8160	12900	11075800
0	80	222	775	1490	3010	4740	7140	11075900
0	95	1060	4070	8230	17500	28600	44400	11080500
0	100	152	757	1760	4340	7780	13200	11081200
0	100	91						11081500
0	100	198	652	1200	2280	3440	4960	11084000
0	100	286	880	1590	2980	4490	6480	11084500
0	100	60	281	629	1490	2600	4300	11086500
.23	46	1100	2940	4940	8590	12300	17000	11090500
0	100	160	312	443	644	821	1020	11091950
0	69	480	2000	4240	9450	15900	25300	11093000
0	100	27	171	448	1260	2450	4470	11093490

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SOUTH COAST REGION--Continued									
652	11094000		64.9	24	5.0	70	100	13.8	3.6
653	11094500		67.5	28	5.0	69	101	21.8	3.5
654	11095000		9.22	31	5.0	54	290	6.8	4.1
655	11095500		106	29	5.0	66	109	25.4	2.8
656	11096000		1.26	25	2.2	54	972	2.1	3.4
657	11096500		21.1	27	5.0	57	212	6.5	1.6
658	11098000		16.0	28	6.0	57	235	11.5	2.6
659	11100000		9.71	33	7.0	58	671	4.6	2.8
660	11100500		1.84	35	7.0	55	892	2.2	3.0
661	11101000		6.47	29	7.0	56	609	5.8	2.7
662	11104000		18.0	23	4.0	48	69	6.6	.7
663	11105200	436	.30	16	2.3	48	358	.9	1.0
664	11105500		105	20	3.1	47	57	22.1	1.0
665	11105700	437	1.35	20	3.5	46	857	1.8	1.6
666	11107000	403	2.57	15	2.8	48	228	4.6	.7
667	11107700	404	4.08	9	1.7	74	311	3.9	3.8
668	11108200	405	.65	18	3.7	56	265	1.4	1.1
669	11108500		644	16	2.5	59	61	47.1	2.0
670	11109600*		372	19	3.0	56	57	60.6	3.1
671	11110000		437	18	3.1	58	76	66.8	2.9
672	11110500		23.6	22	3.0	54	246	13.0	1.9
673	11111500		49.5	29	3.5	51	79	17.8	4.2
674	11113000		251	28	2.8	53	67	55.5	2.8
675	11113500		40.0	28	3.0	51	415	13.0	2.8
676	11114500		50.7	30	4.9	49	208	13.9	2.9
677	11115500*		54.6	35	3.5	49	261	16.2	2.7
678	11116000		15.6	31	3.5	51	300	7.4	2.0
679	11117500		51.2	23	4.0	50	184	14.5	1.4
680	11117600		13.2	26	4.5	46	425	7.2	1.8
681	11117800		9.11	27	3.7	46	507	5.4	1.7
682	11118000		41.2	25	4.0	48	190	13.9	2.3
683	11118500		188	27	4.0	49	176	26.8	2.1
684	11118700	406	.76	25	4.0	47	870	1.3	1.1
685	11119500		13.1	25	3.5	46	352	8.3	1.3
686	11120000		18.9	25	4.0	46	451	8.3	1.4
687	11120500		5.51	26	4.0	46	450	7.2	1.4
688	11120550		18.8	26	2.7	46	107	6.2	.4
689	11120600		20.5	24	2.6	46	97	8.2	.4
690	11123480	407	.28	28	3.5	47	506	1.0	2.4
691	11124500		74.0	27	3.5	48	176	20.5	2.3
692	11125000		23.8	25	3.5	48	197	8.7	1.6
693	11126500		55.8	20	3.5	48	171	12.3	1.4
694	11127500		13.8	18	3.0	47	90	9.1	.8
695	11128400		12.3	26	2.9	46	107	7.2	.7
696	11130000		39.4	18	2.8	47	121	21.3	1.4
697	11132300	408	3.54	27	2.8	45	142	3.1	1.0
698	11132500		47.1	22	2.3	45	64	14.0	.6
699	11136000		93.5	16	2.0	47	44	22.8	.7
700	11136100		135	15	2.3	46	23	27.9	.5
701	11136150	409	.28	15	2.2	44	273	.8	.5

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	Station number
SOUTH COAST REGION--Continued								
0	100	283	1650	4150	11100	21100	37600	11094000
0	99	718	2670	4950	9060			11094500
0	100	253						11095000
.25	99	732	2320	4250	8130	12400	18100	11095500
0	100	5	31	99	360	950	2600	11096000
0	97	325	1200	2340	4740	7450	11100	11096500
0	100	554	1660	2950	5450	8090	11600	11098000
0	100	267	882	1650	3200	4930	7260	11100000
0	100	33	97	167	295	424	586	11100500
0	100	190	517	863	1480	2090	2840	11101000
0	97		3010	5210	9160	13000	17800	11104000
0	100	39	73	102	145	182	224	11105200
.23	31	1410	5860	12100	25800	41800	64100	11105500
0	0	88	179	260	387	501	632	11105700
0	50	86	315	620	1280	2050	3130	11107000
0	50	1	3	7	16	27	44	11107700
0	85	21	58	101	180	263	369	11108200
.20	48	2250	8720	17700	37900	62000	96700	11108500
	89	2670	10000	20200	42500	68800	106000	11109600
.01	90	1860	7370	15200	32900	54200	85100	11110000
0	95	754	2340	4170	7660	11300	15900	11110500
0	93	535	2350	5130	11800	20200	32900	11111500
0	97	7520	19700	32300	54600	76200	103000	11113000
0	97	1180	4090	7830	15700	24500	36600	11113500
	97	592	3600	9270	25500	49200	88800	11114500
0	97	3100	6800	10400	16800			11115500
0	98	635	1930	3420	6250	9210	13000	11116000
.07	87	918	3230	6250	12700	20000	30200	11117500
0	95	948	2970	5400	10200	15500	22500	11117600
0	95	756	2070	3500	6150	8870	12300	11117800
.06	90	1930	5280	8950	15700	22700	31500	11118000
.06	89	5580	15100	25600	44800	64500	89600	11118500
0	100	24	84	162	327	515	776	11118700
0	100	313	1260	2620	5720	9460	14900	11119500
0	30	692	2040	3610	6650	9860	14100	11120000
0	90	345	870	1410	2380	3340	4530	11120500
0	80	384						11120550
0	50	439						11120600
0	95	45	110	176	292	406	546	11123480
0	82	893	2210	3510	5710	7790	10300	11124500
0	70	318	1220	2460	5230	8530	13200	11125000
0	39	394	1370	2630	5270	8280	12400	11126500
0	15	31						11127500
0	50	584	1920	3590	7010	10800	16000	11128400
0	49	38	180	407	976	1720	2870	11130000
0	40	82	253	456	858	1290	1860	11132300
0	27	1330	3670	6190	10800	15400	21100	11132500
.05	23	157	544	1050	2100	3310	4970	11136000
	13	176	581	1090	2120	3270	4840	11136100
0	95	4	6	7	9	10	12	11136150

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
			SOUTH COAST REGION--Continued						
702	11137500		86.6	20	3.5	49	57	21.8	1.3
703	11138000		117	20	3.5	48	41	24.3	.9
704	11138500		281	24	2.8	48	78	42.6	2.2
705	11139000		93.6	23	3.2	48	129	19.5	1.5
706	11139300	412	6.64	16	1.8	47	154	8.0	1.5
707	11139350*		16.8	16	2.2	47	128	11.1	1.3
708	11139480	413	2.44	20	1.8	47	538	3.0	1.4
709	11139500		28.7	22	3.2	48	137	9.4	1.1
			SOUTH LAHONTAN-COLORADO DESERT REGION						
710	9423400	451	0.04						
711	9424050*	526	2.04	7	1.2	86	179	4.5	2.1
712	9428530	527	1.52	6	1.2	86	170	3.8	.8
713	9428560	528	.42	5	1.2	86	298	1.8	.7
714	9428570	529	1.12	5	1.2	86	151	3.6	.8
715	9429240	530	.04						
716	9429250	531	.02						
717	10250600		23.7	8	1.1	66	496	8.6	6.5
718	10250720*	377	.52	5	1.1	68	245	2.8	1.9
719	10250870*	378	.05				320	.5	4.9
720	10251000	376	.95	5	1.1	66	660	2.3	2.2
721	10251200*	452	.21	2	.9	86	412	.5	.3
722	10251350		3.06	5	1.2	82	592	2.7	5.3
723	10251400	453	.20	3	1.1	86	449	.8	2.1
724	10251500	454	.03						
725	10251600	455	.01						
726	10252300	456	.94	7	1.1	76	383	2.0	4.9
727	10252550		1.13	10	1.2	80	638	2.0	6.2
728	10252700	457	.02						
729	10253000	458	.30	3	1.1	86	190	1.0	.1
730	10253080*		3.04	4	1.1	86	322	3.8	3.6
731	10253250	532	.01						
732	10253255	533	.02						
733	10253350		8.55	5	1.2	78	505	5.6	4.4
734	10253540		24.1	5	1.0	86	157	9.7	2.3
735	10253600		7.74	4	1.0	84	273	5.3	2.1
736	10253700	534	.04						
737	10253750*	535	4.29	4	1.0	86	273	6.8	1.8
738	10253800	536	.04						
739	10254020*	537	5.95	3	1.0	80	118	2.3	.1
740	10254475	538	.60	3	1.0	85	70	4.0	.5
741	10255200	539	.11				566	.6	2.0
742	10255230	540	.08				1180	.5	1.2
743	10255730	541	19.6	7	1.6	66	355	8.6	2.8
744	10255820	542	.04						
745	10255825	543	.04						
746	10259500	544	.18	4	1.2	78	307	1.4	.1
747	10259600*	545	.71	5	1.2	80	154	.7	3.3
748	10260200*		15.1	9	2.1	70	324	11.3	6.0
749	10260400*		6.36	12	3.0	76	685	4.9	6.0

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
SOUTH COAST REGION--Continued								
0	90	134	619	1380	3220	5570	9100	11137500
0	86	421	2720	7130	19700	37800	67700	11138000
0	93	1490	4670	8530	16300	24700	36000	11138500
0	94	169	951	2350	6190	11600	20400	11139000
0	40	8	50	100	210			11139300
0	40							11139350
0	50	10	36	69	139	218	329	11139480
0	72	25	144	357	939	1750	3060	11139500
SOUTH LAHONTAN-COLORADO DESERT REGION--Continued								
		2	15	43	121	230	349	9423400
0	0	25	77	108	139			9424050
0	0	33	340	1220	3940	8060	14900	9428530
0	0	5	47	134	384	730	1270	9428560
0	0	2						9428570
		6	16	26	44	59	77	9429240
		12	18	23	28	31	35	9429250
0	30	8	166	705	3000	7290		10250600
0	0	2	15	26	43			10250720
								10250870
0	0	13	42	75	132	187	253	10251000
0	0	4	11	18	29			10251200
0	0	50	397	696	986			10251350
0	0	4	25	60	147	255	408	10251400
		1	7	14	30	47	70	10251500
		1	3	6	11	17	25	10251600
0	0	3	22	47	100			10252300
0	99	23	118	261	574	930	1410	10252550
		1	8	15	30			10252700
0	0	36	72	101	141	172	206	10253000
0	0							10253080
		1	7	16	38	65	103	10253250
		1	7	16	40	68	109	10253255
0	0	105	397	754	1430	2120	2980	10253350
0	0	131	1440	4550	14400	29200	53600	10253540
0	0	4						10253600
		13	30	45	67	85	105	10253700
0	0	21	58	92	140			10253750
		7	18	28	43	56	71	10253900
0	0	6	60	150	360			10254020
0	0	6	37	90	217	371	590	10254475
		1	8	24	75	149	270	10255200
		1	7	15	33	53	80	10255230
0	20	4	204	1370	9260	29800		10255730
		2	11	24	53	87	131	10255820
		2	10	18	36	54	76	10255825
0	99	3	27	79	233	452	800	10259500
0	0	1	12	27	54			10259600
0	98	6	80	300				10260200
0	1	1	49	168	543			10260400

TABLE 5.--*Basin characteristics and flood magnitude-*

Map number	Station number	FFSDA site number	Basin characteristic						
			Drainage area, A (square miles)	Mean annual precipitation P (inches)	Precipitation intensity index, I (inches)	Mean annual potential evapotranspiration E (inches)	Main channel slope, S (feet per mile)	Main channel length, L (miles)	Altitude index, H (thousands of feet)
SOUTH LAHONTAN-COLORADO DESERT REGION--Continued									
750	10261800	459	0.72	4	1.3	75	171	2.2	2.7
751	10262600	460	.24	5	1.0	76	160	1.1	2.3
752	10263100	461	.23	3	1.8	86	2240	1.1	1.6
753	10264520	462	.05				551	.5	3.4
754	10264530*	463	1.37	13	2.7	54	650	2.5	3.8
755	10264560*	464	3.60	10	2.2	60	154	4.0	3.2
756	10264600*		15.8	15	1.8	58	303	8.8	5.2
757	10264605	465	3.83	12	1.7	54	393	3.2	4.5
758	10264700*	466	.14				230	1.2	3.6
759	10264840	467	1.02	6	1.5	55	1120	1.8	3.8
760	10264900*	468	61.6				128	11.0	2.4
761	10264915*	469	.13				396	.6	1.8
762	10266200	383	4.75	11	1.8	40	296	8.3	5.7
763	10268630*	384	1.93	9	1.2	41	369	3.8	6.6
764	10276200*	382	2.48	10	1.4	40	437	4.1	7.6
765	10282480		15.6	6	1.4	40	439	10.8	6.9
766	10285780	379	7.18	5	1.5	47	549	5.2	5.4
767	10287240	385	2.33	13	1.6	37	218	5.0	8.6
768	11136450*	410	.15	20	3.0	54	644	.8	4.9
769	11136500*		89.9	20	2.2	55	112	16.8	4.3
770	11136650*	411	16.1	13	2.0	52	550	9.2	2.8
771	11194050*	328	2.40	6	1.0	63	99	3.8	.9
772	11194100*	329	.01				211	.6	.7
773	11194200	333	1.38	8	1.1	58	385	2.9	2.6
774	11194500*	332	.32	6	1.0	57	196	.7	1.0
775	11194800*	331	5.86	7	1.1	57	183	7.5	1.8
776	11195000*	330	.35	6	1.1	58	137	2.0	1.2
777	11197350	335	7.51	10	1.7	54	133	4.0	1.7
778	11198050*	334	2.38	7	3.2	62	125	2.8	.8

[1] 11513500. Beaver Creek at Pinehurst, Oreg., lat 42°07'05" N., long 122°21'55" W.

