

Final Report

METHODS FOR ESTIMATING THE MAGNITUDE
AND FREQUENCY OF FLOODS IN ARIZONA

by

R. H. Roeske

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U.S. Geological Survey
Water Resources Division
301 West Congress
Tucson, Arizona 85701

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CONVERSION FACTORS

For use of those readers who may prefer to use metric units rather than U.S. customary units, the conversion factors for the terms used in this report are listed below:

<u>Multiply U.S. customary unit</u>	<u>By</u>	<u>To obtain metric unit</u>
inch (in.)	25.4	millimeters (mm)
foot (ft)	.3048	meter (m)
mile (mi)	1.609	kilometers (km)
square mile (mi ²)	2.590	square kilometers (km ²)
cubic foot per second (ft ³ /s)	.02832	cubic meter per second (m ³ /s)

METHODS FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS IN ARIZONA

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ABSTRACT

Regression equations for estimating flood magnitudes at ungaged sites for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years were developed for six flood-frequency regions. The equations relate flood magnitudes to one or more of the following statistically independent variables: size of drainage area, mean basin elevation, and mean annual precipitation. The regression equations are based on annual peak-discharge data collected at 221 gaging stations having 10 or more years of record. Flood magnitudes for selected recurrence intervals were determined for each station from a log-Pearson Type III frequency distribution, and multiple-regression analyses were used to relate flood magnitudes to basin characteristics. The regression equations apply to streams that are not affected significantly by regulation, diversion, or urbanization.

Flood magnitudes and frequencies for the main stem of the Little Colorado River from the Zuni River to the mouth and for the main stem of the Gila River can be estimated from graphs in which discharge is related to size of drainage area for the Little Colorado River and to miles upstream and downstream from Coolidge Dam for the Gila River.

INTRODUCTION

Estimates of the magnitude and frequency of floods are needed to design safe and economical bridges, culverts, dams, and other structures on, over, or near streams. The estimates also are needed to establish flood-insurance rates and for flood-plain management. This study was undertaken to define the best methods for estimating the magnitude and frequency of floods for most streams in Arizona.

Multiple-regression analyses were used to correlate flood magnitudes with physiographic and climatic basin characteristics and to develop regional flood-frequency relations. The report presents equations for estimating flood magnitudes at ungaged sites for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years. Recurrence intervals are intervals of time, in years, in which a given discharge can be expected on the average to be exceeded once as an annual maximum. In terms of probability, the 100-year flood has one chance in 100 (1-percent probability) of being exceeded in a given year, and the 50-year flood has one chance in 50 (2-percent probability) of being exceeded in a given year. The regression equations apply to streams that are not affected significantly by regulation, diversion, or urbanization. The peak discharge at any site can be computed using the equations, but the experienced user will recognize that judgment must be used in the application of the appropriate equations.

The regression equations do not apply to the main stem of the Little Colorado River from the Zuni River to the mouth or to the main stem of the Gila River. Methods for estimating the magnitudes and frequencies of floods on these rivers are given in the section of the report entitled "Little Colorado and Gila Rivers." Flood-frequency information for gaged sites and maximum discharge data for gaged and ungaged sites are given in the section entitled "Streamflow Data."

Methods for estimating the magnitude and frequency of floods in Arizona were described in earlier studies by Patterson and Somers (1966), B. N. Aldridge and Alberto Condes de la Torre (written commun., 1970), Moosburner (1970), and the Arizona Water Commission (1973). This study was based on many more years of gaging-station data than were available for previous studies, especially for streams that drain areas of less than 100 mi², and the flood-frequency equations used in computing the peak discharges given in this report are considered to be the best that can be derived at the present time.

The study was conducted by the U.S. Geological Survey in cooperation with the Arizona Department of Transportation and the Federal Highway Administration. The basic flood data collected during the study are supplemented by flood data being collected for programs in cooperation with Pima County, Tucson, and the Flood Control District of Maricopa County. Additional flood data for small streams were furnished by the Southwest Watershed Research Center of the U.S. Agricultural Research Service in Tucson and by the Rocky Mountain Forest and Range

Experiment Stations of the U.S. Forest Service in Flagstaff and Tempe. The opinions, findings, and conclusions expressed in this report are not necessarily those of the Arizona Department of Transportation or the Federal Highway Administration.

METHODS FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS

Ungaged Sites

Flood magnitudes at ungaged sites can be computed for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years using the regression equations given in table 1. The equations define the relations of flood magnitudes to basin characteristics for the six flood-frequency regions shown in figure 1. Regions 1 to 5 (numbered regions) are contiguous, and region HE (high-elevation region) includes several noncontiguous areas that have a mean basin elevation equal to or greater than 7,500 ft above mean sea level. The areas in figure 1 that have an elevation greater than 7,500 ft are only a guide to the high-elevation flood-frequency region as defined in this report because the high-elevation region is defined using mean basin elevation.

The following methods should be used to determine the basin characteristics that were selected for use in the final analysis:

Drainage area (A), in square miles, is the area, measured in a horizontal plane, enclosed by a topographic divide from which direct runoff from precipitation normally drains by gravity into the stream above a specified point. The drainage

Table 1.--Regression equations for flood magnitudes at
selected recurrence intervals and corresponding
standard error of estimate

Q: Flood magnitude in cubic feet per second for indicated recurrence interval.
A: Drainage area in square miles.
E: Mean basin elevation in thousands of feet above mean sea level.
P: Mean annual precipitation in inches.

Equation	Standard error of estimate, in percent
REGION 1—NORTHWEST PLATEAU AREA (17 STATIONS)	
$Q_2 = 19.0A^{0.660}$	93
$Q_5 = 66.3A^{0.600}$	81
$Q_{10} = 127A^{0.566}$	80
$Q_{25} = 252A^{0.532}$	83
$Q_{50} = 393A^{0.510}$	86
$Q_{100} = 584A^{0.490}$	91
$Q_{500} = 1,300A^{0.451}$	105
REGION 2—SOUTHWEST DESERT AREA (26 STATIONS)	
$Q_2 = 87.0A^{0.433}$	76
$Q_5 = 218A^{0.462}$	53
$Q_{10} = 352A^{0.475}$	53
$Q_{25} = 586A^{0.487}$	62
$Q_{50} = 815A^{0.494}$	72
$Q_{100} = 1,100A^{0.499}$	83
$Q_{500} = 2,000A^{0.509}$	111

Table 1.--Regression equations for flood magnitudes at
selected recurrence intervals and corresponding
standard error of estimate—Continued

Equation	Standard error of estimate, in percent
REGION 3—CENTRAL MOUNTAIN AREA (87 STATIONS)	
$Q_2 = 5.66A^{0.673}E^{-0.605}p^{1.03}$	81
$Q_5 = 31.6A^{0.650}E^{-0.868}p^{0.987}$	64
$Q_{10} = 74.7A^{0.638}E^{-1.00}p^{0.971}$	58
$Q_{25} = 186A^{0.626}E^{-1.14}p^{0.944}$	58
$Q_{50} = 329A^{0.617}E^{-1.22}p^{0.933}$	61
$Q_{100} = 553A^{0.610}E^{-1.30}p^{0.915}$	66
$Q_{500} = 1,530A^{0.595}E^{-1.45}p^{0.886}$	78
REGION 4—NORTHEAST PLATEAU AREA (21 STATIONS)	
$Q_2 = 1.38A^{0.491}E^{2.25}$	83
$Q_5 = 0.319A^{0.446}E^{3.60}$	74
$Q_{10} = 0.143A^{0.423}E^{4.31}$	75
$Q_{25} = 0.0590A^{0.398}E^{5.10}$	80
$Q_{50} = 0.0327A^{0.383}E^{5.60}$	85
$Q_{100} = 0.0188A^{0.369}E^{6.09}$	91
$Q_{500} = 0.0062A^{0.342}E^{7.04}$	107

Table 1.--Regression equations for flood magnitudes at
selected recurrence intervals and corresponding
standard error of estimate—Continued

Equation	Standard error of estimate, in percent
REGION 5—SOUTHEAST MOUNTAIN AREA (61 STATIONS)	
$Q_2 = 96.6A^{0.555}$	58
$Q_5 = 256A^{0.513}$	58
$Q_{10} = 416A^{0.492}$	63
$Q_{25} = 685A^{0.471}$	72
$Q_{50} = 937A^{0.458}$	79
$Q_{100} = 1,230A^{0.447}$	86
$Q_{500} = 2,120A^{0.425}$	102
REGION HE—HIGH-ELEVATION REGION (16 STATIONS)	
$Q_2 = 8.78A^{0.853}$	43
$Q_5 = 19.9A^{0.826}$	33
$Q_{10} = 29.6A^{0.816}$	33
$Q_{25} = 44.9A^{0.805}$	38
$Q_{50} = 58.2A^{0.799}$	42
$Q_{100} = 72.9A^{0.795}$	45
$Q_{500} = 113A^{0.787}$	55