[2] 10299120. O'Banion Canyon near Wellington, Nev., lat 38°38'05" N., long 119°15'50" W.

[3] 10309000. East Fork Carson River near Gardnerville, Nev., lat 38°50'50" N., long 119°42'10" W.

[4] 10310500. Clear Creek near Carson City, Nev., lat 39°06'50" N., long 119°47'50" W.

frequency relations at gaging stations--Continued

Basin characteristic		Peak discharge, in cubic feet per second at indicated recurrence intervals						Station number
Surface-storage index, W (percent)	Forest-cover index, F (percent)	2-year	5-year	10-year	25-year	50-year	100-year	
SOUTH LAHONTAN-COLORADO DESERT REGION--Continued								
0	0	3	43	152	537	1160	2270	10261800
0	0	19	48	74	114	150	188	10262600
0	0	1	5	14	38	69	115	10263100
		5	9	13	19	23	28	10264520
0	62	4	15	36	99			10264530
0	60	56	128	191	284	362	447	10264560
0	77	11	39	75	149	124		10264600
0	5	8	75	214	613	1170	2030	10264605
								10264700
0	0							10264840
								10264900
		1	3	6	10	14	19	10264915
0	20	1	118	211	280			10266200
0	25							10268630
0	40							10276200
0	45							10282480
0	0	8	26	44	76	105	140	10285780
0	90	3	10	18	31	45	60	10287240
0	0	11	21	29	42	53	65	11136450
0	94	417	1530	3020	6250	10000	15300	11136500
0	70	20	201	361	629			11136650
0	0							11194050
								11194100
0	0	38	154	303	596	902	1290	11194200
0	0							11194500
0	0	32	60	80	130			11194800
0	0	3	8	13	20	27	35	11195000
0	10	1	34	201	1200	3560		11197350
0	0	1	6	21	66			11198050

[5] 10311000. Carson River near Carson City, Nev., lat 39°06'30" N., long 119°42'40" W.
[6] 10311450. Brunswick Canyon near New Empire, Nev., lat 39°10'20" N., long 119°41'10" W.
[7] 10347600. Hunter Creek near Reno, Nev., lat 39°29'25" N., long 119°53'55" W.
[8] 10348900. Galena Creek near Steamboat, Nev., lat 39°21'45" N., long 119°49'30" W.

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	NORTH COAST REGION				
11341550	BOULDER CREEK NEAR LAMOINE, CALIF.	13	6.57	2-12-62	2,080
11342000	SACRAMENTO RIVER AT DELTA, CALIF.	31	425	1-16-74	69,800
11372000	CLEAR CREEK NEAR IGO, CALIF.	35	228	12-21-55	24,500
11374400	MIDDLE FORK COTTONWOOD CREEK NEAR ONO, CA	19	249	1-16-74	22,700
11375600	HULING CREEK TRIBUTARY AT ONO, CALIF.	11	.07	1-29-68	18
11375830	BUDDEN CANYON NEAR BEEGUM, CALIF.	13	1.09	12-22-64	120
11375950	COTTONWOOD CREEK TRIBUTARY NEAR COTTONWOO	13	.46	1- 5-65	59
11376000	COTTONWOOD CREEK NEAR COTTONWOOD, CALIF.	35	927	1-16-74	70,000
11378700	VALE GULCH TRIBUTARY NEAR RED BANK, CALIF	13	.19	1-21-67	114
11379500	ELDER CREEK NEAR PASKENTA, CALIF.	27	92.9	2-24-58	11,700
11380500	ELDER CREEK AT GERBER, CALIF.	25	136	1- 5-65	14,100
11381990	THOMES CREEK TRIBUTARY AT PASKENTA, CALIF	13	.65	1- 5-65	107
11382000	THOMES CREEK AT PASKENTA, CALIF.	55	194	12-22-64	37,800
11384400	SOUTH FORK STONY CREEK NEAR STONYFORD, CA	6	2.52	1-16-74	586
11384700	GILMORE CREEK NEAR LODOGA, CALIF.	12	.49	1-31-63	53
11386200	SOUTH FORK ELK CREEK NEAR ELK CREEK, CALI	6	10.6	1-23-70	311
11386300	KILL DRY CREEK NEAR ALDER SPRINGS, CALIF.	2	1.84	1-23-70	242
11386400	GRINDSTONE CREEK TRIBUTARY NEAR ELK CREEK	14	.77	9-16-61	85
11386450	WATSON CREEK TRIBUTARY NEAR NEWVILLE, CAL	9	.52	1- 5-65	116
11387900	MASTERSON HOLLOW CREEK NEAR NEWVILLE, CAL	5	.96	2- 2-61	30
11390680	SALT CREEK NEAR WILLIAMS, CALIF.	14	13.0	2- 7-73	940
11448500	ADOBE CREEK NEAR KELSEYVILLE, CALIF.	21	6.36	1-16-74	1,570
11448900	HIGHLAND CREEK ABOVE HIGHLAND CREEK DAM,	21	11.9	1-16-74	3,140
11449060	LYONS CREEK TRIBUTARY NEAR LAKEPORT, CALI	11	.16	1- 7-65	44
11449350	BURNS VALLEY CREEK NEAR CLEARLAKE HIGHLAN	13	4.37	1-23-70	584
11449450	COPSEY CREEK NEAR LOWER LAKE, CALIF.	8	13.2	1-30-63	2,340
11449460	SEIGLER CREEK AT LOWER LAKE, CALIF.	7	12.5	1-26-69	1,420
11451500	NORTH FORK CACHE CREEK NEAR LOWER LAKE, C	45	197	1-11-37	20,300
11451530	PHIPPS CREEK NEAR LOWER LAKE, CALIF.	11	3.10	12-28-65	310
11451700	BEAR CREEK TRIBUTARY NEAR WILBUR SPRINGS,	13	4.49	1-18-73	695
11453150	PUTAH CREEK TRIBUTARY NEAR WHISPERING PIN	15	.25	2- 1-63	58
11453200	DRY CREEK NEAR MIDDLETOWN, CALIF.	13	8.35	2- 8-60	3,470
11453500	PUTAH CREEK NEAR GUENOC, CALIF.	48	113	12-11-37	32,000
11453700	CAPELL CREEK NEAR WOODEN VALLEY, CALIF.	15	.87	1-21-67	345
11453800	WRAGG CREEK NEAR WINTERS, CALIF.	9	.74	1-25-69	271
11454000	PUTAH CREEK NEAR WINTERS, CALIF.	45	574	2-27-40	81,000
11454020	PUTAH CREEK TRIBUTARY NO. 2 NEAR WINTERS,	5	.05	2- 9-62	7
11455950	SULPHUR CREEK NEAR ST. HELENA, CALIF.	14	4.50	12-23-64	980
11456000	NAPA RIVER NEAR ST. HELENA, CALIF.	39	81.4	12-22-55	12,600
11456400	LAKE HENNESSEY TRIBUTARY NEAR RUTHERFORD,	14	1.04	1- 5-65	184
11456500	CONN CREEK NEAR OAKVILLE, CALIF.	35	52.1	2-27-40	7,700
11457000	DRY CREEK NEAR NAPA, CALIF.	15	17.4	2-24-58	3,460
11458200	REDWOOD CREEK NEAR NAPA, CALIF.	15	9.79	11-27-70	1,460
11458400	SONOMA CREEK NEAR KENWOOD, CALIF.	16	6.07	1- 5-65	2,750
11458500	SONOMA CREEK AT AGUA CALIENTE, CALIF.	20	58.4	12-22-55	8,880
11459000	PETALUMA RIVER NEAR PETALUMA, CALIF.	15	30.9	12-22-55	1,860
11460000	CORTE MADERA CREEK AT ROSS, CALIF.	24	18.1	12-22-55	3,620
11460100	ARROYO CORTE MADERA DEL PRESIDIO AT MILL	8	4.69	1-21-70	1,180
11460150	REDWOOD CREEK NEAR TAMALPAIS VALLEY, CALI	12	6.38	1-16-73	2,150
11460170	PINE CREEK AT BOLINAS, CALIF.	4	7.83	1-21-70	990
11460440	NICASIO CREEK NEAR NICASIO, CALIF.	12	1.74	1-21-67	560
11460900	ROSCOE CREEK AT BODEGA BAY, CALIF.	12	.25	1-21-70	76
11460920	SALMON CREEK AT BODEGA, CALIF.	13	15.7	1-11-73	2,260
11460940	RUSSIAN RIVER NEAR REDWOOD VALLEY, CALIF.	12	14.1	12-22-64	4,400
11461000	RUSSIAN RIVER NEAR UKIAH, CALIF.	25	99.7	12-21-55	18,900

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	NORTH COAST REGION--Continued				
11461400	EAST FORK RUSSIAN RIVER TRIBUTARY NEAR PO	15	0.15	12-22-64	121
11462125	SLIDE CREEK NEAR UKIAH, CALIF.	15	.57	12-23-64	163
11462500	RUSSIAN RIVER NEAR HOPLAND, CALIF.	36	362	12-22-55	45,000
11463200	BIG SULPHUR CREEK NEAR CLOVERDALE, CALIF.	16	82.3	12-22-55	20,000
11463940	FRANZ CREEK NEAR KELLOGG, CALIF.	18	15.7	1- 5-65	5,780
11464000	RUSSIAN RIVER NEAR HEALDSBURG, CALIF.	36	793	12-23-64	71,300
11464050	DRY CREEK TRIBUTARY NEAR HOPLAND, CALIF.	16	1.19	12-22-64	430
11464500	DRY CREEK NEAR CLOVERDALE, CALIF.	34	87.8	12-22-64	18,100
11465050	DUTCHER CREEK NEAR ASTI, CALIF.	15	2.24	2-16-59	381
11465800	SANTA ROSA CREEK NEAR SANTA ROSA, CALIF.	11	12.5	2- 8-60	3,200
11467000	RUSSIAN RIVER NEAR GUERNEVILLE, CALIF.	36	1,340	12-23-64	93,400
11467040	WARD CREEK TRIBUTARY NEAR CAZADERO, CALIF	12	.11	1-16-73	48
11467300	WHEATFIELD FORK GUALALA RIVER TRIBUTARY N	12	.19	1-16-73	255
11467500	SOUTH FORK GUALALA RIVER NEAR ANNAPOLIS,	21	161	12-22-55	55,000
11467560	CHINA GULCH AT GUALALA, CALIF.	12	.54	1-13-69	135
11467850	SODA CREEK TRIBUTARY NEAR BOONVILLE, CALI	10	1.53	12-22-64	394
11467880	NAVARRO RIVER TRIBUTARY NEAR PHILO, CALIF	10	.65	1-16-74	127
11468000	NAVARRO RIVER NEAR NAVARRO, CALIF.	25	303	12-22-55	64,500
11468010	ALBION RIVER NEAR COMPTCHE, CALIF.	14	14.4	1-16-74	4,430
11468020	ALBION RIVER TRIBUTARY NEAR COMPTCHE, CAL	13	.40	1-16-74	110
11468085	NORTH FORK BIG RIVER TRIBUTARY NEAR WILLI	9	.43	12-22-64	165
11468150	WARNER CREEK NEAR FORT BRAGG, CALIF.	13	.61	12-22-64	99
11468500	NOYO RIVER NEAR FORT BRAGG, CALIF.	24	106	3-29-74	26,600
11468540	PUDDING CREEK NEAR FORT BRAGG, CALIF.	8	12.5	12-21-64	2,000
11468850	DUNN CREEK NEAR ROCKPORT, CALIF.	12	1.88	12-22-64	286
11468880	PAINTER CREEK NEAR REDWAY, CALIF.	12	.64	12-22-64	356
11469000	MATTOLE RIVER NEAR PETROLIA, CALIF.	27	240	12-22-55	90,400
11469570	OIL CREEK NEAR FERNDALE, CALIF.	12	.13	12-22-64	25
11469600	HULL CREEK NEAR POTTER VALLEY, CALIF.	6	1.49	1-16-74	820
11469650	CORBIN CREEK NEAR ELK CREEK, CALIF.	5	6.18	1-16-74	1,050
11469800	COLD CREEK TRIBUTARY NEAR ELK CREEK, CALI	6	.81	1-23-70	256
11470700	ALDER CREEK NEAR POTTER VALLEY, CALIF.	9	1.39	12-22-64	2,340
11472170	FULWEITER CREEK TRIBUTARY NEAR WILLITS, C	11	.71	12-22-64	184
11472200	OUTLET CREEK NEAR LONGVALE, CALIF.	19	161	12-22-64	77,900
11472700	HAMMERHORN CREEK NEAR COVELO, CALIF.	4	3.36	1-23-70	720
11473000	MIDDLE FORK EEL RIVER BELOW BLACK BUTTE R	16	367	12-22-64	132,000
11473530	MILL CREEK BELOW ALDER CREEK, NEAR COVELO	4	17.1	12-22-64	5,410
11473570	MILL CREEK TRIBUTARY NEAR COVELO, CALIF.	11	.26	12-22-64	85
11473600	SHORT CREEK NEAR COVELO, CALIF.	12	15.2	12-21-55	3,780
11473700	MILL CREEK NEAR COVELO, CALIF.	15	96.9	12-22-64	24,100
11473980	GOFORTH CREEK AT DOS RIOS, CALIF.	11	3.83	12-22-64	2,340
11474000	EEL RIVER BELOW DOS RIOS, CALIF.	17	1,484	12-22-64	460,000
11474430	SALT CREEK TRIBUTARY NEAR ZENIA, CALIF.	10	.18	12-22-64	200
11474500	NORTH FORK EEL RIVER NEAR MINA, CALIF.	22	250	12-22-64	133,000
11474570	WILSON CREEK NEAR MINA, CALIF.	11	2.84	12-22-64	648
11475000	EEL RIVER AT FORT SEWARD, CALIF.	20	2,107	12-22-64	561,000
11475500	SOUTH FORK EEL RIVER NEAR BRANSCOMB, CALIF	28	43.9	12-22-55	20,100
11475560	ELDER CREEK NEAR BRANSCOMB, CALIF.	9	6.50	12-22-64	3,660
11475690	STEEP CREEK NEAR LAYTONVILLE, CALIF.	11	2.90	12-22-64	1,220
11475700	TENMILE CREEK NEAR LAYTONVILLE, CALIF.	19	50.3	12-22-55	16,300
11475900	SQUAW CREEK NEAR GARBERVILLE, CALIF.	10	.26	1-20-64	124
11476500	SOUTH FORK EEL RIVER NEAR MIRANDA, CALIF.	35	537	12-22-64	199,000
11477000	EEL RIVER AT SCOTIA, CALIF.	64	3,113	12-23-64	752,000
11477700	SOUTH FORK VAN DUZEN RIVER NEAR BRIDGEVILL	12	36.2	12-22-64	13,600
11477870	LITTLE LARABEE CREEK TRIBUTARY NEAR BRIDGE	10	.39	12-22-64	126

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	NORTH COAST REGION--Continued				
11478400	VAN DUZEN RIVER TRIBUTARY NEAR BRIDGEVILLE	11	0.71	12-22-64	120
11478500	VAN DUZEN RIVER NEAR BRIDGEVILLE, CALIF.	36	222	12-22-64	48,700
11478800	SOUTH FORK YAGER CREEK NEAR BRIDGEVILLE, C	12	.53	12-22-64	236
11479700	ELK RIVER NEAR FALK, CALIF.	10	44.2	12-22-64	3,430
11480000	JACOBY CREEK NEAR FRESHWATER, CALIF.	19	6.05	3-2-72	2,510
11480700	MAPLE CREEK NEAR BLUE LAKE, CALIF.	12	12.1	3- 2-72	4,100
11481000	MAD RIVER NEAR ARCATA, CALIF.	28	485	12-22-64	81,000
11481200	LITTLE RIVER AT CRANNELL, CALIF.	20	44.4	1-22-72	9,830
11481300	BIG LAGOON TRIBUTARY NEAR TRINIDAD, CALIF.	12	.10	1-21-72	27
11482400	PRAIRIE CREEK TRIBUTARY NEAR KLAMATH, CALI	12	.40	1-19-69	90
11482500	REDWOOD CREEK AT ORICK, CALIF.	25	278	12-22-64	50,500
11517840	DONA CREEK NEAR KLAMATH RIVER, CALIF.	13	2.90	12-22-64	83
11518310	CEDAR GULCH NEAR CALLAHAN, CALIF.	13	.99	12-22-64	144
11518400	ETNA CREEK ABOVE LUNCH CREEK, NEAR ETNA, C	13	.80	12-22-64	509
11518610	SOAP CREEK TRIBUTARY NEAR FORT JONES, CALI	11	.42	12-22-64	11
11519500	SCOTT RIVER NEAR FORT JONES, CALIF.	34	653	12-22-64	54,600
11520520	FORT GOFF CREEK NEAR SEIAD VALLEY, CALIF.	13	13.0	12-22-64	2,820
11521500	INDIAN CREEK NEAR HAPPY CAMP, CALIF.	24	120	12-22-64	39,000
11522210	BENJAMIN CREEK NEAR HAPPY CAMP, CALIF.	13	1.19	12-22-64	146
11522260	TI CREEK NEAR SOMES BAR, CALIF.	5	9.46	12-22-64	16,000
11522300	SOUTH FORK SALMON RIVER NEAR FORKS OF SALM	22	252	12-22-64	31,400
11522430	BUTLER CREEK NEAR SOMES BAR, CALIF.	1	6.87	1 - 62	101
11522500	SALMON RIVER AT SOMES BAR, CALIF.	51	751	12-22-64	133,000
11522900	WILSON CREEK NEAR ORLEANS, CALIF.	11	1.93	12-22-64	6,500
11523060	AIKENS CREEK TRIBUTARY NEAR WEITCHPEC, CALI	10	.90	12-22-64	142
11523100	DAN RICE CREEK NEAR CALLAHAN, CALIF.	13	1.11	12-22-64	265
11523200	TRINITY RIVER ABOVE COFFEE CREEK, NEAR TRIN	18	149	1-16-74	26,500
11525300	SLATE CREEK NEAR TRINITY ALPS, CALIF.	13	2.30	12-22-64	741
11525500	TRINITY RIVER AT LEWISTON, CALIF.	64	719	12-22-55	71,600
11525650	TOM LANG GULCH NEAR DOUGLAS CITY, CALIF.	13	2.53	12-22-64	56
11525900	BROWNS CREEK NEAR DOUGLAS CITY, CALIF.	11	71.6	2-18-58	3,950
11527010	MILL CREEK NEAR BURNT RANCH, CALIF.	13	6.09	12-22-64	5,000
11527550	PANTHER CREEK NEAR DENNY, CALIF.	5	5.66	12-22-64	14,000
11528090	POST CREEK NEAR FOREST GLEN, CALIF.	7	5.19	1-20-69	220
11528110	SWIFT CREEK NEAR FOREST GLEN, CALIF.	4	.57	1-31-63	44
11528480	HAYFORK CREEK TRIBUTARY NEAR HYAMPOM, CALIF	12	.93	12-22-64	168
11528500	HAYFORK CREEK NEAR HYAMPOM, CALIF.	21	398	1-16-74	29,400
11529000	SOUTH FORK TRINITY RIVER NEAR SALYER, CALIF	17	898	12-22-64	95,400
11529950	CAMPBELL CREEK NEAR HOOPA, CALIF.	12	6.90	12-22-64	2,420
11530000	TRINITY RIVER NEAR HOOPA, CALIF.	49	2,854	12-22-64	231,000
11530150	MAREEP CREEK NEAR WEITCHPEC, CALIF.	12	3.56	12-22-64	890
11530850	MIDDLE FORK SMITH RIVER TRIBUTARY NEAR O'BR	12	.29	12-22-64	102
11530950	DARLINGTONIA CREEK AT DARLINGTONIA, CALIF.	11	.77	3- 2-72	270
11531000	MIDDLE FORK SMITH RIVER AT GASQUET, CALIF.	16	130	12-22-64	41,100
11532000	SOUTH FORK SMITH RIVER NEAR CRESCENT CITY,	16	291	12-22-64	162,000
11532500	SMITH RIVER NEAR CRESCENT CITY, CALIF.	44	609	12-22-64	228,000
11533000	LOPEZ CREEK NEAR SMITH RIVER, CALIF.	12	.92	3- 2-72	570
	NORTHEAST REGION				
10353985	WASHOE CREEK NEAR HALLELUJAH JUNCTION, CALI	8	1.53	6- 9-69	4
10354700	MILL CREEK AT MILFORD, CALIF.	10	2.26	1-29-67	28
10356300	WEST FORK WILLARD CREEK TRIBUTARY NEAR WEST	11	.83	1- 5-67	88
10357000	GOLD RUN CREEK NEAR SUSANVILLE, CALIF.	10	7.20	2-24-58	483
10358470	WILLOW CREEK TRIBUTARY NEAR SUSANVILLE, CAL	11	3.08	1-23-70	183

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	NORTHEAST REGION--Continued				
10359100	SHAFFER CREEK NEAR LITCHFIELD, CALIF.	10	5.63	1-23-70	389
10359250	PINE CREEK NEAR WESTWOOD, CALIF.	19	24.8	12-23-55	174
10359270	ASPEN CREEK NEAR WESTWOOD, CALIF.	6	4.70	5-15-75	21
10359290	PINE CREEK TRIBUTARY NEAR SUSANVILLE, CALI	5	4.70	5-15-75	397
10359320	DOW CREEK NEAR SUSANVILLE, CALIF.	1	1.49	-	-
10359350	EAGLE LAKE TRIBUTARY NEAR SUSANVILLE, CALI	11	.91	1-16-67	25
10359490	MADELINE PLAINS TRIBUTARY NEAR RAVENDALE,	9	.06	12-23-64	9
10359510	WHISKEY CREEK NEAR TERMO, CALIF.	11	4.56	2- 1-63	132
10360230	EAGLE CREEK AT EAGLEVILLE, CALIF.	8	6.36	12-23-64	800
11342945	THOMS CREEK NEAR CEDARVILLE, CALIF.	11	1.06	1-31-63	119
11342960	NORTH FORK PIT RIVER TRIBUTARY NEAR ALTURA	11	2.36	10-12-62	109
11345800	SOUTH FORK PIT RIVER TRIBUTARY NEAR LIKELY	9	1.59	1-23-70	256
11348080	BIG SAGE RESERVOIR TRIBUTARY NEAR ALTURAS,	11	2.54	3-26-71	175
11348560	TURNER CREEK TRIBUTARY NEAR CANBY, CALIF.	11	.97	10-12-62	42
11349030	PIT RIVER TRIBUTARY NEAR LOOKOUT, CALIF.	10	.47	1-23-70	62
11349850	JOHNSON CREEK TRIBUTARY NEAR ADIN, CALIF.	11	.66	12-22-64	86
11350850	WILLOW CREEK ABOVE INDIAN SPRINGS, NEAR AC	11	9.51	6-18-67	48
11352620	PIT RIVER TRIBUTARY NO. 2 NEAR PITTVILLE,	9	.31	10-12-62	68
11352900	BEAVER CREEK NEAR HAT CREEK, CALIF.	6	23.2	1-23-70	349
11353600	DRY CREEK NEAR DANA, CALIF.	10	6.46	12-22-64	702
11355100	BUTTE CREEK TRIBUTARY NEAR OLD STATION, CA	10	5.15	1-23-70	20
11355400	BUNCHGRASS CREEK NEAR MANZANITA LAKE, CALI	6	.62	1-23-70	80
11359800	CAYTON CREEK TRIBUTARY NEAR DANA, CALIF.	11	.16	1-23-70	35
11488700	DRY LAKE TRIBUTARY AT PEREZ, CALIF.	11	1.74	1-23-70	164
11489350	HORSETHIEF CREEK NEAR MACDOEL, CALIF.	11	9.98	12-22-64	635
11489500	ANTELOPE CREEK NEAR TENNANT, CALIF.	23	18.6	11-11-73	1,350
11513500	BEAVER CREEK AT PINEHURST, OREG.	5	12.9	1- 7-48	407
	SIERRA REGION				
10264870	LITTLE LAKE CREEK NEAR LITTLE LAKE, CALIF.	8	8.60	8- 4-64	7
10264878	NINEMILE CREEK NEAR BROWN, CALIF.	14	10.4	10-17-63	437
10265200	CONVICT CREEK NEAR MAMMOTH LAKES, CALIF.	50	18.2	6-29-32	290
10265700	ROCK CREEK AT LITTLE ROUND VALLEY, NEAR BI	49	35.8	5-30-69	312
10267000	PINE CREEK AT DIVISION BOX, NEAR BISHOP, C	54	36.4	7- 2-67	509
10281800	INDEPENDENCE CREEK BELOW PINYON CREEK, NEA	53	18.1	6- 1-69	169
10284800	INYO CREEK NEAR LONE PINE, CALIF.	11	1.54	8- 2-69	42
10287210	BRIDGEPORT CREEK NEAR BODIE, CALIF.	11	13.1	5-12-69	115
10287400	RUSH CREEK ABOVE GRANT LAKE, NEAR JUNE LAK	38	51.3	7-14-67	1,070
10287900	LEE VINING CREEK NEAR LEE VINING, CALIF.	22	34.9	7- 4-67	590
10290000	SUMMERS CREEK NEAR BRIDGEPORT, CALIF.	6	8.26	12-23-55	690
10291500	BUCKEYE CREEK NEAR BRIDGEPORT, CALIF.	22	44.1	2- 1-63	947
10292000	SWAUGER CREEK NEAR BRIDGEPORT, CALIF.	22	52.8	12-23-55	585
10292300	BRIDGEPORT RESERVOIR TRIBUTARY NEAR BRIDGE	11	.79	3-16-67	98
10295450	HOT CREEK TRIBUTARY NEAR BRIDGEPORT, CALIF	9	.97	4- -69	15
10295500	LITTLE WALKER RIVER NEAR BRIDGEPORT, CALIF	31	63.0	1-31-63	1,510
10296000	WEST WALKER RIVER BELOW LITTLE WALKER RIVE	38	180	11-20-50	6,220
10296800	SLINKARD CREEK TRIBUTARY NEAR TOPAZ, CALIF	11	.14	7-16-67	640
10299120	O'BANION CANYON NEAR WELLINGTON, NEV.	8	5.05	8- 5-71	336
10304000	WOLF CREEK NEAR MARKLEEVILLE, CALIF.	5	11.7	11-20-50	1,480
10304500	SILVER CREEK BELOW PENNSYLVANIA CREEK, NEA	26	19.6	2- 1-63	2,220
10306000	HOT SPRINGS CREEK NEAR MARKLEEVILLE, CALIF	11	14.3	11-20-50	1,740
10308100	MILLBERRY CREEK AT MARKLEEVILLE, CALIF.	11	5.10	1-31-63	[1]291
10309000	EAST FORK CARSON RIVER NEAR GARDNERVILLE,	53	341	12-23-55	17,600
10310000	WEST FORK CARSON RIVER AT WOODFORDS, CALIF	60	65.6	2- 1-63	4,890

SEE FOOTNOTES AT END OF TABLE.