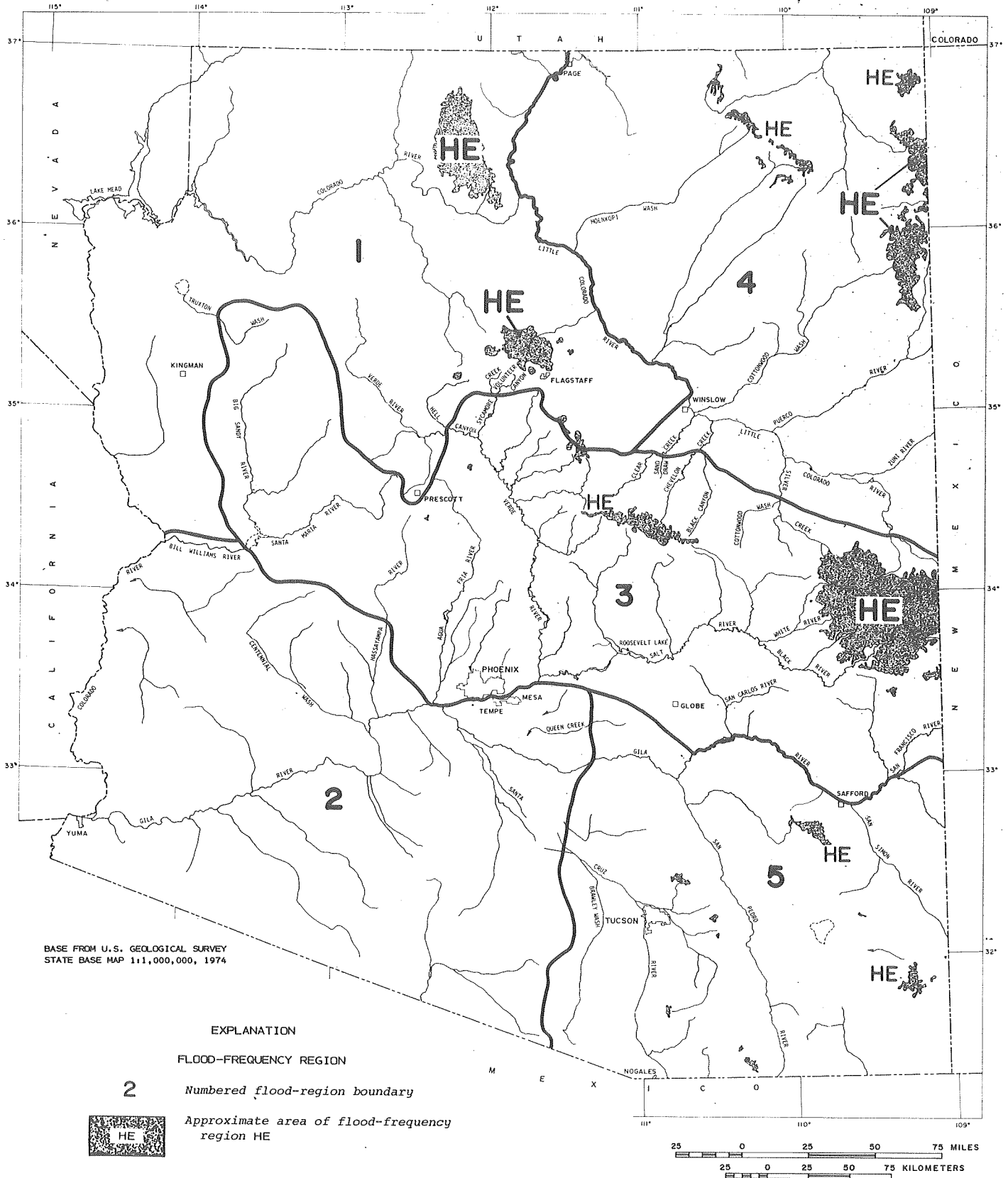


Figure 1.--Flood-frequency regions.

area should be measured by planimetering from the best available topographic maps.

Mean basin elevation (E), in thousands of feet above mean sea level, is obtained from topographic maps by placing a transparent grid over the area of the drainage basin, determining the elevation at each grid intersection, averaging the elevations, and dividing by 1,000. The grid size should be chosen so that at least 20 elevation points are sampled in the basin.

Mean annual precipitation (P), in inches, is determined from the normal annual precipitation map for Arizona, which was prepared by the U.S. Weather Bureau and published by the University of Arizona (1965) at a scale of 1:500,000. A smaller scale map (fig. 2) showing the same data is given in this report (U.S. Weather Bureau, no date). The mean annual precipitation is obtained by outlining the drainage basin on the precipitation map, placing a transparent grid over the basin, determining the precipitation at each grid intersection, and averaging the values. The grid size should be chosen to insure that an adequate number of precipitation points are sampled in the basin. Although the number will be governed by basin size, at least 10 points are recommended except in small basins. For small basins that fall between two precipitation lines and for those crossed by only one line, the precipitation value can be interpolated.

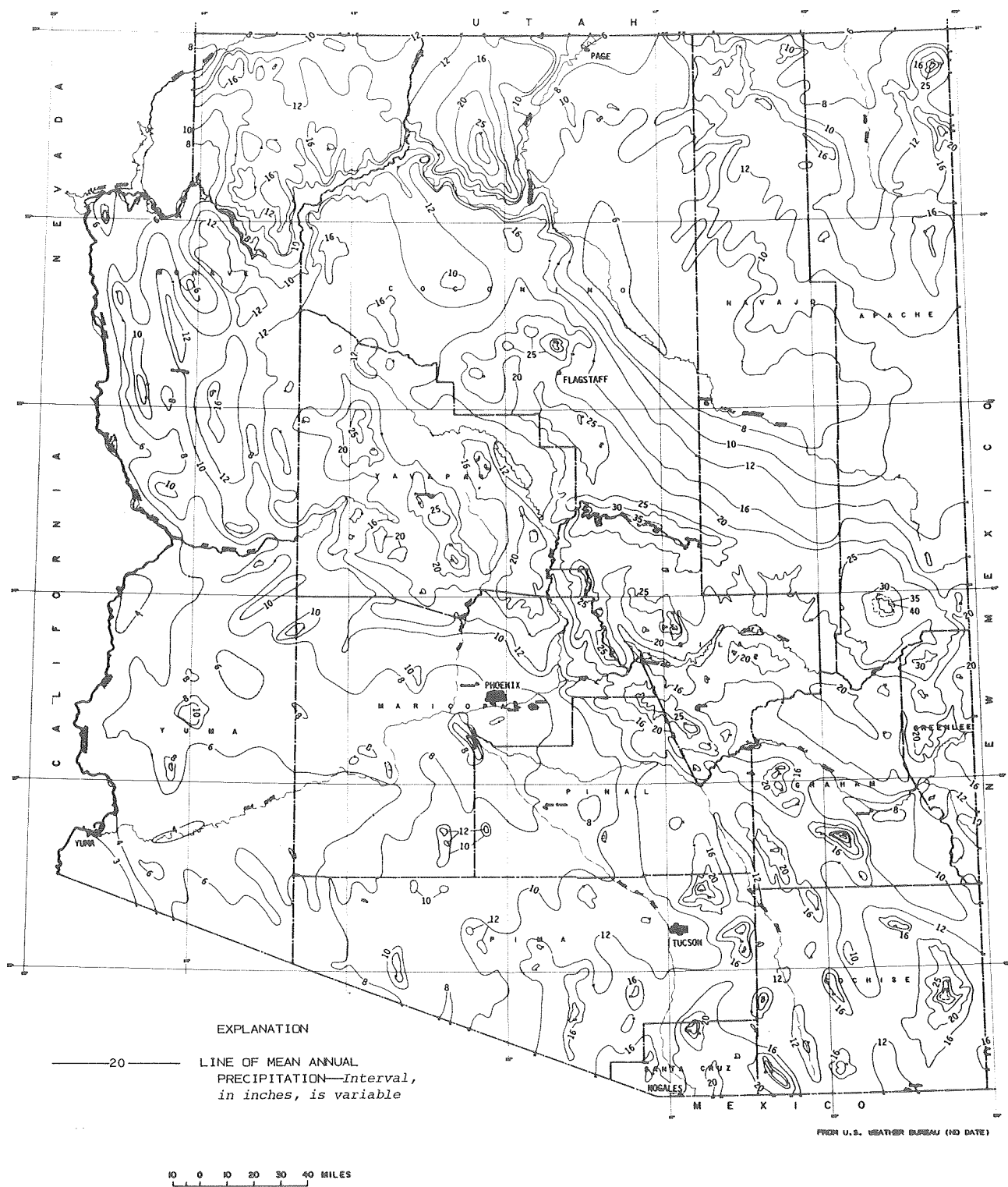


Figure 2.--Mean annual precipitation, 1931-60.

A transition zone between the high-elevation flood-frequency region and the numbered flood-frequency regions is defined for sites where the mean basin elevation is between 7,300 and 7,500 ft (see example 3 in the following section). In the transition zone discharge should be computed using the equation for the numbered flood-frequency region in which the site is located and the equation for the high-elevation flood-frequency region. The characteristics for the entire basin should be used in both computations, and then a weighted discharge should be computed on the basis of the mean basin elevation as

$$Q_{T(W)} = Q_{T(R)} \frac{7,500 - \bar{E}}{200} + Q_{T(HE)} \frac{\bar{E} - 7,300}{200},$$

where

$Q_{T(W)}$ = weighted discharge, in cubic feet per second, for recurrence interval T , in years;

$Q_{T(R)}$ = discharge from numbered flood-frequency region equation for recurrence interval T , in years;

$Q_{T(HE)}$ = discharge from high-elevation flood-frequency region equation for recurrence interval T , in years; and

$\bar{E}$ = mean elevation of basin, in feet.

At a site where the stream flows from one numbered flood-frequency region to another, the discharge should be computed using the equations for both regions. The characteristics for the entire basin should be used in both computations, and then a weighted average should be computed on the basis of the amount of the drainage area in each region. (See example 2 in the following section.)

If a stream flows from one numbered flood-frequency region to another and the mean basin elevation of the site is between 7,300 and 7,500 ft, the following method should be applied:

1. Compute the discharge for each of the numbered flood-frequency regions.
2. Compute a weighted discharge on the basis of the amount of drainage area in each region.
3. Compute the discharge for the high-elevation region.
4. Use the discharges obtained in steps 2 and 3, and compute a weighted discharge on the basis of the mean basin elevation.

Examples

Three examples illustrate the application of the method for estimating the magnitude of floods at ungaged sites.

EXAMPLE 1: Estimate of the magnitude of the 50-year flood in Olsen Wash at U.S. Highway 80-89, 35 mi northwest of Tucson.

1. The drainage basin is shown on U.S. Geological Survey 15-minute topographic maps—Tortolita Mountains and Oracle quadrangles—and the drainage area is 6.64 mi^2 .
2. Using the topographic maps and figure 1, the basin is in region 5 and is not in the high-elevation region or in the transition zone.
3. The basin characteristic required for region 5 is drainage area.

4. From table 1, the equation for the 50-year flood in region 5 is

$$Q_{50} = 937A^{0.458}.$$

Substituting the basin-characteristic value in the equation,

$$Q_{50} = 937(6.64)^{0.458} = 2,230 \text{ ft}^3/\text{s}.$$

EXAMPLE 2: Estimate of the magnitude of the 50-year flood in Jacks Canyon at State Highway 87, 13 mi southeast of Winslow.