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SIERRA REGION--Continued				
10310500	CLEAR CREEK NEAR CARSON CITY, NEV.	23	15.5	1-31-63	170
10311000	CARSON RIVER NEAR CARSON CITY, NEV.	36	876	12-24-55	30,000
10311450	BRUNSWICK CANYON NEAR NEW EMPIRE, NEV.	5	12.7	-	63
10336635	LAKE TAHOE TRIBUTARY NEAR MEEKS BAY, CALI	11	.64	1-31-63	43
10336660	BLACKWOOD CREEK NEAR TAHOE CITY, CALIF.	15	11.2	12-22-64	2,100
10337900	TRUCKEE RIVER TRIBUTARY NEAR TRUCKEE, CAL	11	1.05	1-31-63	220
10339200	MIDDLE MARTIS CREEK NEAR TRUCKEE, CALIF.	9	2.80	2- -72	67
10339900	ALDER CREEK NEAR TRUCKEE, CALIF.	13	7.47	1-31-63	730
10340500	PROSSER CREEK NEAR BOCA, CALIF.	33	53.6	12-23-55	4,560
10342000	LITTLE TRUCKEE RIVER NEAR HOBART MILLS, C	26	36.5	2- 1-63	7,910
10343500	SAGEHEN CREEK NEAR TRUCKEE, CALIF.	22	10.8	2- 1-63	765
10344400	LITTLE TRUCKEE RIVER ABOVE BOCA RESERVOIR,	43	146	2- 1-63	13,300
10347600	HUNTER CREEK NEAR RENO, NEV.	10	11.5	1-31-63	986
10348900	GALENA CREEK NEAR STEAMBOAT, NEV.	14	8.50	8-15-65	3,670
11185300	GOLDEN TROUT CREEK NEAR CARTAGO, CALIF.	16	23.6	7-20-56	4,730
11185400	LITTLE KERN RIVER NEAR QUAKING ASPEN CAMP,	18	132	12- 6-66	13,100
11185600	PACKSADDLE CANYON CREEK NEAR FAIRVIEW, CAL	14	4.05	12- 6-66	660
11186000	KERN RIVER NEAR KERNVILLE, CALIF.	64	846	12- 6-66	60,000
11186340	SALMON CREEK TRIBUTARY B NEAR FAIRVIEW, CA	7	.46	12- 6-66	22
11186360	SALMON CREEK TRIBUTARY C NEAR FAIRVIEW, CA	7	.30	12- 6-66	60
11186380	SALMON CREEK TRIBUTARY E NEAR FAIRVIEW, CA	7	.23	12- 6-66	24
11187200	SHIRLEY CREEK TRIBUTARY NEAR ALTA SIERRA,	13	.27	12- 6-66	60
11188200	SOUTH FORK KERN RIVER NEAR OLANCHA, CALIF.	15	146	5-22-67	1,590
11189500	SOUTH FORK KERN RIVER NEAR ONYX, CALIF.	43	530	12- 6-66	28,700
11190000	SOUTH FORK KERN RIVER AT ISABELLA, CALIF.	23	982	2- 7-37	4,100
11191800	KERN RIVER TRIBUTARY NEAR MIRACLE HOT SPRI	14	1.24	12- 6-66	593
11199300	COHO CREEK NEAR WHITE RIVER, CALIF.	13	10.8	2-24-69	564
11199500	WHITE RIVER NEAR DUCOR, CALIF.	14	92.9	3- 9-43	2,300
11202450	WINDING CREEK NEAR CAMP NELSON, CALIF.	13	.30	12- 6-66	48
11203300	WARDLOW CREEK NEAR SPRINGVILLE, CALIF.	5	.46	2-24-69	196
11203500	TULE RIVER NEAR PORTERVILLE, CALIF.	59	253	11-19-50	25,500
11204500	SOUTH FORK TULE RIVER NEAR SUCCESS, CALIF.	44	109	12- 6-66	14,300
11204950	TULE RIVER TRIBUTARY NEAR SUCCESS, CALIF.	9	1.13	12- 6-66	219
11206500	MIDDLE FORK KAWEAH RIVER NEAR POTWISHA CAMI	25	102	12-23-55	46,800
11208000	MARBLE FORK KAWEAH RIVER AT POTWISHA CAMP,	25	51.4	12-23-55	12,500
11208500	MIDDLE FORK KAWEAH RIVER TRIBUTARY NEAR HA	14	1.90	12- 6-66	879
11208630	ATWELL CREEK ABOVE MINERAL KING HIGHWAY, NI	2	.66	3-13-71	21
11208730	EAST FORK KAWEAH RIVER NEAR THREE RIVERS,	21	85.8	12- 6-66	13,000
11209000	DORST CREEK NEAR KAWEAH CAMP, CALIF.	14	6.11	12- 6-66	2,010
11209500	NORTH FORK KAWEAH RIVER AT KAWEAH, CALIF.	50	129	12- 6-66	23,900
11210500	KAWEAH RIVER NEAR THREE RIVERS, CALIF.	58	519	12-23-55	80,700
11212000	SAND CREEK NEAR ORANGE COVE, CALIF.	17	31.6	1-25-69	3,520
11212450	GRIZZLY CREEK NEAR CEDAR GROVE, CALIF.	14	9.73	2- 1-63	293
11213500	KINGS RIVER ABOVE NORTH FORK, NEAR TRIMMER,	46	952	12-23-55	59,100
11214000	NORTH FORK KINGS RIVER BELOW MEADOW BROOK,	34	37.7	6- 2-69	2,040
11214200	FLEMING CREEK NEAR BLACKCAP MOUNTAIN, CALIF	10	15.0	12-23-55	800
11214500	HELMS CREEK AT SAND MEADOWS, CALIF.	16	34.7	12-23-55	7,600
11215000	NORTH FORK KINGS RIVER NEAR CLIFF CAMP, CAL	54	181	12-11-37	14,000
11215500	RANCHERIA CREEK NEAR SMITH MEADOW, CALIF.	10	21.3	6- 3-35	480
11215800	TEAKETTLE CREEK AT SITE NO. 3, NEAR PATTERS	12	.86	2- 1-63	99
11215820	TEAKETTLE CREEK TRIBUTARY NO. 2 NEAR PATTER	12	.85	12- 6-66	70
11215830	TEAKETTLE CREEK TRIBUTARY NO. 2A NEAR PATTE	12	.27	12- 6-66	60
11215840	TEAKETTLE CREEK TRIBUTARY NO. 1 NEAR PATTER	12	.77	12- 6-66	142
11216000	NORTH FORK KINGS RIVER BELOW RANCHERIA CREE	25	229	12-23-55	24,600
11216800	ROCK CREEK AT DINKEY CREEK, CALIF.	16	7.60	2- 1-63	2,850

TABLE 6.–*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SIERRA REGION--Continued				
11217000	DINKEY CREEK AT DINKEY MEADOW, CALIF.	14	50.7	11-26-26	2,660
11217500	DEER CREEK BELOW EAST FORK, CALIF.	12	19.0	5-16-32	860
11218000	DINKEY CREEK AT MOUTH, NEAR TRIMMER, CALIF	18	132	2-13-37	4,320
11220000	BIG CREEK ABOVE PINE FLAT LAKE, NEAR TRIMM	22	70.0	1-25-69	16,400
11220500	SYCAMORE CREEK ABOVE PINE FLAT LAKE, NEAR	21	56.1	1-25-69	16,800
11221700	MILL CREEK NEAR PIEDRA, CALIF.	18	127	12- 6-66	11,000
11222000	KINGS RIVER AT PIEDRA, CALIF.	61	1,687	11-19-50	91,000
11222600	BEAR MOUNTAIN CREEK NEAR SQUAW VALLEY, CAL	14	.14	12- 6-66	32
11226000	NORTH FORK SAN JOAQUIN RIVER BELOW IRON CR	25	35.5	7-24-56	3,860
11226500	SAN JOAQUIN RIVER AT MILLER CROSSING, CALI	31	249	12-23-55	16,600
11230500	BEAR CREEK NEAR LAKE THOMAS A. EDISON, CAL	54	52.5	9- 5-72	1,800
11231500	MONO CREEK BELOW LAKE THOMAS A. EDISON, CA	54	92.5	6- 2-38	1,760
11232500	JACKASS CREEK NEAR BASS LAKE, CALIF.	24	12.1	12-23-55	786
11234500	CHIQUITO CREEK NEAR BASS LAKE, CALIF.	26	60.1	12-23-55	8,630
11235300	RANCHERIA CREEK TRIBUTARY NEAR LAKESHORE,	12	.68	3-16-67	98
11237200	SOUTH FORK TAMARACK CREEK TRIBUTARY NEAR B	14	1.24	5- -69	68
11237500	PITMAN CREEK BELOW TAMARACK CREEK, CALIF.	48	22.9	12-23-55	3,670
11242400	NORTH FORK WILLOW CREEK NEAR SUGAR PINE, C	10	16.9	12- 6-66	1,600
11247200	BIG SANDY CREEK TRIBUTARY NEAR TOLLHOUSE,	14	.46	1-25-69	48
11248000	FINE GOLD CREEK NEAR FRIANT, CALIF.	22	92.6	3-12-38	10,300
11250500	COTTONWOOD CREEK NEAR FRIANT, CALIF.	10	35.7	1-22-43	569
11251500	LITTLE DRY CREEK NEAR FRIANT, CALIF.	15	57.8	1-25-52	1,810
11257100	MIAMI CREEK NEAR OAKHURST, CALIF.	15	10.6	2- 1-63	804
11257500	FRESNO RIVER NEAR KNOWLES, CALIF.	60	133	12-23-55	13,300
11257700	PICAYUNE CREEK NEAR COARSEGOLD, CALIF.	14	8.17	1-21-69	979
11257800	FRESNO RIVER TIRBUTARY NEAR RAYMOND, CALIF	10	.05	2-24-69	3
11258000	FRESNO RIVER NEAR DAULTON, CALIF.	35	258	12-23-55	17,500
11258800	EAST FORK CHOWCHILLA RIVER NEAR AHWAHNEE,	11	57.8	1-25-69	4,800
11258900	WEST FORK CHOWCHILLA RIVER NEAR MARIPOSA,	18	33.6	1-25-69	4,350
11258920	MIDDLE FORK CHOWCHILLA RIVER NEAR NIPINNAW	10	13.6	1-25-69	1,510
11258940	STRIPED ROCK CREEK NEAR RAYMOND, CALIF.	10	17.1	4- 3-58	1,180
11259000	CHOWCHILLA RIVER AT BUCHANAN DAMSITE, NEAR	42	235	12-23-55	30,000
11260200	BEAR CREEK NEAR CATHEYS VALLEY, CALIF.	12	24.9	1-21-69	7,720
11260210	BEAR CREEK TRIBUTARY NEAR CATHEYS VALLEY,	14	1.23	1-21-69	820
11264500	MERCED RIVER AT HAPPY ISLES BRIDGE, NEAR Y	60	181	12-23-55	9,860
11265000	TENAYA CREEK NEAR YOSEMITE, CALIF.	46	46.9	12-11-37	6,800
11266500	MERCED RIVER AT POHONO BRIDGE, NEAR YOSEMI	59	321	12-23-55	23,400
11267700	STRAWBERRY CREEK NEAR WAWONA, CALIF.	11	1.05	12-23-64	46
11268000	SOUTH FORK MERCED RIVER NEAR EL PORTAL, CAI	25	241	12-23-55	46,500
11268500	MERCED RIVER AT BAGBY, CALIF.	44	911	12-23-55	92,500
11269300	MAXWELL CREEK AT COULTERVILLE, CALIF.	15	17.0	12-22-64	1,770
11269350	NORTH FORK BLACKS CREEK NEAR COULTERVILLE,	7	2.27	1-21-69	806
11271300	HAYWARD CREEK NEAR LA GRANGE, CALIF.	14	3.88	1-21-69	2,230
11274730	BUDD CREEK NEAR TUOLUMNE MEADOWS, CALIF.	11	2.94	7- 1-67	159
11275000	FALLS CREEK NEAR HETCH HETCHY, CALIF.	60	46.0	12-23-55	6,660
11277000	CHERRY CREEK NEAR HETCH HETCHY, CALIF.	41	111	12-11-37	18,100
11279300	SMOKY JACK CREEK TRIBUTARY NEAR YOSEMITE V	11	.68	2- 1-63	101
11281000	SOUTH FORK TUOLUMNE RIVER NEAR OAKLAND RECI	53	87.0	12-23-55	11,900
11282000	MIDDLE TUOLUMNE RIVER AT OAKLAND RECREATIOI	59	73.5	12-23-55	4,920
11283100	LILY CREEK NEAR PINECREST, CALIF.	12	11.9	2- 1-63	2,030
11283200	BELL CREEK NEAR PINECREST, CALIF.	13	9.11	2- 1-63	1,410
11284500	BIG CREEK NEAR GROVELAND, CALIF.	17	25.0	2- 1-63	4,530
11284700	NORTH FORK TUOLUMNE RIVER NEAR LONG BARN,	15	23.1	12-23-55	2,560
11284800	SUGARPINE CREEK AT LONG BARN, CALIF.	11	1.38	12-24-64	139
11286300	CURTIS CREEK TRIBUTARY NEAR STANDARD, CALIF	11	.26	1-21-69	85

TABLE 6.—*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*— Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SIERRA REGION--Continued				
11292500	CLARK FORK STANISLAUS RIVER NEAR DARDANELL	25	67.5	11-20-50	4,350
11292680	CASCADE CREEK NEAR PINECREST, CALIF.	11	4.97	2- 1-63	532
11293300	NORTH FORK STANISLAUS RIVER TRIBUTARY NEAR	11	.09	12-23-64	27
11293500	NORTH FORK STANISLAUS RIVER BELOW SILVER C	25	27.8	11-20-50	2,790
11294500	NORTH FORK STANISLAUS RIVER NEAR AVERY, CA	55	163	1-31-63	36,000
11305500	SAN ANTONIO CREEK NEAR SAN ANDREAS, CALIF.	24	48.0	12-23-55	2,500
11306000	SOUTH FORK CALAVERAS RIVER NEAR SAN ANDREA	24	118	12-23-55	17,600
11306500	CALAVERITAS CREEK NEAR SAN ANDREAS, CALIF.	15	53.0	4- 2-58	4,410
11307000	ESPERANZA CREEK NEAR MOKELUMNE HILL, CALIF	18	16.6	12-23-55	3,060
11307500	JESUS MARIA CREEK NEAR MOKELUMNE HILL, CAL	20	34.6	12-23-55	5,490
11308000	NORTH FORK CALAVERAS RIVER NEAR SAN ANDREA	24	85.2	12-23-55	6,200
11308300	ELDORADO CREEK AT MOUNTAIN RANCH, CALIF.	11	1.97	1-21-69	145
11308500	MURRAY CREEK NEAR SAN ANDREAS, CALIF.	18	23.6	1-31-63	1,730
11309000	COSGROVE CREEK NEAR VALLEY SPRINGS, CALIF.	44	21.1	12-23-55	3,240
11311400	BEAR CREEK TRIBUTARY NEAR VALLEY SPRINGS,	14	.15	3-11-73	60
11312000	BEAR CREEK NEAR LOCKEFORD, CALIF.	45	47.6	4- 3-58	2,930
11315000	COLE CREEK NEAR SALT SPRINGS DAM, CALIF.	47	20.4	12-23-64	6,140
11316650	ANTELOPE CREEK NEAR WEST POINT, CALIF.	11	1.48	2- 1-63	78
11316800	FOREST CREEK NEAR WILSEYVILLE, CALIF.	15	20.8	12-24-64	1,770
11317000	MIDDLE FORK MOKELUMNE RIVER AT WEST POINT,	64	68.4	12-23-55	4,320
11318500	SOUTH FORK MOKELUMNE RIVER NEAR WEST POINT	42	75.1	12-23-55	6,920
11327000	SUTTER CREEK NEAR SUTTER CREEK, CALIF.	21	48.1	1-31-63	5,770
11327800	CLAY CREEK NEAR IONE, CALIF.	14	3.30	1- 5-65	432
11329000	GOOSE CREEK NEAR ELLIOTT, CALIF.	6	8.44	2- 6-32	726
11329500	DRY CREEK NEAR GALT, CALIF.	38	329	4- 3-58	24,000
11332500	SLY PARK CREEK NEAR POLLOCK PINES, CALIF.	7	18.2	12- 3-50	1,030
11333500	NORTH FORK COSUMNES RIVER NEAR EL DORADO,	57	205	12-23-55	15,800
11334200	MIDDLE FORK COSUMNES RIVER NEAR SOMERSET,	17	107	2- 1-63	11,800
11334300	SOUTH FORK COSUMNES RIVER NEAR RIVER PINES	18	64.3	2- 1-63	5,540
11335000	COSUMNES RIVER AT MICHIGAN BAR, CALIF.	68	536	12-23-55	42,000
11335650	DEER CREEK NEAR SHINGLE SPRINGS, CALIF.	11	6.62	10-13-62	1,320
11364550	WILLOW CREEK NEAR ROUND MOUNTAIN, CALIF.	13	2.61	12-22-64	824
11365500	SQUAW CREEK ABOVE SHASTA LAKE, CALIF.	29	64.0	12-21-55	17,800
11367500	MCCLOUD RIVER NEAR MCCLOUD, CALIF.	44	358	12-21-55	11,800
11369000	MCCLOUD RIVER AT BAIRD, CALIF.	34	673	2-16-04	55,000
11372060	CHURN CREEK BELOW NEWTOWN CREEK, NEAR REDD	8	11.9	12-22-64	4,000
11372200	SOUTH COW CREEK NEAR MILLVILLE, CALIF.	16	77.3	1-23-70	6,970
11373200	OAK RUN CREEK NEAR OAK RUN, CALIF.	16	11.0	1-16-74	3,860
11374000	COW CREEK NEAR MILLVILLE, CALIF.	26	425	12-27-51	45,200
11374060	SHINGLE CREEK NEAR SHINGLETOWN, CALIF.	13	3.25	1-21-67	608
11376100	SOUTH FORK BAILEY CREEK NEAR MANZANITA LAK	6	3.67	1-23-70	266
11376200	SUMMIT CREEK NEAR MINERAL, CALIF.	13	1.80	1-23-70	220
11376550	BATTLE CREEK BELOW COLEMAN FISH HATCHERY,	36	357	12-11-37	35,000
11377500	PAYNES CREEK NEAR RED BLUFF, CALIF.	24	92.7	12- 1-61	10,600
11378000	SACRAMENTO RIVER NEAR RED BLUFF, CALIF.	87	9,020	2-28-40	291,000
11379000	ANTELOPE CREEK NEAR RED BLUFF, CALIF.	34	123	1-23-70	17,200
11381500	MILL CREEK NEAR LOS MOLINOS, CALIF.	47	131	12-11-37	36,400
11382950	NORTH FORK CALF CREEK NEAR BUTTE MEADOWS,	6	1.26	1-23-70	34
11383500	DEER CREEK NEAR VINA, CALIF.	59	208	12-10-37	23,800
11384000	BIG CHICO CREEK NEAR CHICO, CALIF.	45	72.4	1- 5-65	9,580
11389650	SCOTTS JOHN CREEK NEAR STIRLING CITY, CALI	6	3.76	1-23-70	206
11390045	LITTLE CHICO CREEK TRIBUTARY NEAR FOREST F	10	.62	1- 5-65	96
11390200	GOLD RUN TRIBUTARY NEAR NELSON, CALIF	13	1.31	1-13-69	253
11391423	COTTONWOOD CREEK NEAR SIERRAVILLE, CALIF.	11	7.08	2- 1-63	162
11391460	MILLER CREEK NEAR SATTLEY, CALIF.	13	7.60	5-18-57	813

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SIERRA REGION--Contiued				
11391480	COUNTY LINE CREEK NEAR LOYALTON, CALIF.	8	0.33	1-21-69	36
11391500	BIG GRIZZLY CREEK AT GRIZZLY VALLEY DAM, I	30	45.5	2- 1-63	4,080
11392300	WILLOW CREEK TRIBUTARY NEAR BLAIRSDEN, CAI	11	1.08	2- 1-63	77
11392500	MIDDLE FORK FEATHER RIVER NEAR CLIO, CALIF	50	686	2- 1-63	14,500
11394500	MIDDLE FORK FEATHER RIVER NEAR MERRIMAC, (	26	1,062	12-22-64	86,200
11394620	FALL RIVER NEAR FEATHER FALLS, CALIF.	13	9.89	12-22-64	3,770
11394800	SOUTH FORK FEATHER RIVER ABOVE LITTLE GRA!	15	8.09	1-31-63	4,160
11395300	LOST CREEK ABOVE SLY CREEK RESERVOIR, CAL!	10	14.1	12-22-64	5,640
11396400	SUCKER RUN NEAR FORBESTOWN, CALIF.	11	18.7	12-22-64	2,190
11397000	SOUTH FORK FEATHER RIVER AT ENTERPRISE, C/	55	132	12-22-55	19,200
11397500	FEATHER RIVER AT BIDWELL BAR, CALIF.	53	1,341	12-23-55	104,000
11397900	BENNER CREEK NEAR CHESTER, CALIF.	6	7.67	1-23-70	182
11397970	LAKE ALMANOR TRIBUTARY NEAR ALMANOR, CALIF	11	1.66	1-23-70	131
11400000	BUTT CREEK ABOVE ALMANOR-BUTT TUNNEL, CAL!	28	69.0	12-11-37	2,320
11401460	HOUGH CREEK NEAR CRESCENT MILLS, CALIF.	11	3.79	1-23-70	227
11401500	INDIAN CREEK NEAR CRESCENT MILLS, CALIF.	54	739	3-19-68	25,000
11401940	MILL CREEK NEAR QUINCY, CALIF.	11	6.72	12-22-64	601
11402000	SPANISH CREEK ABOVE BLACKHAWK CREEK, AT KE	42	184	12-22-64	15,400
11402700	KINGSBURY CREEK NEAR TWAIN, CALIF.	11	1.36	7-16-67	391
11403000	EAST BRANCH OF NORTH FORK FEATHER RIVER NE	22	1,025	12-22-64	48,300
11403340	GRANITE CREEK AT TOBIN, CALIF.	11	.79	12-22-64	158
11404000	GRIZZLY CREEK NEAR STORRIE, CALIF.	14	5.20	12-10-37	1,570
11407000	FEATHER RIVER AT OROVILLE, CALIF.	74	3,624	3-19-07	230,000
11407400	WYMAN RAVINE TRIBUTARY NEAR PALERMO, CALIF	13	1.72	10-13-62	260
11407500	SOUTH HONCUT CREEK NEAR BANGOR, CALIF.	25	30.6	12-26-64	17,600
11409300	OREGON CREEK AT CAMPTONVILLE, CALIF.	8	23.0	1-21-70	3,130
11409500	OREGON CREEK NEAR NORTH SAN JUAN, CALIF.	56	34.4	12-22-64	10,300
11410400	HAYPRESS CREEK NEAR SIERRA CITY, CALIF.	6	18.2	12-23-64	3,100
11410500	NORTH YUBA RIVER NEAR SIERRA CITY, CALIF.	21	94.7	12-23-55	11,400
11412000	ROCK CREEK AT GOODYEARS BAR, CALIF.	23	8.98	3-25-28	1,600
11412500	GOODYEARS CREEK AT GOODYEARS BAR, CALIF.	20	12.9	3-25-28	1,800
11412700	NORTH YUBA RIVER TRIBUTARY AT GOODYEARS BA	10	.24	2- 1-63	75
11413000	NORTH YUBA RIVER BELOW GOODYEARS BAR, CALI	45	250	2- 1-63	40,000
11413600	SWEETLAND CREEK NEAR NORTH SAN JUAN, CALIF	11	2.68	12-22-64	600
11413900	UPPER CASTLE CREEK AT SODA SPRINGS, CALIF.	6	3.96	1-31-63	1,300
11413950	SOUTH YUBA RIVER TRIBUTARY NEAR SODA SPRIN	11	.92	12-23-64	585
11417100	POORMAN CREEK NEAR WASHINGTON, CALIF.	13	23.1	12-22-64	6,090
11420000	DRY CREEK NEAR BROWNSVILLE, CALIF.	12	20.4	12-22-55	1,890
11420300	WILLOW GLEN CREEK NEAR RACKERBY, CALIF.	11	1.95	10-13-62	344
11420500	DRY CREEK AT VIRGINIA RANCH, CALIF.	13	71.3	2- 8-60	9,730
11423050	MAGNOLIA CREEK NEAR AUBURN, CALIF.	11	5.65	10-13-62	1,380
11424600	WELLMAN CREEK NEAR SMARTVILLE, CALIF.	14	.59	1-20-64	467
11426110	ONION CREEK TRIBUTARY NO. 3 NEAR SODA SPRI	8	.65	1-31-63	242
11426120	ONION CREEK TRIBUTARY NO. 5A NEAR SODA SPR	7	.39	1-31-63	135
11426130	ONION CREEK TRIBUTARY NO. 2 NEAR SODA SPRI	9	.48	1-31-63	116
11426140	ONION CREEK TRIBUTARY NO. 1 NEAR SODA SPRI	9	.19	1-31-63	55
11426150	ONION CREEK NEAR SODA SPRINGS, CALIF.	15	3.58	12-23-64	1,750
11426160	ONION CREEK TRIBUTARY NO. 7 NEAR SODA SPRI	6	.80	1-31-63	181
11426400	NORTH SHIRTTAIL CREEK NEAR DUTCH FLAT, CAL	20	9.10	12-22-64	1,780
11427000	NORTH FORK AMERICAN RIVER AT NORTH FORK DA!	34	342	12-23-64	65,400
11427500	MIDDLE FORK AMERICAN RIVER AT FRENCH MEADO!	24	47.9	1-31-63	21,500
11427700	DUNCAN CREEK NEAR FRENCH MEADOWS, CALIF.	15	9.94	12-22-64	3,650
11431000	RUBICON RIVER NEAR GEORGETOWN, CALIF.	20	195	2- 1-63	58,000
11432500	PILOT CREEK NEAR GEORGETOWN, CALIF.	14	15.1	12-23-55	3,040
11433100	LONG CANYON CREEK NEAR FRENCH MEADOWS, CAL!	15	18.0	12-23-64	4,690