1. The drainage area is 267 mi^2 and is shown on the following U.S. Geological Survey topographic maps:

Sunset Pass, 15-minute

Chavez Mountain NE, $7\frac{1}{2}$ -minute

Chavez Mountain East, $7\frac{1}{2}$ -minute

Quayle Hill, $7\frac{1}{2}$ -minute

Hay Lake, $7\frac{1}{2}$ -minute

Chavez Mountain West, $7\frac{1}{2}$ -minute

Turkey Mountain, $7\frac{1}{2}$ -minute

Blue Ridge Reservoir, $7\frac{1}{2}$ -minute

Long Valley, $7\frac{1}{2}$ -minute

2. Using the grid-sampling technique on the topographic maps, the mean basin elevation is 6,530 ft; therefore, the basin is not in the high-elevation region or the transition zone. Using the topographic maps and figure 1, the basin is in regions 3 and 4.

3. The basin characteristics required for region 3 are drainage area, mean basin elevation, and mean annual precipitation. The basin characteristics required for region 4 are drainage area and mean basin elevation.
4. The total drainage area is 267 mi², of which 222 mi² is in region 3 and 45 mi² is in region 4.
5. Using the grid-sampling technique on the precipitation map, the mean annual precipitation is 20 in.
6. The mean basin elevation, in thousands of feet, is 6.53.
7. From table 1, the equation for the 50-year flood in region 3 is

$$Q_{50} = 329A^{0.617}E^{-1.22}p^{0.933},$$

and the equation for the 50-year flood in region 4 is

$$Q_{50} = 0.0327A^{0.383}E^{5.60}.$$

Substituting the basin-characteristics values in the equations for regions 3 and 4, respectively,

$$Q_{50} = 329(267)^{0.617}(6.53)^{-1.22}(20)^{0.933} = 17,100 \text{ ft}^3/\text{s}$$

and

$$Q_{50} = 0.0327(267)^{0.383}(6.53)^{5.60} = 10,200 \text{ ft}^3/\text{s}.$$

8. The magnitude of the 50-year flood was computed by weighting the discharge computed for each region on the basis of the amount of drainage area in each region, and

$$Q_{50} = \frac{(10,200)45 + (17,100)222}{267} = 15,900 \text{ ft}^3/\text{s}.$$

EXAMPLE 3: Estimate of the magnitude of the 100-year flood in Slate Mountain Wash at U.S. Highway 180, 24 mi northwest of Flagstaff.

1. The drainage basin is shown on U.S. Geological Survey topographic maps—Ebert Mountain, 15-minute, and Kendrick Peak, 7½-minute—and the drainage area is 5.49 mi².
2. Using the grid-sampling technique on the topographic maps, the mean basin elevation is 7,350 ft; therefore, the basin is in the transition zone between the high-elevation region and one of the numbered regions. Using the topographic maps and figure 1, the basin is in region 1.
3. The basin characteristic required for region 1 is drainage area. Drainage area also is the only basin characteristic required for the high-elevation region.
4. From table 1, the equation for the 100-year flood in region 1 is

$$Q_{100} = 584A^{0.490},$$

and the equation for the 100-year flood in the high-elevation region is

$$Q_{100} = 72.9A^{0.795}.$$

Substituting the basin-characteristic value in the equations for region 1 and the high-elevation region, respectively,

$$Q_{100} = 584(5.49)^{0.490} = 1,350 \text{ ft}^3/\text{s}$$

and

$$Q_{100} = 72.9(5.49)^{0.795} = 282 \text{ ft}^3/\text{s}.$$

5. The magnitude of the 100-year flood was computed by weighting the discharge computed for each region on the basis of mean basin elevation, and

$$Q_{100} = 1,350 \frac{7,500-7,350}{200} + 282 \frac{7,350-7,300}{200} = 1,080 \text{ ft}^3/\text{s}.$$

Engineering judgment should be used in the application of the equations given in this report. The preceding recommendations for application of the equations where basins cross regional boundaries are examples. Many other possibilities exist that cannot be discussed in this report, and these must be considered on an individual basis.

Limitations and Accuracy

The regression equations for estimating the magnitude and frequency of floods are not applicable to streams where reservoirs, diversions, or urbanization have a significant effect on flood discharges. For example, the equations do not apply to the Santa Cruz River downstream from Greene Canal 40 mi downstream from Tucson because at this point the channel divides, and most of the water flows into Greene Canal. The equations also do not apply to the main stem of the Little Colorado River from the Zuni River to the mouth and to the main stem of the Gila River; the methods for estimating the magnitudes and

frequencies of floods for these streams are given in the section entitled "Little Colorado and Gila Rivers."

A potential hazard in using regression equations is the estimation of the peak discharge at a site having basin characteristics outside the range of values used in the regression analysis. Extrapolation beyond the observed range of the independent variable can be risky, and the applicability of the equations beyond the range of these values is unknown. The extreme values for each basin characteristic used in obtaining the equations are given in table 2. Caution and judgment should be used where a basin characteristic is outside the range of values used in the regression analysis, and the accuracy of the estimated peak discharge should be lowered.

A measure of the accuracy of a regression equation is the magnitude of the standard error of estimate. The standard error of estimate is a measure of how well the peak discharge estimated from the regression equation approximates the observed peak discharge used in the regression analysis. About 68 percent of the observed values used in a regression are within one standard error of the estimated value of the peak discharge. Standard errors for each regression equation were calculated in log units and converted to percentages for convenience. (See table 1.) Much of the error can be attributed to the extreme time and spatial variability of the annual peak discharges in Arizona; the variability of the annual peak discharges in Arizona is greater than that in most other States.

Table 2.--Extreme values for the basin characteristics used in the regression equations

Basin characteristics	Extremes	
	Maximum	Minimum
REGION 1		
Drainage area	5,090 mi ²	1.84 mi ²
REGION 2		
Drainage area	1,810 mi ²	0.09 mi ²
REGION 3		
Drainage area	5,499 mi ²	0.065 mi ²
Mean basin elevation	7,400 ft	1,780 ft
Mean annual precipitation	30.0 in.	10.0 in.
REGION 4		
Drainage area	3,300 mi ²	0.17 mi ²
Mean basin elevation	6,920 ft	5,150 ft
REGION 5		
Drainage area	3,610 mi ²	0.15 mi ²
HIGH-ELEVATION REGION		
Drainage area	747 mi ²	1.61 mi ²
Mean basin elevation	9,400 ft	7,390 ft

Another measure of the accuracy of a regression equation was introduced by Hardison (1971) and is expressed in terms of the equivalent years of record, which takes into account the regional variability of annual peak discharge. Equivalent years of record is the number of years of record that would be required at a previously ungaged site to obtain an estimate of peak discharge having an accuracy equal to that of the regression estimate. The main use of equivalent years of record is for the weighting of discharges from the record for a gaged site with the regional estimates for the site to obtain a better estimate of discharge. The procedure is discussed in the section entitled "Gaged Sites."

The equivalent years of record for the regression estimates of peak discharge for each recurrence interval on a statewide basis are:

<u>Recurrence interval, in years</u>	<u>Equivalent years of record</u>
2.....	3
5.....	5
10.....	7
25.....	8
50.....	9
100.....	9
500.....	10

Gaged Sites

Flood-frequency information for gaged sites is given in table 3 (see the section entitled "Streamflow Data"), and the locations

of the gaged sites are shown in figure 3. For each gaged site, two values of peak discharge are given for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years. The first value is the flood discharge determined from the frequency analysis of the station data, and the second value is the adjusted station discharge determined from a procedure described by Sauer (1974). The adjusted station discharge values should be used for the gaged sites. The adjusted station value is a weighted average of the station value and the regression value computed from the equation

$$Q_{T(A)} = \frac{Q_{T(S)}^N + Q_{T(R)}^M}{N + M},$$

where

$Q_{T(A)}$ = adjusted flood discharge, in cubic feet per second,
for recurrence interval T , in years;

$Q_{T(S)}$ = flood discharge from the station data for recurrence
interval T , in years;

$Q_{T(R)}$ = flood discharge from the regression equation for
recurrence interval T , in years;

N = number of years of record; and

M = equivalent years of record for the regression equation.

The discharge values for the 500-year flood at all the gaged sites have a low reliability; the flood-frequency relation for each gaged site was extended far beyond the years of record. Historical data were available for some sites and were helpful in making the extensions.