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SIERRA REGION--Contiued				
11433400	CANYON CREEK NEAR GEORGETOWN, CALIF.	10	12.5	1-21-70	1,300
11433500	MIDDLE FORK AMERICAN RIVER NEAR AUBURN, C	64	612	2- 1-63	21,000
11434000	NORTH FORK AMERICAN RIVER AT RATTLESNAKE I	25	997	11-21-50	115,000
11437560	KIRKWOOD CREEK NEAR SILVER LAKE, CALIF.	11	3.62	2- 1-63	385
11440000	ALDER CREEK NEAR WHITE HALL, CALIF.	53	22.1	12-23-55	5,500
11440500	PLUM CREEK NEAR RIVERTON, CALIF.	16	7.32	3-25-28	635
11440850	PICKET PEN CREEK NEAR KYBURZ, CALIF.	11	.49	12-24-64	111
11441000	SILVER CREEK AT UNION VALLEY, CALIF.	35	83.0	12-23-55	15,800
11441500	SILVER CREEK, SOUTH FORK, NEAR ICE HOUSE,	51	27.5	12-23-55	3,940
11442000	SILVER CREEK NEAR PLACERVILLE, CALIF.	40	177	12-23-55	27,500
11443500	SOUTH FORK AMERICAN RIVER NEAR CAMINO, CAL	53	493	12-23-55	49,800
11446000	WEBER CREEK NEAR SALMON FALLS, CALIF.	16	97.6	4- 2-58	12,200
11446500	AMERICAN RIVER AT FAIR OAKS, CALIF.	69	1,888	11-21-50	180,000
11447300	DRY CREEK TRIBUTARY NEAR ROSEVILLE, CALIF.	14	.39	2- 9-62	220
	CENTRAL COAST REGION				
11141150	ARROYO GRANDE ABOVE PHOENIX CREEK, NEAR AR	8	13.5	1-25-69	1,270
11141160	WITTENBERG CREEK NEAR ARROYO GRANDE, CALIF	8	3.11	1-19-69	840
11141280	LOPEZ CREEK NEAR ARROYO GRANDE, CALIF.	8	21.6	1-25-69	2,830
11141400	TAR SPRING CREEK NEAR ARROYO GRANDE, CALIF	8	18.2	1-25-69	1,340
11141500	ARROYO GRANDE AT ARROYO GRANDE, CALIF.	36	102	12- 6-66	5,400
11141600	LOS BERROS CREEK NEAR NIPOMO, CALIF.	7	15.0	1-25-69	599
11142150	COTTONTAIL CREEK TRIBUTARY NEAR CAYUCOS, C	14	1.33	1-25-69	295
11142200	SANTA ROSA CREEK NEAR CAMBRIA, CALIF.	15	12.5	1-25-69	3,350
11142500	ARROYO DE LA CRUZ NEAR SAN SIMEON, CALIF.	25	41.2	12- 6-66	35,200
11142600	REDWOOD GULCH NEAR JOLON, CALIF.	12	1.31	1-31-63	372
11142800	RAT CREEK NEAR LUCIA, CALIF.	13	.82	11-17-65	28
11143000	BIG SUR RIVER NEAR BIG SUR, CALIF.	25	46.5	4- 2-58	5,680
11143050	DOUD CREEK NEAR CARMEL, CALIF.	13	2.75	2-24-69	42
11143190	KLONDIKE CANYON NEAR CARMEL VALLEY, CALIF.	12	2.14	12-21-70	82
11143300	ARROYO DEL REY AT DEL REY OAKS, CALIF.	9	14.3	1-3-74	64
11143500	SALINAS RIVER NEAR POZO, CALIF.	30	73.8	1-25-69	18,600
11144000	TORO CREEK NEAR POZO, CALIF.	12	9.56	2-24-69	2,400
11145200	RINCONADA CREEK TRIBUTARY NEAR POZO, CALIF	14	.34	1-19-69	182
11147000	JACK CREEK NEAR TEMPLETON, CALIF.	26	25.3	2-24-69	8,160
11147040	SANTA RITA CREEK TRIBUTARY NEAR TEMPLETON,	5	2.95	1-19-69	1,290
11147070	SANTA RITA CREEK NEAR TEMPLETON, CALIF.	14	18.2	1-19-69	6,060
11147630	SAN MARCOS CREEK TRIBUTARY NEAR PASO ROBLE	14	.59	12- 6-66	135
11147700	CHOLAME CREEK TRIBUTARY NEAR CHOLAME, CALI	15	9.26	12- 6-66	750
11147750	WHITE CANYON CREEK AT CHOLAME, CALIF.	15	4.80	2-24-69	444
11148500	ESTRELLA RIVER NEAR ESTRELLA, CALIF.	21	922	2-24-69	32,500
11148550	INDIAN VALLEY CREEK TRIBUTARY NEAR VALLETO	13	.13	1-26-69	65
11148800	NACIMIENTO RIVER NEAR BRYSON, CALIF.	16	140	1-25-69	39,100
11148820	SAPAQUE CREEK TRIBUTARY AT BRYSON, CALIF.	13	.76	1-25-69	72
11149500	NACIMIENTO RIVER NEAR SAN MIGUEL, CALIF.	19	343	12-23-55	58,600
11149650	SULPHUR SPRING CANYON NEAR JOLON, CALIF.	13	5.16	12- 6-66	372
11150000	SAN ANTONIO RIVER AT PLEYTO, CALIF.	36	284	4- 3-58	19,100
11150020	SAN ANTONIO RIVER TRIBUTARY NEAR PLEYTO, C	5	.50	1-31-63	30
11150700	FELIZ CANYON TRIBUTARY NEAR SAN LUCAS, CAL	13	3.00	1-26-69	102
11150800	COW CREEK NEAR SAN ARDO, CALIF.	13	4.80	1-18-73	435
11150950	SAN LORENZO CREEK TRIBUTARY NEAR BITTERWAT	12	3.24	2-24-69	36
11151600	LITTLE RABBIT VALLEY CREEK NEAR SAN BENITO	12	4.25	1-18-73	79

SEE FOOTNOTES AT END OF TABLE.

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	CENTRAL COAST REGION--Continued				
11151950	SAND CREEK NEAR PARAISO SPRINGS, CALIF.	10	14.8	1-31-63	673
11152000	ARROYO SECO NEAR SOLEDAD, CALIF.	70	244	4- 3-58	28,300
11152500	SALINAS RIVER NEAR SPRECKELS, CALIF.	44	4,156	2-26-69	83,100
11152700	MORO COJO SLOUGH TRIBUTARY NEAR CASTROVILL	13	.11	2-24-69	13
11152900	CEDAR CREEK NEAR BELL STATION, CALIF.	14	12.8	1-31-63	3,490
11153050	PACHECO CREEK TRIBUTARY NEAR DUNNEVILLE, C	13	.17	1-18-73	14
11153800	ALEC CANYON NEAR MORGAN HILL, CALIF.	13	.91	1-31-63	367
11153900	UVAS CREEK ABOVE UVAS RESERVOIR, NEAR MORG	14	21.0	10-13-62	6,580
11154000	UVAS CREEK NEAR MORGAN HILL, CALIF.	27	30.4	12-23-55	10,300
11154100	BODFISH CREEK NEAR GILROY, CALIF.	16	7.40	1-31-63	1,240
11156450	WILLOW CREEK TRIBUTARY NEAR SAN BENITO, CA	13	1.24	1-18-73	55
11156500	SAN BENITO RIVER NEAR WILLOW CREEK SCHOOL,	36	249	4- 3-58	8,210
11156680	THOMPSON CREEK NEAR PAICINES, CALIF.	13	9.67	2-24-69	76
11157500	TRES PINOS CREEK NEAR TRES PINOS, CALIF.	36	206	4- 4-41	8,060
11158500	SAN BENITO RIVER NEAR HOLLISTER, CALIF.	26	586	4- 3-58	11,600
11159150	CORRALITOS CREEK NEAR CORRALITOS, CALIF.	15	10.6	4- 2-58	1,970
11159200	CORRALITOS CREEK AT FREEDOM, CALIF.	20	27.8	12-22-55	3,620
11159400	GREEN VALLEY CREEK NEAR CORRALITOS, CALIF.	13	7.05	1-31-63	925
11159700	APTOS CREEK AT APTOS, CALIF.	14	12.3	1-31-63	2,110
11159770	LAUREL CREEK NEAR LAUREL, CALIF.	13	.93	1-31-63	290
11159800	WEST BRANCH SOQUEL CREEK NEAR SOQUEL, CALI	14	12.2	1-24-67	4,530
11160000	SOQUEL CREEK AT SOQUEL, CALIF.	25	40.2	12-23-55	15,800
11160020	SAN LORENZO RIVER NEAR BOULDER CREEK, CALI	7	6.17	1-16-73	672
11160030	SAN LORENZO RIVER TRIBUTARY NEAR BOULDER C	12	.26	1-31-63	58
11160300	ZAYANTE CREEK AT ZAYANTE, CALIF.	18	11.1	4- 2-58	3,700
11160500	SAN LORENZO RIVER AT BIG TREES, CALIF.	39	111	12-23-55	30,400
11161500	BRANCIFORTE CREEK AT SANTA CRUZ, CALIF.	19	17.3	12-22-55	8,100
11162470	PESCADERO CREEK TRIBUTARY NEAR LA HONDA, C	13	.22	1-16-73	51
11162500	PESCADERO CREEK NEAR PESCADERO, CALIF.	24	45.9	12-23-55	9,420
11162540	BUTANO CREEK NEAR PESCADERO, CALIF.	14	18.3	2-13-62	1,600
11162600	PURISIMA CREEK NEAR HALF MOON BAY, CALIF.	11	4.83	1-21-67	343
11162720	COLMA CREEK AT SOUTH SAN FRANCISCO, CALIF.	12	10.8	1-16-73	2,880
11162800	REDWOOD CREEK AT REDWOOD CITY, CALIF.	16	1.82	1-31-63	644
11163200	LOS TRANCOS CREEK TRIBUTARY NEAR STANFORD	8	.42	1-31-63	66
11164500	SAN FRANCISQUITO CREEK AT STANFORD UNIVERS	35	37.4	12-22-55	5,560
11166000	MATADERO CREEK AT PALO ALTO, CALIF.	23	7.24	2-27-73	1,100
11166700	ARROYO CALERO TRIBUTARY NEAR NEW ALMADEN,	13	.17	1-18-73	78
11167660	ROSS CREEK AT SAN JOSE, CALIF.	9	5.72	1-30-68	763
11169500	SARATOGA CREEK AT SARATOGA, CALIF.	42	9.22	12-22-55	2,730
11170000	COYOTE CREEK NEAR MADRONE, CALIF.	68	196	3- 7-11	25,000
11173550	ALAMEDA CREEK TRIBUTARY NO. 2 NEAR WARM SP	15	.47	1-23-67	36
11173560	ALAMEDA CREEK TRIBUTARY NO. 1 NEAR WARM SP	13	.35	2-14-62	13
11174000	SAN ANTONIO CREEK NEAR SUNOL, CALIF.	23	37.0	12-23-55	5,810
11174450	BIG CANYON CREEK NEAR DUBLIN, CALIF.	6	1.13	1-31-63	160
11176000	ARROYO MOCHO NEAR LIVERMORE, CALIF.	31	38.2	12-23-55	1,880
11176500	ARROYO VALLE NEAR LIVERMORE, CALIF.	19	147	12-23-55	18,200
11176550	ARROYO VALLE TRIBUTARY NEAR LIVERMORE, CAL	15	3.58	1-18-73	152
11179005	ALAMEDA CREEK TRIBUTARY NEAR NILES, CALIF.	15	.28	10-13-62	60
11180500	DRY CREEK AT UNION CITY, CALIF.	20	9.41	10-13-62	930
11181000	SAN LORENZO CREEK AT HAYWARD, CALIF.	31	37.5	10-13-62	7,460
11181400	WILDCAT CREEK AT RICHMOND, CALIF.	11	8.69	1-21-70	776
11182030	RHEEM CREEK AT SAN PABLO, CALIF.	15	1.49	12-20-69	477
11182100	PINOLE CREEK AT PINOLE, CALIF.	36	10.0	4- 2-58	1,660
11182300	ARROYO DEL HAMBRE NEAR MARTINEZ, CALIF.	15	.80	2-14-62	236