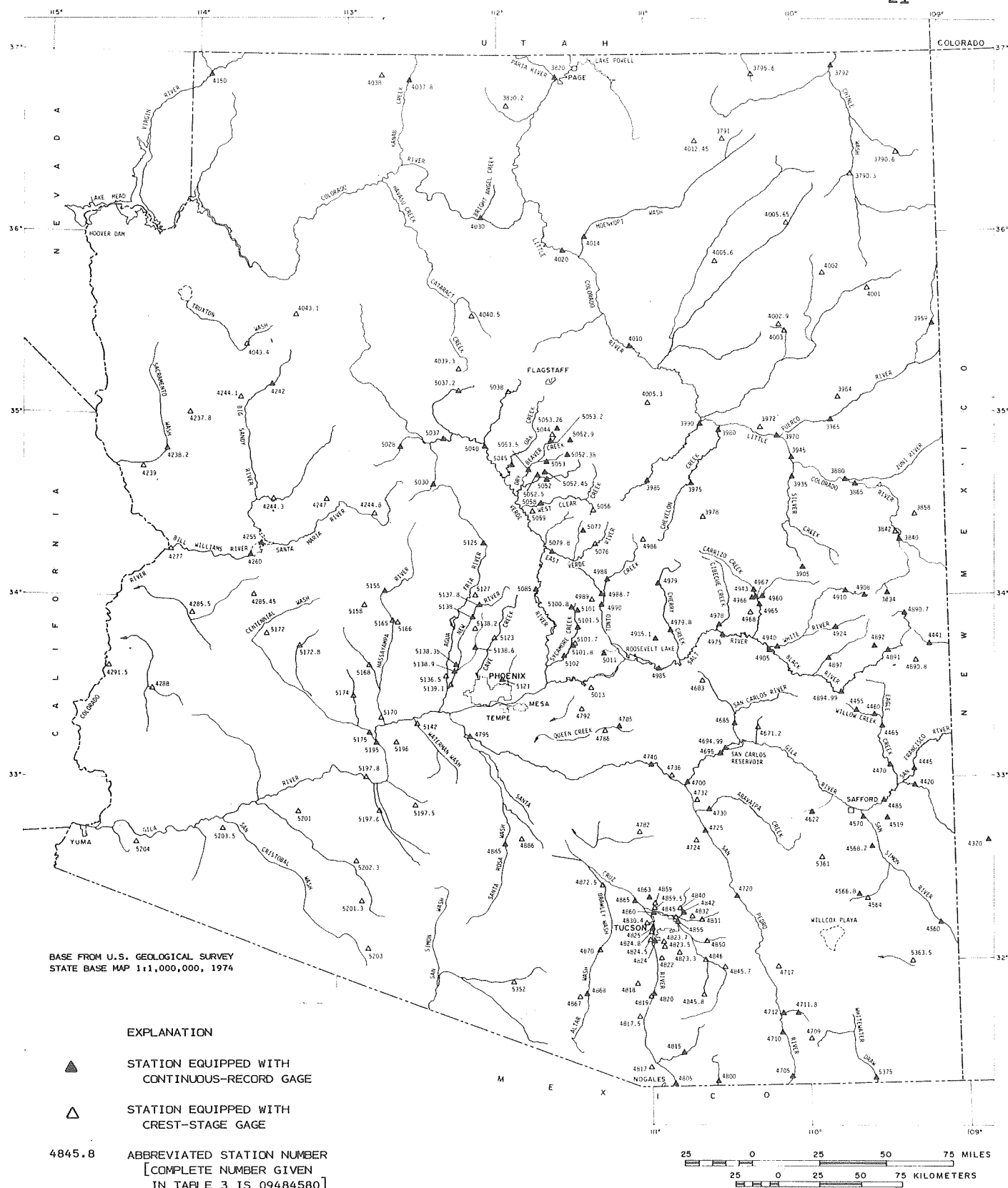


Figure 3.--Location of gaging stations used in the regression and Little Colorado and Zuni Rivers analyses.

The discharge values for the 500-year flood are included in this report because they are useful in flood-insurance studies.

Little Colorado and Gila Rivers

The Little Colorado and Gila Rivers are large streams that drain areas in several flood-frequency regions. Flow in the rivers is affected by regulation and diversions, and the rivers have flood-frequency characteristics different from those of tributary streams. Therefore, the regional regression equations do not apply to the main stem of the Little Colorado River from the Zuni River to the mouth or to the main stem of the Gila River.

Flood-frequency analyses for the Little Colorado and Gila Rivers were based on the flood-frequency relations for several gaged sites along the rivers, and the relations were adjusted for the effects of regulation and diversions. The relation between discharge for selected recurrence intervals and drainage area for the Little Colorado River from the Zuni River to the mouth is shown in figure 4. For the Gila River, the relation between discharge for selected recurrence intervals and distance in miles upstream and downstream from Coolidge Dam is shown in figures 5 and 6, respectively. Flood-frequency analyses for the Gila River below Coolidge Dam are based on discharges that were adjusted to the regulated conditions in 1975.

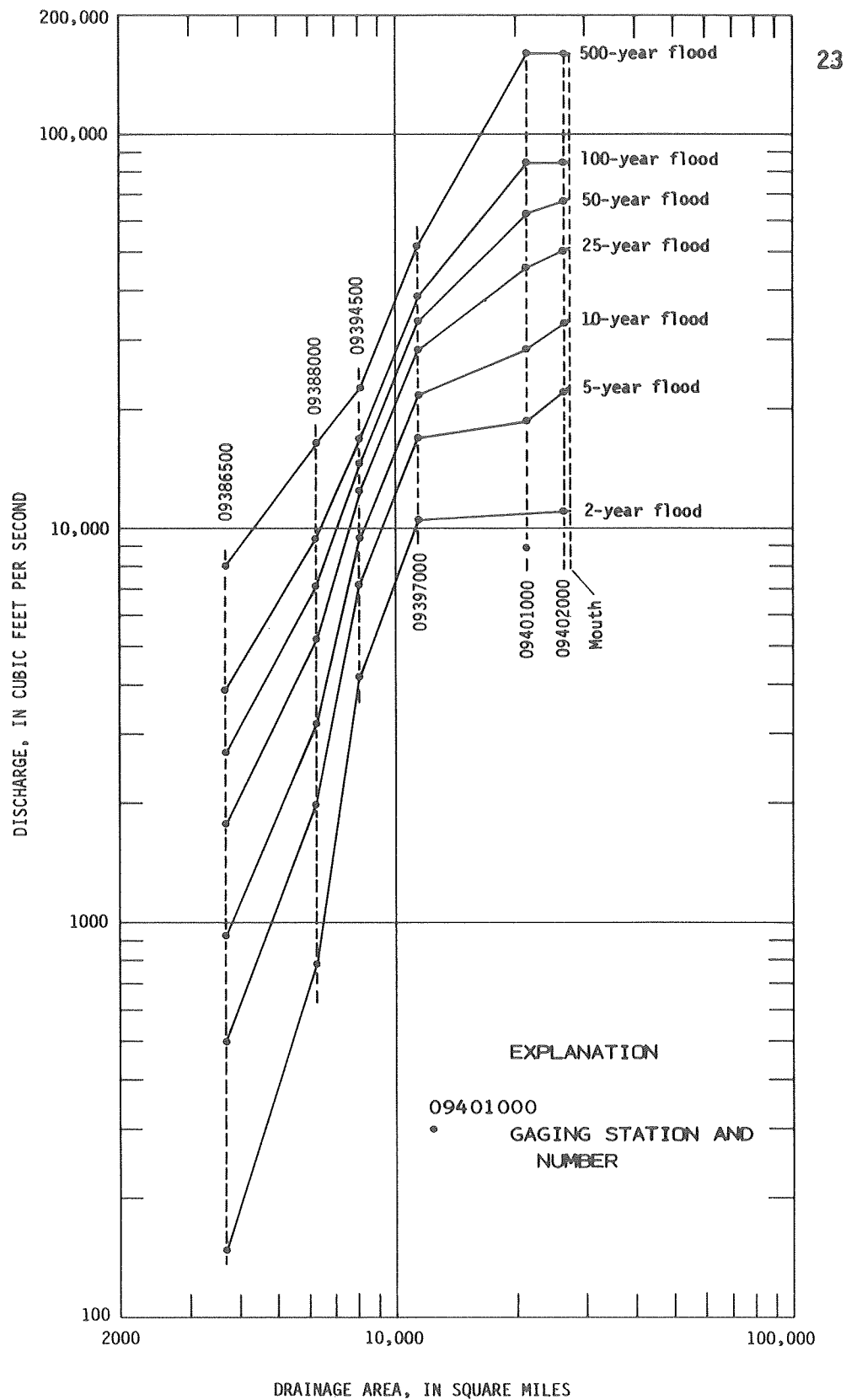


Figure 4.--Relation of discharge to drainage area for selected recurrence intervals for the Little Colorado River from the Zuni River to the mouth.

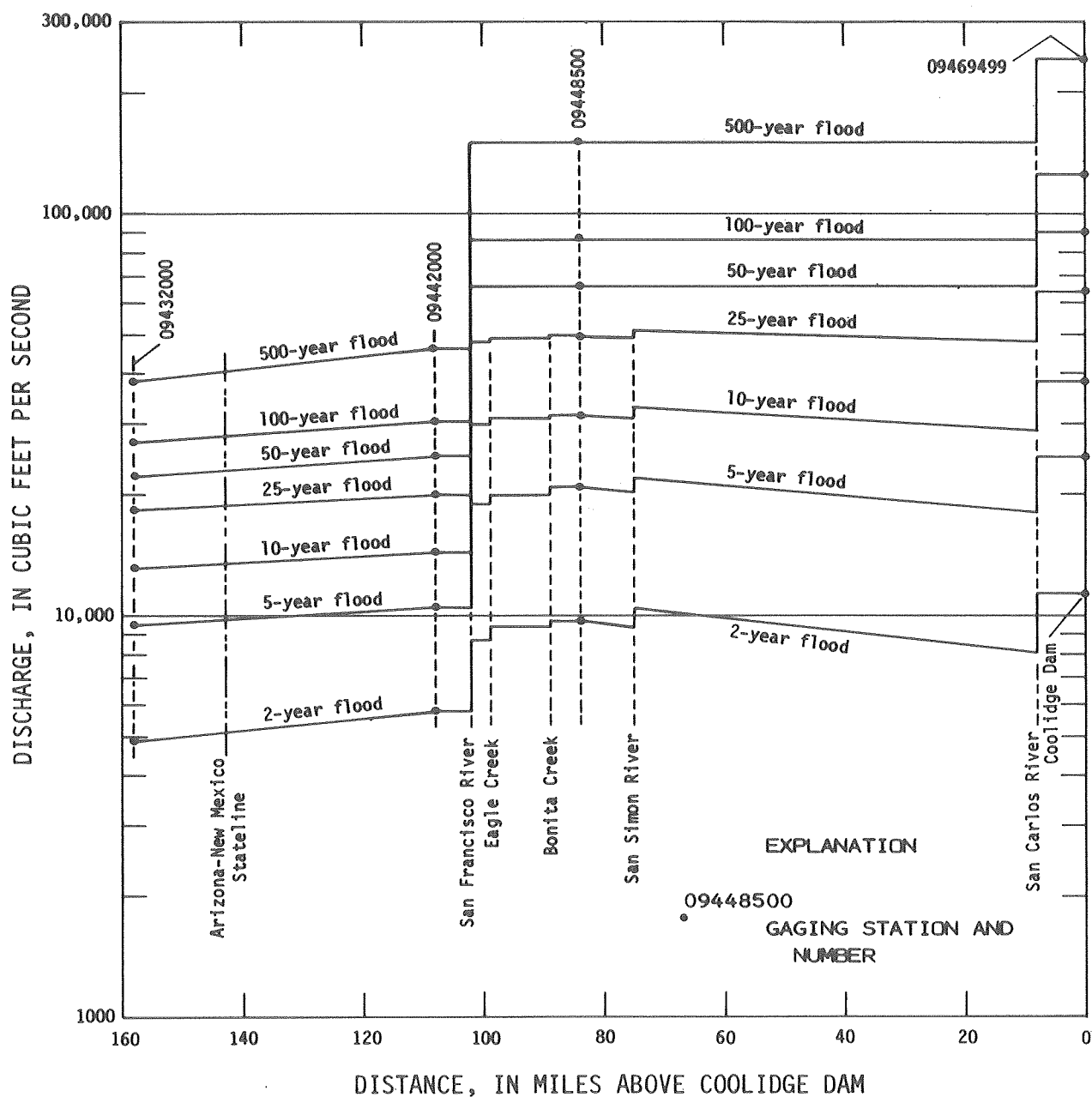


Figure 5.--Relation of discharge to miles above Coolidge Dam, Gila River main stem, for selected recurrence intervals.