TABLE 6.—*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*— Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	CENTRAL COAST REGION--Continued				
11182400	ARROYO DEL HAMBRE AT MARTINEZ, CALIF.	11	15.1	1-18-73	1,960
11182500	SAN RAMON CREEK AT SAN RAMON, CALIF.	23	5.89	10-13-62	1,600
11183000	SAN RAMON CREEK AT WALNUT CREEK, CALIF.	23	50.8	1-31-63	7,980
11183500	WALNUT CREEK AT WALNUT CREEK, CALIF.	16	79.2	4- 2-58	12,200
11185000	GRAYSON CREEK NEAR HOOKSTON, CALIF.	6	1.96	4- 2-58	602
11185150	HORSE CREEK NEAR CLAYTON, CALIF.	15	.20	10-13-62	44
11224500	LOS GATOS CREEK ABOVE NUNEZ CANYON, NEAR C	30	95.8	2-24-69	4,360
11225050	WARTHAN CREEK TRIBUTARY NO. 1 NEAR COALING	14	.13	2-24-69	51
11225075	WARTHAN CREEK TRIBUTARY NO. 2 NEAR COALING	11	.01	2-24-69	6
11255500	PANOCHE CREEK BELOW SILVER CREEK, NEAR PAN	19	293	2-24-69	5,400
11255550	LITTLE PANOCHE CREEK TRIBUTARY NO. 1 NEAR	15	.33	1-19-62	58
11255600	LITTLE PANOCHE CREEK TRIBUTARY NO. 2 NEAR	13	14.8	11-21-67	113
11258700	DEEP CREEK NEAR ORO LOMA, CALIF.	10	6.96	11-23-65	645
11262950	WOLF CREEK NEAR VOLTA, CALIF.	10	2.82	2- 1-63	207
11263000	SAN LUIS CREEK NEAR LOS BANOS, CALIF.	11	84.6	4- 2-58	3,420
11274500	ORESTIMBA CREEK NEAR NEWMAN, CALIF.	44	134	4- 2-58	10,200
11274600	DEL PUERTO CREEK TRIBUTARY NO. 1 NEAR PATT	15	.71	2- 1-63	20
11274610	DEL PUERTO CREEK TRIBUTARY NO. 2 NEAR PATT	11	.02	1-26-69	1
11274620	WINDMILL CANYON CREEK NEAR PATTERSON, CALI	13	.99	11-13-60	8
11312925	MOUNTAIN HOUSE CREEK NEAR MIDWAY, CALIF.	15	11.7	1-24-69	84
11312950	MOUNTAIN HOUSE CREEK TRIBUTARY NEAR ALTAMO	13	.27	1-18-73	14
11313100	KELLOGG CREEK TRIBUTARY NEAR BYRON, CALIF.	15	1.09	1-26-69	33
11337500	MARSH CREEK NEAR BYRON, CALIF.	22	42.6	1-31-63	3,880
	SOUTH COAST REGION				
10255650	CHARIOT CREEK NEAR JULIAN, CALIF.	12	7.95	12- 6-66	340
10255810	BORREGO PALM CREEK NEAR BORREGO SPRINGS, C	25	21.8	8-23-55	2,000
10256000	WHITEWATER RIVER AT WHITE WATER, CALIF.	27	57.4	3- 2-38	42,000
10256500	SNOW CREEK NEAR WHITE WATER, CALIF.	15	10.8	1-25-69	13,000
10257800	LONG CREEK NEAR DESERT HOT SPRINGS, CALIF.	13	19.4	8- 7-63	9,270
10258000	TAHQUITZ CREEK NEAR PALM SPRINGS, CALIF.	28	16.8	1-25-69	2,900
10258100	PALM CANYON CREEK TRIBUTARY NEAR ANZA, CAL	12	.47	8-30-67	28
10258500	PALM CANYON CREEK NEAR PALM SPRINGS, CALIF	40	93.3	2- 6-37	3,850
10259000	ANDREAS CREEK NEAR PALM SPRINGS, CALIF.	26	8.61	8-31-54	1,960
10260500	DEEP CREEK NEAR HESPERIA, CALIF.	57	136	3- 2-38	46,600
10261000	WEST FORK MOJAVE RIVER NEAR HESPERIA, CALI	50	74.7	3- 2-38	26,100
10263500	BIG ROCK CREEK NEAR VALYERMO, CALIF.	53	22.9	3- 2-38	8,300
10263900	BUCKHORN CREEK NEAR VALYERMO, CALIF.	13	.48	1-25-69	169
10264000	LITTLE ROCK CREEK NEAR LITTLE ROCK, CALIF.	44	49.0	3- 2-38	17,000
10264680	MESCAL CREEK TRIBUTARY AT BIG PINES, CALIF	12	.06	5- 5-69	21
11010900	WILSON CREEK TRIBUTARY NEAR DULZURA, CALIF	12	.61	12- 6-66	98
11011900	POTRERO CREEK TRIBUTARY NEAR BARRETT JUNCT	12	.78	11-22-65	294
11012500	CAMPO CREEK NEAR CAMPO, CALIF.	39	85.0	2- 6-37	880
11013850	CEDAR CREEK NEAR JAMUL, CALIF.	12	6.66	12- 6-66	660
11014850	JAPACHA CREEK NEAR DESCANSO, CALIF.	12	2.40	12- 6-66	178
11021100	WILDCAT CREEK NEAR LAKESIDE, CALIF.	12	.82	2-12-62	38
11023300	RATTLESNAKE CREEK NEAR POWAY, CALIF.	12	3.74	11-11-72	68
11025500	SANTA YSABEL CREEK NEAR RAMONA, CALIF.	41	112	1-27-16	28,400
11025800	CLEVENGER CREEK TRIBUTARY NEAR RAMONA, CAL	12	.45	11-16-72	54
11027000	GUEJITO CREEK NEAR SAN PASQUAL, CALIF.	28	22.5	2- 6-66	2,920

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SOUTH COAST REGION--Continued				
11029800	LAKE HODGES TRIBUTARY NEAR ESCONDIDO, CALI	12	0.18	12-18-67	28
11031500	AGUA CALIENTE CREEK NEAR WARNER SPRINGS, C	15	19.0	12- 6-66	1,200
11032100	AGUA CALIENTE CREEK TRIBUTARY NEAR WARNER	19	.05	8-30-67	13
11033000	WEST FORK SAN LUIS REY RIVER NEAR WARNER S	16	25.5	12- 6-66	4,200
11035300	WIGHAM CREEK NEAR LAKE HENSHAW, CALIF.	9	1.40	12- 6-66	161
11037700	PAUMA CREEK NEAR PAUMA VALLEY, CALIF.	11	11.0	12- 6-66	2,100
11039100	SAN LUIS REY RIVER TRIBUTARY NEAR PALA, CA	12	1.01	11-22-65	25
11040400	SAN LUIS REY RIVER TRIBUTARY NO. 2 NEAR FA	12	.36	2-25-69	62
11042400	TEMECULA CREEK NEAR AGUANGA, CALIF.	18	131	4- 3-58	3,540
11042430	COAHUILA CREEK TRIBUTARY AT ANZA, CALIF.	13	4.90	8-18-61	102
11042520	TEMECULA CREEK AT NIGGER CANYON, NEAR TEME	25	320	2-16-27	17,100
11043000	MURRIETA CREEK AT TEMECULA, CALIF.	44	222	1-23-43	17,500
11044000	SANTA MARGARITA RIVER NEAR TEMECULA, CALIF	53	588	2-16-27	25,000
11044600	SANTA MARGARITA RIVER TRIBUTARY NEAR FALLB	12	.52	2-25-69	109
11044900	DE LUZ CREEK NEAR FALLBROOK, CALIF.	17	47.5	1-25-69	7,800
11046100	LAS FLORES CREEK NEAR OCEANSIDE, CALIF.	23	26.6	2-25-69	4,200
11046200	SAN ONOFRE CREEK NEAR SAN ONOFRE, CALIF.	18	34.6	2-25-69	7,100
11046300	SAN MATEO CREEK NEAR SAN CLEMENTE, CALIF.	16	80.8	1-25-69	9,240
11046320	SAN MATEO CREEK TRIBUTARY NEAR SAN ONOFRE,	12	.65	1-25-69	268
11046350	CRISTIANITOS CREEK NEAR SAN CLEMENTE, CALI	18	29.0	2-25-69	4,750
11046390	SAN JUAN CREEK TRIBUTARY NEAR ELSINORE, CA	11	.39	2-25-69	2,130
11046410	SAN JUAN CREEK TRIBUTARY NEAR SAN JUAN CAP	12	.15	1-25-69	29
11046500	SAN JUAN CREEK NEAR SAN JUAN CAPISTRANO, C	41	106	2-25-69	22,400
11046700	LIVE OAK CREEK NEAR MODJESKA, CALIF.	11	1.31	2-25-69	590
11047000	ARROYO TRABUCO NEAR SAN JUAN CAPISTRANO, C	40	35.7	2- 6-37	9,240
11047500	ALISO CREEK AT EL TORO, CALIF.	45	7.91	2-24-69	2,500
11048500	SAN DIEGO CREEK NEAR IRVINE, CALIF.	26	40.3	2-24-69	6,700
11048800	FORSEE CREEK NEAR CAMP ANGELUS, CALIF.	13	2.82	12- 6-66	390
11048900	CARIBOU CREEK AT BIG BEAR CITY, CALIF.	13	7.02	1-25-69	350
11054000	MILL CREEK NEAR YUCAIPA, CALIF.	43	42.4	1-25-69	35,400
11054300	MILL CREEK TRIBUTARY NEAR YUCAIPA, CALIF.	12	2.01	2-25-69	199
11055300	LITTLE MILL CREEK NEAR RUNNING SPRINGS, CA	13	1.73	1-25-69	620
11055500	PLUNGE CREEK NEAR EAST HIGHLANDS, CALIF.	56	16.9	3- 2-38	5,340
11055800	CITY CREEK NEAR HIGHLAND, CALIF.	56	19.6	2-25-69	7,000
11056500	LITTLE SAN GORGONIO CREEK NEAR BEAUMONT, C	26	3.23	2-25-69	11,000
11057000	SAN TIMOTEO CREEK NEAR REDLANDS, CALIF.	42	119	3- 2-38	7,460
11058500	EAST TWIN CREEK NEAR ARROWHEAD SPRINGS, CA	56	8.80	3- 2-38	3,360
11058600	WATERMAN CANYON CREEK NEAR ARROWHEAD SPRI	52	4.65	3- 2-38	2,350
11061600	LYTLE CREEK TRIBUTARY NEAR LYTLE CREEK, CA	9	.53	2-25-69	260
11062000	LYTLE CREEK NEAR FONTANA, CALIF.	41	46.3	1-25-69	35,900
11063000	CAJON CREEK NEAR KEENBROOK, CALIF.	52	40.6	3- 2-38	14,500
11063500	LONE PINE CREEK NEAR KEENBROOK, CALIF.	45	15.1	3- 2-38	6,180
11063680	DEVIL CANYON CREEK NEAR SAN BERNARDINO, CA	54	5.61	1-25-69	3,720
11067000	DAY CREEK NEAR ETIWANDA, CALIF.	45	4.56	1-25-69	9,450
11069300	SOUTH FORK SAN JACINTO RIVER TRIBUTARY NEA	12	2.20	2-25-69	51
11070000	BAUTISTA CREEK NEAR HEMET, CALIF.	22	39.4	4- 3-58	1,440
11070190	LABORDE CREEK NEAR SAN JACINTO, CALIF.	12	7.57	2-25-69	1,690
11070380	ST. JOHNS CREEK NEAR SAGE, CALIF.	11	.37	11-22-65	12
11071300	TEMESCAL CREEK TRIBUTARY NEAR ELSINORE, CA	12	.36	1-25-69	33
11072400	ICEHOUSE CANYON CREEK NEAR MT. BALDY, CALI	9	4.45	1-25-69	7,600
11073000	SAN ANTONIO CREEK NEAR CLAREMONT, CALIF.	55	16.5	3- 2-38	21,400
11073470	CUCAMONGA CREEK NEAR UPLAND, CALIF.	48	10.1	1-25-69	14,100
11075740	CARBON CREEK NEAR YORBA LINDA, CALIF.	22	20.1	- -27	2,500
11075800	SANTIAGO CREEK AT MODJESKA, CALIF.	14	12.5	2-25-69	6,520
11075900	BLACK STAR CREEK NEAR SILVERADO, CALIF.	11	4.65	2-25-69	2,340

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SOUTH COAST REGION--Continued				
11080500	EAST FORK SAN GABRIEL RIVER NEAR CAMP BONI	43	84.6	3- 2-38	46,000
11081200	NORTH FORK SAN GABRIEL RIVER AT COLDBROOK	13	6.79	12-29-65	2,080
11081500	NORTH FORK SAN GABRIEL RIVER AT CAMP RINCO	7	18.6	1- 1-34	276
11084000	ROGERS CREEK NEAR AZUSA, CALIF.	45	6.64	1- 6-59	2,400
11084500	FISH CREEK NEAR DUARTE, CALIF.	56	6.36	1-25-69	13,000
11086500	LITTLE DALTON CREEK NEAR GLENDORA, CALIF.	35	2.72	1-25-69	2,600
11090500	COYOTE CREEK NEAR ARTESIA, CALIF.	33	120	1-18-52	7,360
11091950	LIMEKILN CANYON WASH NEAR CHATSWORTH, CALI	14	3.41	11-29-70	540
11093000	PACOIMA CREEK NEAR SAN FERNANDO, CALIF.	54	28.3	2 - 14	5,400
11093490	NORTH FORK MILL CREEK NEAR LA CANADA, CALI	14	5.80	1-25-69	1,280
11094000	TUJUNGA CREEK BELOW MILL CREEK, NEAR COLBY	24	64.9	2-25-69	20,700
11094500	TUJUNGA CREEK NEAR COLBY RANCH, CALIF.	19	67.5	1-23-43	14,800
11095000	FOX CREEK NEAR COLBY RANCH, CALIF.	7	9.22	2- 2-36	410
11095500	TUJUNGA CREEK NEAR SUNLAND, CALIF.	57	106	3- 2-38	50,000
11096000	HAINES CREEK NEAR TUJUNGA, CALIF.	43	1.26	2- -14	4,620
11096500	LITTLE TUJUNGA CREEK NEAR SAN FERNANDO, CA	46	21.1	3- 2-38	8,500
11098000	ARROYO SECO NEAR PASADENA, CALIF.	62	16.0	3- 2-38	8,620
11100000	SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF	54	9.71	1-25-69	8,500
11100500	LITTLE SANTA ANITA CREEK NEAR SIERRA MADRE	46	1.84	3- 2-38	536
11101000	EATON CREEK NEAR PASADENA, CALIF.	50	6.47	3- 2-38	2,400
11104000	TOPANGA CREEK NEAR TOPANGA BEACH, CALIF.	45	18.0	1-25-69	12,200
11105200	COLD CREEK TRIBUTARY NEAR MALIBU BEACH, CA	13	.30	11-29-70	102
11105500	MALIBU CREEK AT CRATER CAMP, NEAR CALABASA	45	105	1-25-69	33,800
11106700	LITTLE SYCAMORE CREEK NEAR NEWBURY PARK, C	13	1.35	12-29-65	377
11107000	HONDA BARRANCA NEAR SOMIS, CALIF.	19	2.57	11-15-72	770
11107700	SOLEDAD CANYON TRIBUTARY NEAR ACTON, CALIF	14	4.08	12-29-65	8
11108200	SANTA CLARA RIVER TRIBUTARY NEAR VAL VERDE	14	.65	12-29-65	190
11108500	SANTA CLARA RIVER AT LOS ANGELES-VENTURA C	23	644	1-25-69	68,800
11109600	PIRU CREEK ABOVE LAKE PIRU, CALIF.	21	372	3- 2-38	35,000
11110000	PIRU CREEK NEAR PIRU, CALIF.	30	437	3- 2-38	35,600
11110500	HOPPER CREEK NEAR PIRU, CALIF.	40	23.6	1-25-69	8,400
11111500	SESPE CREEK NEAR WHEELER SPRINGS, CALIF.	27	49.5	1-25-69	9,700
11113000	SESPE CREEK NEAR FILLMORE, CALIF.	43	251	1-25-69	60,000
11113500	SANTA PAULA CREEK NEAR SANTA PAULA, CALIF.	43	40.0	2-25-69	21,000
11114500	MATILIJA CREEK ABOVE RESERVOIR, NEAR MATIL	21	50.7	1-25-69	19,600
11115500	MATILIJA CREEK AT MATILIJA HOT SPRINGS, CA	41	54.6	1-25-69	20,000
11116000	NORTH FORK MATILIJA CREEK AT MATILIJA HOT	41	15.6	2-24-69	9,440
11117500	SAN ANTONIO CREEK AT CASITAS SPRINGS, CALI	26	51.2	1-25-69	16,200
11117600	COYOTE CREEK NEAR OAK VIEW, CALIF.	17	13.2	1-25-69	8,000
11117800	SANTA ANA CREEK NEAR OAK VIEW, CALIF.	18	9.11	1-25-69	4,730
11118000	COYOTE CREEK NEAR VENTURA, CALIF.	29	41.2	3- 2-38	11,500
11118500	VENTURA RIVER NEAR VENTURA, CALIF.	42	188	1-25-69	58,000
11118700	CASITAS CREEK TRIBUTARY NEAR SEA CLIFF, CA	14	.76	1-25-69	195
11119500	CARPINTERIA CREEK NEAR CARPINTERIA, CALIF.	35	13.1	12-27-71	8,880
11120000	ATASCADERO CREEK NEAR GOLETA, CALIF.	34	18.9	1-18-73	5,380
11120500	SAN JOSE CREEK NEAR GOLETA, CALIF.	34	5.51	1-25-69	2,000
11120550	GAVIOTA CREEK NEAR GAVIOTA, CALIF.	9	18.8	1-24-67	4,000
11120600	JALAMA CREEK NEAR LOMPOC, CALIF.	10	20.5	1-18-73	3,530
11123480	LOS LAURELES CANYON TRIBUTARY NEAR GOLETA,	14	.28	1-24-67	163
11124500	SANTA CRUZ CREEK NEAR SANTA YNEZ, CALIF.	33	74.0	2-24-69	7,050
11125000	CACHUMA CREEK NEAR SANTA YNEZ, CALIF.	15	23.8	1-15-52	4,300
11126500	SANTA AGUEDA CREEK NEAR SANTA YNEZ, CALIF.	31	55.8	2-24-69	7,300
11127500	ZANJA DE COTA CREEK NEAR SANTA YNEZ, CALIF	7	13.8	3-21-58	460
11128400	ALISAL CREEK NEAR SOLVANG, CALIF.	18	12.3	1-25-69	4,960

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SOUTH COAST REGION--Continued				
11130000	ZACA CREEK AT BUELLTON, CALIF.	24	39.4	3- 3-41	874
11132300	EL JARO CREEK NEAR LAS CRUCES, CALIF.	14	3.54	1-18-73	500
11132500	SALSIPUEDES CREEK NEAR LOMPOC, CALIF.	35	47.1	3-15-52	11,400
11136000	SAN ANTONIO CREEK AT HARRIS, CALIF.	15	93.5	3-15-52	1,800
11136100	SAN ANTONIO CREEK NEAR CASMALIA, CALIF.	20	135	2-25-69	2,300
11136150	SAN ANTONIO CREEK TRIBUTARY NEAR CASMALIA,	14	.28	2-10-62	8
11137500	ALAMO CREEK NEAR SANTA MARIA, CALIF.	19	86.6	4- 3-58	[3]3,120
11138000	HUASNA RIVER NEAR SANTA MARIA, CALIF.	32	117	2-11-38	[4]11,400
11138500	SISQUOC RIVER NEAR SISQUOC, CALIF.	37	281	12- 6-66	23,200
11139000	LA BREA CREEK NEAR SISQUOC, CALIF.	31	93.6	12- 6-66	11,200
11139300	FOXEN CREEK NEAR LOS ALAMOS, CALIF.	14	6.64	2- 9-62	116
11139350	FOXEN CREEK NEAR SISQUOC, CALIF.	8	16.8	2-26-69	271
11139480	TEPUSQUET CREEK TRIBUTARY NEAR SISQUOC, CA	14	2.44	10-18-72	186
11139500	TEPUSQUET CREEK NEAR SISQUOC, CALIF.	30	28.7	12- 6-66	788
	SOUTH LAHONTAN-COLORADO DESERT REGION				
09423400	TIN CAN CREEK NEAR NEEDLES, CALIF.	15	.04	11-11-58	98
09424050	CHEMEHUEVI WASH TRIBUTARY NEAR NEEDLES, CA	14	2.04	9-26-62	114
09428530	ARCH CREEK NEAR EARP, CALIF.	15	1.52	8-19-71	7,160
09428560	COLORADO RIVER TRIBUTARY NO. 2 NEAR VIDAL,	14	.42	8-11-71	400
09428570	COLORADO RIVER TRIBUTARY NEAR VIDAL, CALIF	14	1.12	8-11-71	460
09429240	OGILBY WASH NEAR PALO VERDE, CALIF.	14	.04	8-16-67	39
09429250	OGILBY WASH NO. 2 NEAR PALO VERDE, CALIF.	14	.02	8-16-67	32
10250600	WILDROSE CREEK NEAR WILDROSE STATION, CALI	15	23.7	9- 4-67	1,060
10250720	ONYX CREEK NEAR BALLARAT, CALIF.	11	.52	7-26-64	24
10250870	TOWNE CREEK NEAR PANAMINT SPRINGS, CALIF.	10	.05	9- 4-67	2
10251000	BIG DIP CREEK NEAR STOVEPIPE WELLS, CALIF.	15	.95	12- 6-66	199
10251200	SPRING CREEK AT FURNACE CREEK INN, CALIF.	15	.21	9- 4-67	24
10251350	HORSE THIEF CREEK NEAR TECOPA, CALIF.	10	3.06	9- 6-69	850
10251400	IBEX CREEK NEAR TECOPA, CALIF.	15	.20	10- 3-72	126
10251500	YUCCA CREEK NEAR YUCCA GROVE, CALIF.	15	.03	7-28-68	24
10251600	SALSBERRY CREEK NEAR SHOSHONE, CALIF.	15	.01	10- 3-72	12
10252300	CHINA SPRING CREEK NEAR MOUNTAIN PASS, CAL	15	.94	8- 5-64	113
10252550	CARUTHERS CREEK NEAR IVANPAH, CALIF.	12	1.13	8-25-69	518
10252700	CREOSOTE CREEK NEAR CADIZ, CALIF.	15	.02	8-13-72	20
10253000	GOURD CREEK NEAR LUDLOW, CALIF.	15	.30	7- 6-68	125
10253080	SUNFLOWER WASH NEAR ESSEX, CALIF.	8	3.04	9-18-63	972
10253250	GRANITE WASH NEAR RICE, CALIF.	14	.01	8-14-70	22
10253255	GRANITE WASH NO. 2 NEAR RICE, CALIF.	14	.02	8-14-70	27
10253350	FORTYNINE PALMS CREEK NEAR TWENTYNINE PALM	13	8.55	8- 7-63	1,240
10253540	CORN SPRINGS WASH NEAR DESERT CENTER, CALI	8	24.1	10- 3-68	10,500
10253600	EAGLE CREEK AT EAGLE MOUNTAIN, CALIF.	6	7.74	8-23-61	380
10253700	PALEN DRY LAKE TRIBUTARY NEAR DESERT CENTE	14	.04	8-16-65	52
10253750	MONUMENT WASH NEAR DESERT CENTER, CALIF.	14	4.29	9- 5-67	100
10253800	COXCOMB WASH NEAR DESERT CENTER, CALIF.	14	.04	9- 6-69	75
10254020	BETZ WASH NEAR SALTON BEACH, CALIF.	14	5.95	12-29-65	133
10254475	GLAMIS WASH AT GLAMIS, CALIF.	14	.60	1-30-66	86
10255200	MYER CREEK TRIBUTARY NEAR JACUMBA, CALIF.	14	.11	8-12-65	41
10255230	MYER CREEK TRIBUTARY NO. 2 NEAR COYOTE WEL	14	.08	8-12-65	21
10255730	PINYON WASH NEAR BORREGO, CALIF.	14	19.6	9-12-61	19,200
10255820	YAQUI PASS WASH NEAR BORREGO, CALIF.	14	.04	8-16-70	38
10255825	YAQUI PASS WASH NO. 2 NEAR BORREGO, CALIF.	14	.04	8-16-70	25

TABLE 6.--*Maximum discharges at gaging stations considered in study of flood magnitude and frequency*-- Continued

Station number	Stream and station	Years of record	Drainage area (mi^2)	Date	Discharge (ft^3/s)
	SOUTH LAHONTAN-COLORADO DESERT REGION--Continued				
10259500	THERMAL CANYON TRIBUTARY NEAR MECCA, CALIF	14	0.18	8-16-67	128
10259600	COTTONWOOD WASH NEAR COTTONWOOD SPRING, CA	14	.71	10- 3-66	34
10260200	PIPES CREEK NEAR YUCCA VALLEY, CALIF.	17	15.1	12-29-65	350
10260400	CUSHENBURY CREEK NEAR LUCERNE VALLEY, CALI	18	6.36	2-25-69	530
10261800	BEACON CREEK AT HELENDALE, CALIF.	11	.72	8- 7-68	360
10262600	BOOM CREEK NEAR BARSTOW, CALIF.	15	.24	9- 1-60	125
10263100	ZZYZX CREEK NEAR BAKER, CALIF.	11	.23	8-30-67	46
10264520	AMARGOSA CREEK TRIBUTARY NEAR PALMDALE, CAI	15	.05	11-29-70	19
10264530	PINE CREEK NEAR PALMDALE, CALIF.	15	1.37	2-25-69	69
10264560	SPENCER CANYON CREEK NEAR FAIRMONT, CALIF.	15	3.60	2-25-69	290
10264600	OAK CREEK NEAR MOJAVE, CALIF.	18	15.8	2-25-69	597
10264605	JOSHUA CREEK NEAR MOJAVE, CALIF.	15	3.83	8-16-65	2,540
10264700	PEEWEE CREEK NEAR RANDSBURG, CALIF.	15	.14	1-25-69	1
10264840	SAND CREEK NEAR INYOKERN, CALIF.	15	1.02	8- 8-63	22
10264900	SALT WELLS CREEK NEAR WESTEND, CALIF.	15	61.6	8-30-67	612
10264915	CRUST CREEK NEAR WESTEND, CALIF.	15	.13	7-28-68	9
10266200	PARADISE CREEK NEAR PARADISE CAMP, CALIF.	11	4.75	12- 6-66	238
10268630	BLIND CREEK NEAR BENTON, CALIF.	6	1.93	6-15-69	1
10276200	DEADMAN CREEK NEAR BIG PINE, CALIF.	10	2.48	12- 6-66	4
10282480	MAZOURKA CREEK NEAR INDEPENDENCE, CALIF.	12	15.6	12- 6-66	1,300
10285780	OWENS LAKE TRIBUTARY NEAR KEELER, CALIF.	9	7.18	9- 4-67	68
10287240	DRY CREEK NEAR JUNE LAKE, CALIF.	6	2.33	5- -69	12
11136450	DRY CANYON TRIBUTARY NEAR STAUFFER, CALIF.	14	.15	2-10-62	26
11136500	CUYAMA RIVER NEAR VENTUCOPA, CALIF.	12	89.9	2-19-58	7,210
11136650	ALISO CREEK NEAR NEW CUYAMA, CALIF.	14	16.1	2-24-69	552
11194050	TUMBLEWEED CREEK NEAR OILDALE, CALIF.	14	2.40	2-13-63	104
11194100	CULVERT CREEK NEAR OILDALE, CALIF.	11	.01	2-13-63	1
11194200	WAGON WHEEL CREEK NEAR REWARD, CALIF.	15	1.38	6- 6-72	338
11194500	SAND CREEK NEAR MCKITTRICK, CALIF.	10	.32	4- 7-67	35
11194800	SHALE CREEK NEAR FELLOWS, CALIF.	13	5.86	2-19-62	118
11195000	OIL CREEK NEAR TAFT, CALIF.	11	.35	5-28-63	11
11197350	STOKER CANYON CREEK NEAR DEVILS DEN, CALIF.	11	7.51	12- 6-66	517
11198050	MON CANYON CREEK NEAR OILDALE, CALIF.	15	2.38	4- 1-64	35
	SELECTED MISCELLANEOUS SITES				
	SIERRA REGION				
M1	CALABOOSE CREEK IN REDDING, CALIF.	-	0.22	9-18-59	502
M2	SCHELY GULCH IN REDDING, CALIF.	-	.22	9-18-59	390
	SOUTH COAST REGION				
M3	TORO CANYON CREEK NEAR SUMMERLAND, CALIF.	-	3.84	1-25-69	5,350
M4	BUENA VISTA CREEK NEAR MONTECITO, CALIF.	-	.66	1-25-69	2,160
M5	SAN YSIDRO CREEK NEAR MONTECITO, CALIF.	-	2.98	1-25-69	5,620

[1]OUTFLOW FROM PONDED AREA UPSTREAM; INFLOW, ABOUT 480 FT^3/S.

[2]MAXIMUM DISCHARGE 253,000 FT^3/S, DECEMBER 22, 1964, AS A RESULT OF OVERTOPPING OF THE PARTLY CONSTRUCTED HELL HOLE DAM ON THE RUBICON RIVER.

[3]MAXIMUM DISCHARGE, ALAMO CREEK NEAR NIPOMO (STATION 11137400), DRAINAGE AREA, 83.3 MI^2, 9,020 FT^3/S JAN. 25, 1969.

[4]MAXIMUM DISCHARGE, HUASNA RIVER NEAR ARROYO GRANDE (STATION 11137900), DRAINAGE AREA 193 MI^2, 21,000 FT^3/S JAN. 25, 1969, AND FEB. 11, 1973.

[5]MAXIMUM DISCHARGE, 1,740 FT^3/S, MAY 14, 1973, RESULT OF FAILURE OF DAM