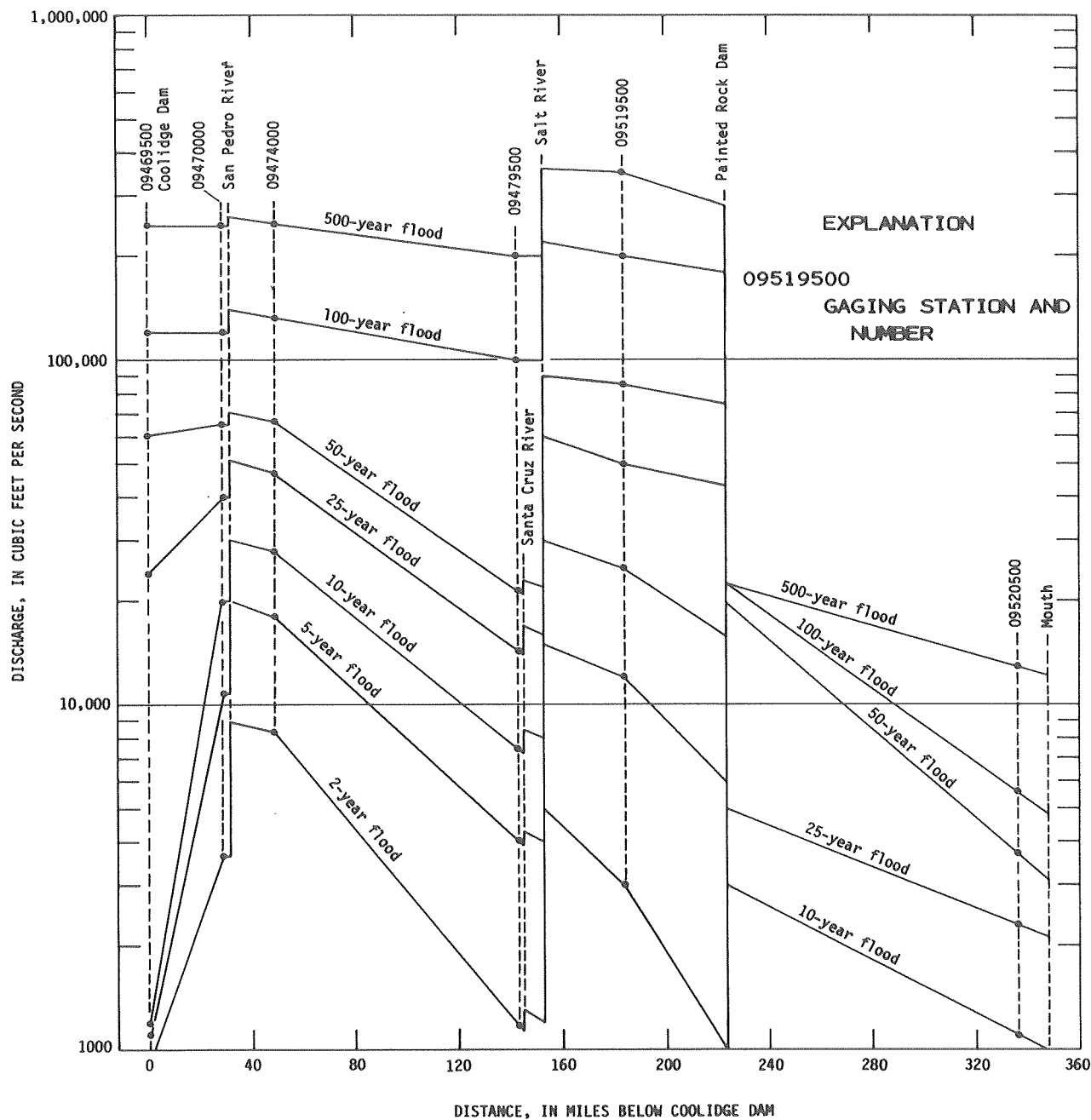


Figure 6.--Relation of discharge to miles below Coolidge Dam, Gila River main stem, for selected recurrence intervals.

MAXIMUM KNOWN FLOODS

The maximum known peak discharges at sites in Arizona having drainage areas of about 0.06 to 8,000 mi² are shown in figure 7. The discharge values shown were selected from tables 4 and 5, which give the maximum observed discharge at gaging stations and peak-discharge measurements at ungaged sites, respectively. An enveloping curve (H. F. Matthai, written commun., 1977) of maximum known discharges in the United States is shown for comparison. The curve reflects the additional data that have become available since Matthai (1969, p. 6) presented his original enveloping curve. The enveloping curve shown in figure 7 can be used to determine the potential or upper limit of peak discharge. As more streamflow data become available for Arizona, more peak discharges will be nearer the enveloping curve.

ANALYTICAL TECHNIQUES

Flood Records

Annual peak-discharge data collected through September 30, 1975, from 110 continuous-record and 111 crest-stage gaging stations were used in the regression analyses. The gaging stations are on streams that are not affected significantly by regulation, diversion, or urbanization. Installation of the crest-stage gages was begun in 1963; most of the crest-stage gages were installed to provide peak-discharge data for drainage areas of less than 100 mi², but some were installed

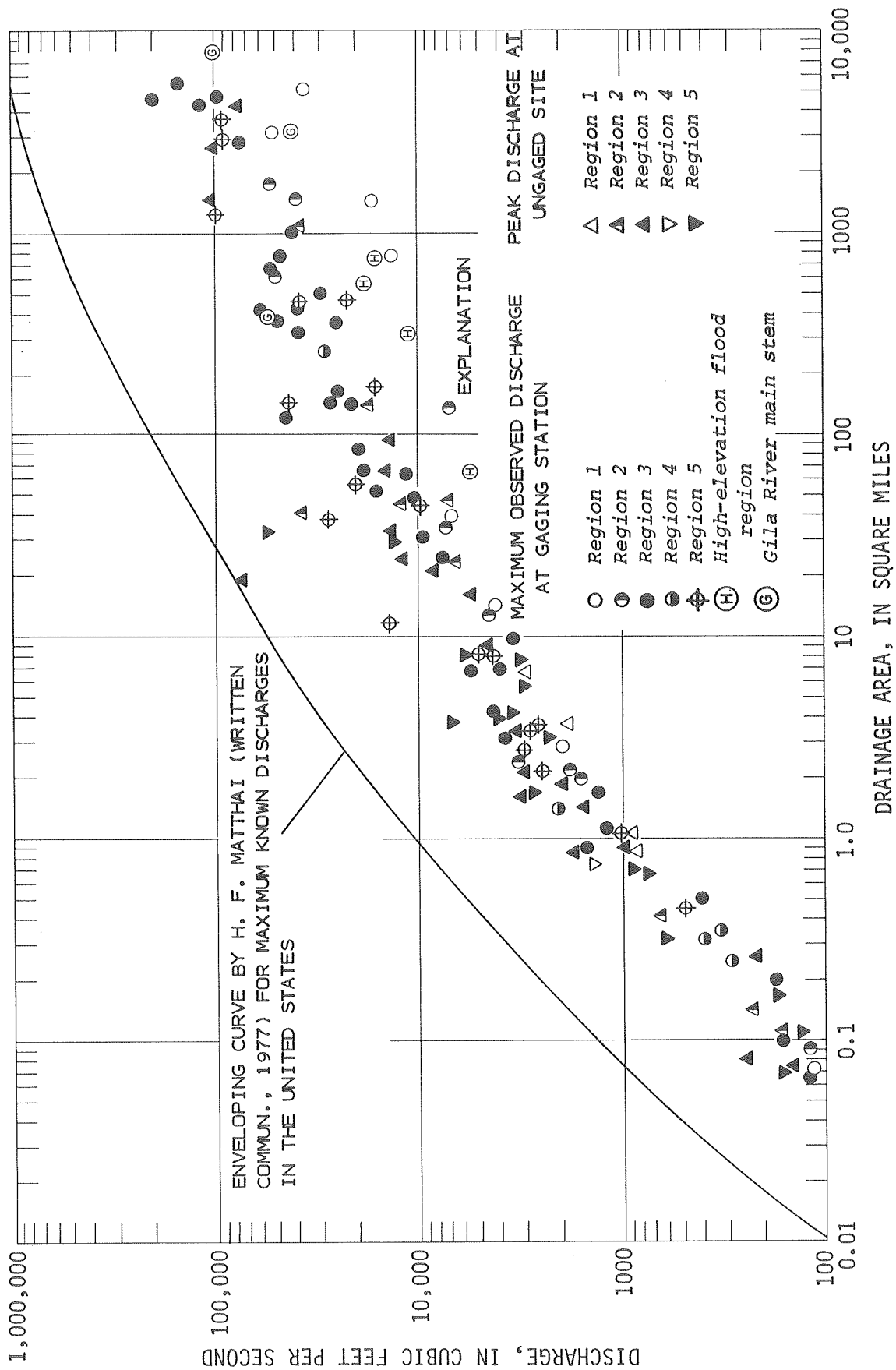


Figure 7.--Relation of maximum discharge to size of drainage area.

to provide data for drainage areas of more than 100 mi² in areas of the State where no data were available. Gaging stations used in the analysis were limited to those having 10 or more years of record and those at which flow events occurred in at least 75 percent of the years of record.

A summary of the distribution of average length of gaging-station record for drainage areas of different sizes is:

<u>Drainage area, in square miles</u>	<u>Number of stations</u>	<u>Average length of record, in years</u>
Less than 1	27	14
1-10	55	14
10-100	50	15
100-500	43	18
500-1,000	18	31
More than 1,000	28	33

The summary indicates that the stations are fairly evenly distributed in relation to size of drainage area. The strong relation between size of drainage area and average length of record reflects the recent emphasis on the collection of data for small streams.

Flood-Frequency Relations

The annual peak-discharge data for each gaging station were fitted to a log-Pearson Type III frequency distribution in accordance with the guidelines recommended by the U.S. Water Resources Council (1976). Generalized skew coefficients determined from the map by the

U.S. Water Resources Council (1976) were used for stations having 25 or less years of record, and weighted skew coefficients were used for stations having more than 25 years of record. Weighted skew coefficients were computed from the generalized values and the station values with years of record as the weighting factors. The flood-frequency distributions were adjusted, where applicable, for high and low outliers and for years having no flood events. Adjustments also were made for historic peak data according to the procedure adopted by the Water Resources Council (written commun.) in December 1976. The flood discharges determined from the computed frequency distributions for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years (table 3) were used in the regression analyses.

Basin Characteristics

Physiographic and climatic characteristics of drainage basins are used to transfer flood-frequency information from gaged sites to ungaged sites by multiple-regression techniques. Initially, basin characteristics were selected on the basis of their possible effect on flood peaks, on the availability of data for defining the characteristics, and on the ease of measuring the characteristics. The basin characteristics measured and used in the initial analysis of data are as follows:

Drainage area (A), in square miles, is the area, measured in a horizontal plane, enclosed by a topographic divide from which

direct runoff from precipitation normally drains by gravity into the stream above a specified point. The drainage area was measured by planimetering from the best available topographic maps.

Main channel slope (S), in feet per mile, is the slope between two points at 10 and 85 percent of the distance from the gaging station to the basin divide (main channel length) and was computed by dividing the difference in altitude, in feet, by the distance, in miles, between the 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 and was measured, on the best available topographic maps, along the channel that drains the largest basin.

Mean basin elevation (E), in thousands of feet above mean sea level, was obtained from topographic maps by placing a transparent grid over the drainage basin, determining the elevation at each grid intersection, averaging the elevations, and dividing by 1,000. The grid size was chosen so that at least 20 elevation points were sampled in the basin.

Soils index (Si), in inches, is a numerical index proportional to the long-term infiltration rate and was derived from a map of hydrologic soil groups (U.S. Soil Conservation Service, 1969).

Mean annual precipitation (P), in inches, was determined from the normal annual precipitation map for Arizona, which was prepared by the U.S. Weather Bureau and published by the University of Arizona (1965) at a scale of 1:500,000. The mean annual precipitation was obtained by outlining the drainage basin on the precipitation map, placing a transparent grid over the basin, determining the precipitation at each grid intersection, and averaging the values. For small basins between two precipitation lines and those crossed by only one line, the precipitation value was interpolated.

Precipitation intensity index (I), in inches, is the 50-year 24-hour precipitation, and was determined from an isohyetal map prepared by the U.S. Weather Bureau (1967).

Mean annual snowfall (Sn), in inches, was determined from Sellers (1960).

Only drainage area, mean basin elevation, and mean annual precipitation were found to be significant in the regression analyses (see table 3 for values). Selected basin characteristics for all U.S. Geological Survey gaging stations in the United States are stored in the basin-characteristics file at U.S. Geological Survey National Headquarters in Reston, Virginia.

Regression Analyses

Standard multiple-regression techniques are used to develop equations relating peak discharges at selected recurrence intervals to basin characteristics. Previous studies show that transforming all variables to logarithms tends to normalize the variables and residuals and tends to make the residuals homoscedastic as required in standard multiple-regression analysis. The equations resulting from the regression analysis are of the general form

$$Q_T = aC_1^{b_1}C_2^{b_2}C_3^{b_3} \dots,$$

where

Q_T = discharge, in cubic feet per second, for selected
recurrence interval T , in years;

a = regression constant;

C_1 , C_2 , and C_3 = basin characteristics; and

b_1 , b_2 , and b_3 = regression coefficients estimated by
correlating logarithms of observed T -year peak discharges
with logarithms of basin characteristics for the network
of gaged sites.

The most important facets in the development of regression equations for predicting peak discharges are the variable selection and regionalization or grouping of data into hydrologic regions to provide the best predictive equations. The initial variable selection is made by the backward elimination procedure (Draper and Smith, 1966). The

procedure is a statistical technique that eliminates variables one by one according to their statistical significance in explaining variation in the dependent variable (T-year peak discharge). The procedure continues to eliminate variables until only those that are significant at a predetermined level remain in the analysis. The significance level that is traditionally used—and the one used in this report—is the 5-percent level. The following tabulation summarizes the backward elimination procedure for the 50-year peak discharge in the high-elevation region.

<u>Basin characteristic used in equation</u>	<u>Variance in 50-year peak explained by equation, in percent</u>	<u>Standard error of estimate</u>	
		<u>Log units</u>	<u>Percent</u>
A, S, L, E, Si, P, I, Sn	96	0.186	45
A, S, E, Si, P, I, Sn	96	.176	42
A, S, Si, P, I, Sn	96	.167	40
A, S, Si, P, I	95	.161	38
A, S, P, I	95	.155	37
A, S, I	94	.174	42
A, S	93	.172	41
A	92	.175	42

The only variable found to be statistically significant at the 5-percent level in the preceding table is drainage area (A).

After the initial runs were made using the backward elimination procedure, other possible combinations of variables were tested. The

selection of basin characteristics for the final equations (table 1) was made using the following guidelines:

1. Each variable selected significantly contributed to explaining the spatial variation in the T-year peak discharge.
2. The seven equations in each region contained the same basin characteristics in order to preserve the inter-correlation that exists among peak discharges of different recurrence intervals.
3. No equation contained two or more variables that are highly correlated because this can reduce the effectiveness of the predictive equation.

The predictive ability of regression equations often can be improved by dividing an area into hydrologic regions in which the basin characteristics in each region are similar but are collectively different from those of all other regions. Accordingly, plots were made of residuals from the statewide regression against mean basin elevation (fig. 8) and drainage area (fig. 9). Figure 8 shows that the stations having mean basin elevations greater than 7,500 ft have similar flood characteristics and that they differ from those for the remaining stations; figure 9 shows no such relation for drainage area.

After the high-elevation stations were removed from the analysis, the remaining stations were analyzed by regions. Many different regional configurations were tested using map plots of residuals and

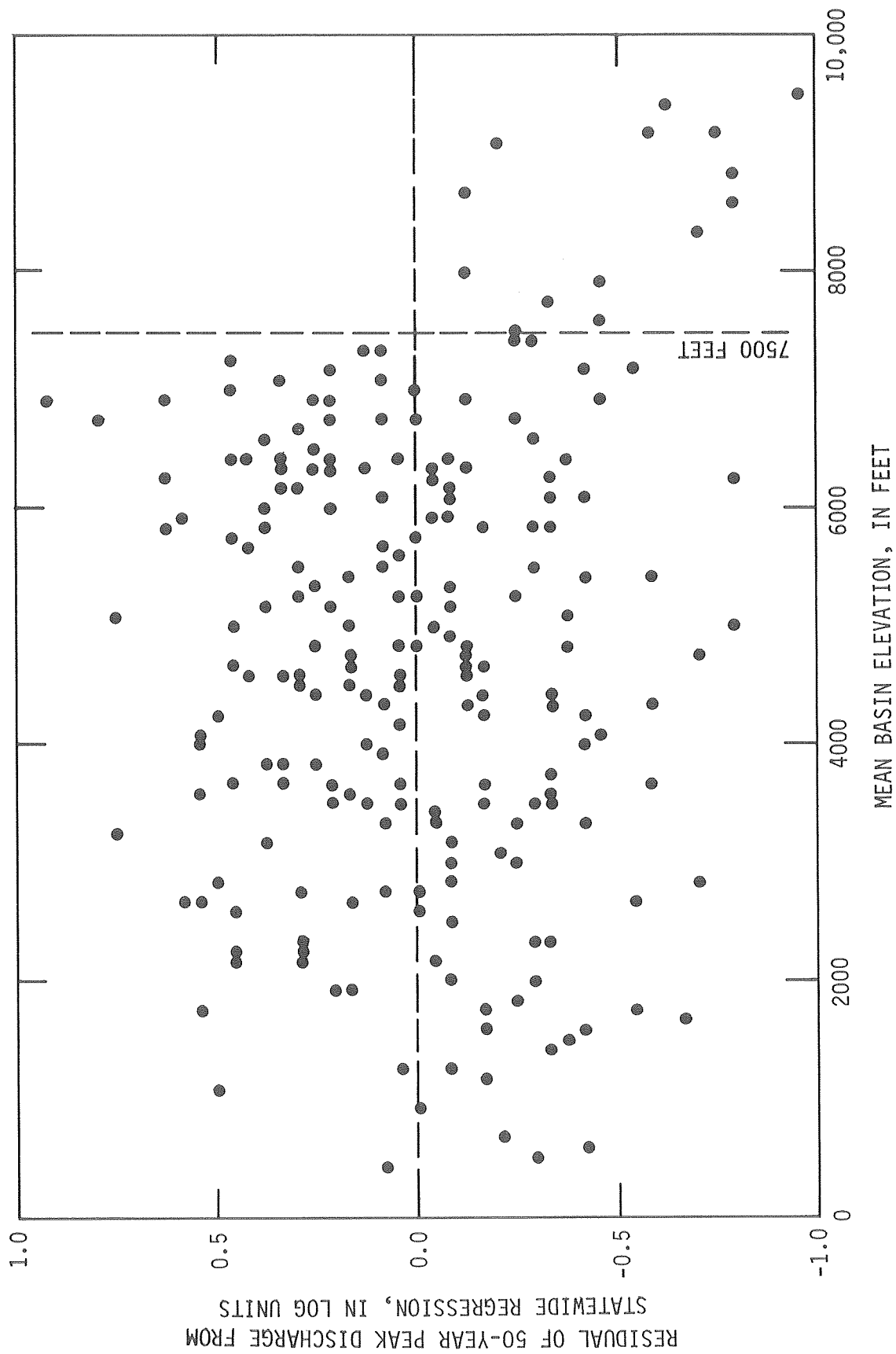


Figure 8.--Relation of residuals for 50-year peak discharge to mean basin elevation.

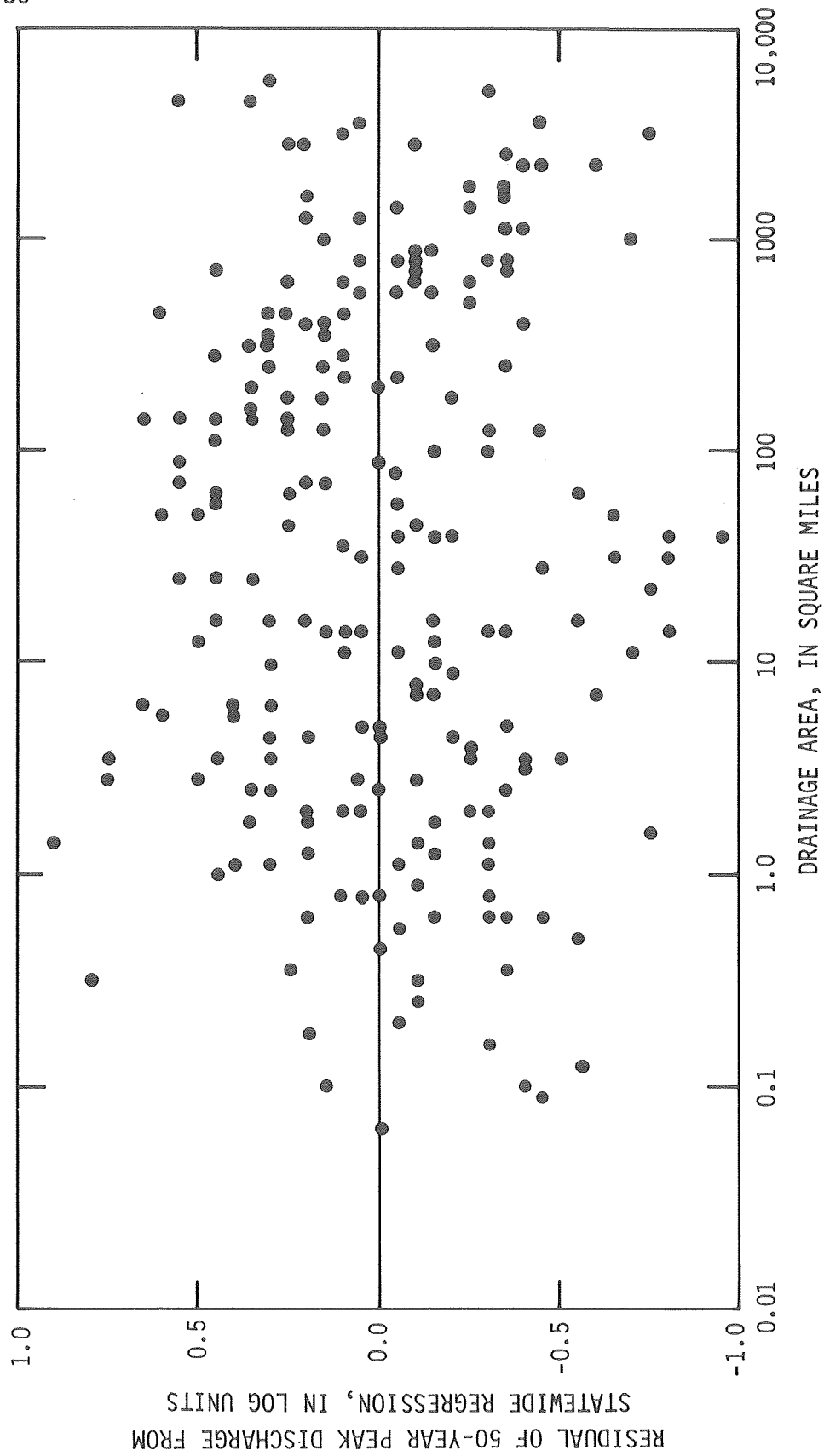


Figure 9.--Relation of residuals for 50-year peak discharge to size of drainage area.

general topographic and meteorologic regions. The five numbered flood-frequency regions selected for the final analyses are shown in figure 1, and the number of stations used in the regression analyses for each region is shown in table 1. Where a regional boundary crosses the drainage basin above a gaging station, the station was used in the regression analyses for both regions (see table 3).

Stations having a mean basin elevation greater than 7,500 ft were used in the analyses for the high-elevation region, stations having a mean basin elevation of less than 7,400 ft were used in the analyses for the numbered regions, and two stations having mean basin elevations of 7,390 and 7,400 ft were used in both analyses. In order to provide a smooth transition between the equations for the high-elevation region and those for the numbered regions, mean basin elevations between 7,300 and 7,500 ft were designated as a transition zone. The high-elevation region, therefore, was designated for basins having a mean elevation equal to or greater than 7,500 ft. In the transition zone flood magnitudes were computed using the equations for the appropriate regions, and the results were weighted (see example 3).

In the analyses for the high-elevation region 13 of the 16 stations used are in the east-central part of the State. Although most of the high-elevation data are for this area, data for the three stations in other parts of the State indicate that the equations for the high-elevation region also apply to other parts of the State.

SUMMARY

Regression equations were developed to estimate flood magnitudes at ungaged sites in Arizona for recurrence intervals of 2, 5, 10, 25, 50, 100, and 500 years for six flood-frequency regions. The equations relate flood magnitudes to one or more of the following statistically independent variables: size of drainage area, mean basin elevation, and mean annual precipitation. The regression equations apply to streams that are not affected significantly by regulation, diversion, or urbanization. Separate methods were developed to estimate flood magnitudes and frequencies for the main stem of the Little Colorado River from the Zuni River to the mouth and for the main stem of the Gila River; discharge is related to size of drainage area for the Little Colorado River and to miles upstream and downstream from Coolidge Dam for the Gila River.

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STREAMFLOW DATA

Table 3.--Basin characteristics and flood-frequency data for gaging stations used in
regression analyses

REGION:	HE, high-elevation flood-frequency region.	FLOOD DISCHARGES:	Q, discharge, in cubic feet
YR:	Number of years of record.		per second, for indicated recurrence interval
BASIN CHAR:	Basin characteristics. DA, drainage		in years. First line, discharge used in
	area in square miles; EL, mean basin elevation		regression analysis; second line, weighted
	in feet above mean sea level; PR, mean annual		averages of values from frequency distributions
	precipitation in inches.		and values from regression equations.

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09379030	BLACK MOUNTAIN WASH NEAR CHINLE, AZ	4	13	80.70	5920	10.9	597 607	1310 1320	1970 1960	3060 3020	4050 3910	5230 5050	8750 8260
09379060	LUKACHUKAI CREEK TRIB NR LUKACHUKAI, AZ	4	13	1.37	5820	9.8	13 26	44 89	83 167	161 302	248 436	366 609	803 1180
09379100	LONG HOUSE WASH NEAR KAYENTA, AZ	4	14	1.38	6920	12.0	323 288	915 776	1580 1280	2810 2260	4090 3220	5730 4570	11300 8960
09379200	CHINLE WASH NR MEXICAN WATER, AZ	4	12	3300.00	6260	10.9	1190 1870	2210 4130	3060 6330	4320 9440	5410 12100	6610 15100	9940 23700
09379560	EL CAPTIAN WASH NEAR KAYENTA, AZ	4	13	5.88	5690	9.0	497 434	1010 831	1470 1150	2180 1670	2810 2110	3540 2680	5640 4210
09382000	PARIA RIVER AT LEES FERRY, AZ	1	52	1410.00	6150	12.0	4270 2380	8030 5390	11000 8090	15100 12400	18400 16200	21800 20600	30600 33600
09383020	HOUSE ROCK WASH TRIB NR MARBLE CANYON, AZ	1	14	3.54	5290	9.6	26 40	84 126	156 225	308 426	480 643	719 941	1650 2030
09383400	LITTLE COLORADO RIVER AT GREEP, AZ	HE	15	30.90	9400	31.2	176 174	341 340	475 479	669 683	829 857	1000 1040	1450 1540
09384000	LITTLE COLORADO R ABV LYMAN RES NR ST. JOHNS, AZ	HE	36	747.00	7760	20.0	976 1090	2360 2650	3720 4180	6030 6610	8220 8880	10900 11500	19000 19400
09384200	LYMAN RES TRIB NR ST. JOHNS, AZ	4	13	0.24	6100	11.6	26 28	58 73	86 122	130 209	168 292	211 400	329 745
09385800	LITTLE COLORADO R TRIB NR ST. JOHNS, AZ	4	13	0.35	6350	11.1	49 49	138 142	236 246	414 440	593 630	815 885	1540 1710
09390500	SHOW LOW CREEK NEAR LAKESIDE, AZ	3,HE	22	68.60	7320	23.7	277 330	1120 1260	2260 2450	4670 4760	7360 7250	11000 10500	24100 21600
09393500	SILVER CREEK NEAR SNOWFLAKE, AZ	3,4	46	886.00	6400	16.7	2970 2980	5950 6150	8470 9060	12300 13600	15500 17700	19200 22300	29000 35600
09395900	BLACK CREEK NEAR LUPTON, AZ	HE	12	500.00	7500	15.8	2730 2540	4180 3940	5230 5040	6650 6660	7750 8000	8910 9460	11800 13300

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09396400	DEAD WASH TRIB NEAR HOLBROOK, AZ	4	13	1.00	5740	7.9	188 165	387 327	560 457	825 677	1060 864	1320 1100	2040 1750
09396500	PUERCO RIVER NEAR ADAMANA, AZ	4	10	2760.00	6730	12.6	11600 10100	20900 17400	28300 22900	39000 31900	47700 39100	57100 48300	81900 72400
09397200	PENZANCE WASH NEAR JOSEPH CITY, AZ	4	13	0.17	5150	7.8	30 28	72 66	113 101	183 160	247 211	324 277	555 464
09397500	CHEVELON CR BLW WILDCAT CANYON NR WINSLOW, AZ	3	23	275.00	7030	24.0	2470 2420	7310 6930	12700 11700	22800 20400	33100 29100	46000 40000	89000 75000
09397800	BROOKBAUK CANYON NEAR HEBER, AZ	3	12	27.60	6950	22.1	111 168	304 531	502 982	845 1720	1170 2510	1560 3340	2750 6180
09398000	CHEVELON CREEK NEAR WINSLOW, AZ	3,4	48	794.00	6440	18.4	2440 2480	5940 6120	9490 9870	15700 16400	21800 22800	29400 30500	53700 55300
09398500	CLEAR CR BLW WILLOW CR NR WINSLOW, AZ	3	28	321.00	7100	25.8	2420 2420	6810 6700	11600 11200	20100 19200	28600 27000	39200 36600	73300 67000
09399000	CLEAR CREEK NEAR WINSLOW, AZ	3,4	46	607.00	6500	18.7	2610 2620	6990 6980	11700 11600	20500 20200	29500 28800	40900 39600	79700 75800
09400100	GANADO WASH TRIB NEAR GANADO, AZ	4	13	11.10	6770	11.8	223 243	535 639	845 1080	1380 1860	1890 2620	2510 3620	4450 6840
09400200	STEAMBOAT WASH TRIB NR GANADO, AZ	4	13	0.32	6750	12.1	30 35	171 175	426 392	1130 941	2110 1630	3710 2760	11600 7810
09400290	TESHBITU WASH TRIB NR HOLBROOK, AZ	4	13	16.40	6420	8.2	368 366	934 923	1500 1470	2480 2430	3410 3310	4520 4460	7970 7900
09400300	TESHBITU WASH NEAR HOLBROOK, AZ	4	13	57.40	6280	9.2	601 606	1200 1270	1710 1870	2470 2850	3130 3710	3870 4770	5890 7790
09400530	COW CANYON NEAR WINSLOW, AZ	1	14	3.53	5380	10.0	47 44	109 132	168 228	263 409	350 592	451 835	750 1650
09400560	ORAI BI WASH TRIB NEAR ORAI BI, AZ	4	12	1.76	6020	10.2	108 107	300 289	511 476	902 820	1300 1150	1810 1590	3530 2980

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09400565	POLACCA WASH TRIB NEAR CHINLE, AZ	4	12	6.17	6890	12.3	227 233	903 857	1860 1640	4020 3330	6620 5170	10400 7950	25600 18100
09401245	KLEITHLA VALLEY TRIB NR KAYENTA, AZ	4	14	0.77	6730	10.2	129 121	192 213	236 315	296 511	341 709	389 973	505 1890
09401400	MOENKOPI WASH NEAR, TUBA CITY, AZ	4	35	2500.00	5820	8.7	3870 3830	6120 6100	7760 7760	9950 10100	11700 11900	13400 13800	17900 18800
09403000	BRIGHT ANGEL CREEK NEAR GRAND CANYON, AZ	1, HE	50	101.00	7390	19.8	430 430	1000 999	1570 1560	2550 2540	3500 3460	4660 4620	8370 8250
09403780	KANAB CREEK NEAR FREDONIA, AZ	1	11	1085.00	6100	12.0	884 1690	2260 3730	3700 5490	6240 8640	8750 11600	11900 15200	22000 26400
09403800	BITTER SEEPS WASH TRIB NR FREDONIA, AZ	1	13	2.85	5120	12.0	126 116	560 456	1220 898	2810 1930	4810 3130	7810 4990	20800 12500
09403930	WEST CATARACT CREEK NR WILLIAMS, AZ	1	12	3.18	7190	23.5	25 37	80 117	146 207	274 389	409 580	585 838	1190 1740
09404050	SPRING VALLEY WASH TRIB NR WILLIAMS, AZ	1	13	3.93	6750	12.2	11 40	54 124	121 221	283 430	488 666	791 998	2070 2260
09404310	YAMPAT CANYON TRIB NR PEACH SPRINGS, AZ	3	12	0.20	5360	12.2	15 14	43 39	72 66	126 118	179 172	246 239	461 466
09404340	TRUXTON WASH AT VALENTINE, AZ	3	11	370.00	4630	12.1	1240 1310	4320 4400	7860 7880	14300 14100	20600 20300	28200 27800	51300 51100
09415000	VIRGIN RIVER AT LITTLEFIELD, AZ	1	46	5090.00	5200	11.0	5050 5290	10000 11000	14400 15700	21300 23200	27500 30000	34700 37600	55600 60000
09423780	WALNUT CREEK NEAR KINGMAN, AZ	1	11	31.30	5040	13.9	258 199	410 487	520 747	666 1190	781 1600	899 2140	1190 3780
09423820	SACRAMENTO WASH NEAR YUCCA, AZ	1	11	787.00	3400	10.1	2390 1730	5610 4240	8770 6790	14100 11000	19200 15100	25300 19800	44300 34900
09423900	SACRAMENTO WASH TRIB NR TOPOUCK, AZ	1	13	14.70	1450	6.2	41 98	182 291	399 517	920 1000	1580 1560	2570 2340	6860 5450

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09424200	CUTTONWOOD WASH NR KINGMAN, AZ	3	12	143.00	5350	14.0	2870 2470	6390 5250	9610 7650	14800 11900	19400 15700	24800 20400	40300 34100
09424410	BIG SANDY RIVER TRIB NR KINGMAN, AZ	3	13	1.99	3700	12.0	19 25	99 123	229 271	551 599	965 994	1590 1550	4310 3790
09424430	KAISER SPRING CANYON TRIB NR WIKIEUP, AZ	3	13	1.70	3520	11.2	59 56	244 221	506 438	1090 906	1770 1430	2740 2170	6520 4940
09424480	ASH CREEK NEAR KIRKLAND, AZ	3	13	6.95	4680	10.4	96 95	293 293	518 524	942 960	1380 1420	1940 1990	3810 3940
09424700	IRON SPRING WASH TRIB NR BAGDAD, AZ	3	12	0.64	3470	12.1	8 12	40 56	89 123	208 269	356 444	574 679	1490 1610
09425500	SANTA MARIA RIVER NR ALAMO, AZ	3	28	1520.00	3650	14.4	2880 3140	10500 11400	20200 22000	40200 42800	62300 65400	91900 94600	200000 199000
09426000	BILL WILLIAMS RIVER BELOW ALAMO DAM, AZ	3	43	4730.00	4120	13.7	10500 10500	43700 42300	84500 79800	161000 150000	235000 216000	325000 298000	589000 536000
09427700	MONKEYS HEAD WASH NEAR PARKER, AZ	2	12	1.84	1130	5.5	18 94	87 229	197 369	470 661	824 982	1360 1430	3790 3210
09428545	CUNNINGHAM WASH TRIB NEAR WENDEN, AZ	2	12	0.77	2330	8.1	45 71	98 165	147 250	225 399	298 536	382 715	634 1240
09428550	BOUSE WASH TRIB NEAR BOUSE, AZ	2	13	14.60	1230	6.5	292 280	858 781	1510 1350	2750 2390	4060 3470	5750 4830	11700 9510
09428800	TYSON WASH TRIB NR QUARTZSITE, AZ	2	13	13.70	1520	6.0	329 281	587 691	794 1070	1100 1720	1350 2310	1630 3070	2380 5320
09429150	CREDSUTE WASH NEAR EHRENBERG, AZ	2	11	1.98	509	5.5	76 108	226 276	401 453	737 783	1090 1120	1560 1550	3190 3000
09444100	CAMPBELL BLUE CREEK NR ALPINE, AZ (USFS)	HE	17	11.60	8300	20.0	32 38	89 103	147 168	247 271	343 367	458 477	806 796
09444500	SAN FRANCISCO RIVER AT CLIFTON, AZ	3	69	2766.00	6880	18.1	7230 7230	17600 17600	28000 28000	45900 45900	63200 63100	84100 83600	150000 148000

STA NO.	STATION NAME	REGION	YR	BASIN CHAR				FLOOD DISCHARGES						
				DA	EL	PR		Q2	Q5	Q10	Q25	Q50	Q100	Q500
09445500	WILLOW CR NR POINT OF PINES NR MORENCI, AZ		3	23	102.00	6340	19.8	629	1510	2330	3670	4870	6250	10200
								660	1680	2740	4500	6230	8130	14100
09446000	WILLOW CR NR DOUBLE CIRCLE RANCH NR MORENCI, AZ		3	25	149.00	6310	19.2	1040	3220	5630	9980	14300	19500	35800
								1050	3190	5510	9630	13700	18600	33700
09446500	EAGLE CR NR DOUBLE CIRCLE RANCH NR MORENCI, AZ		3	25	377.00	6410	20.0	2500	6330	10000	16200	21800	28400	47500
								2470	6230	9870	16100	21800	28400	48300
09447000	EAGLE CR ABV PUMPING PLANT NR MORENCI, AZ		3	33	613.00	6060	19.2	2330	6200	10100	16700	22800	30100	51700
								2390	6430	10600	17700	24400	32200	56000
09451900	AGRIC RSCH SERV WATERSHED W-I NR SAFFORD, AZ		5	29	0.81	3350	8.0	83	194	297	460	606	773	1240
								83	199	312	494	664	854	1420
09456000	SAN SIMON RIVER NR SAN SIMON, AZ		5	12	814.00	4830	14.9	2670	4680	6200	8290	9950	11700	16000
								2930	5650	8060	11400	14300	17200	25400
09456400	GOLD GULCH NEAR BOWIE, AZ		5	13	15.00	5170	10.9	572	1270	1900	2880	3730	4690	7360
								546	1200	1790	2720	3530	4460	7070
09456680	AGRIC RSCH SERV WATERSHED W-V NR SAFFORD, AZ		5	29	1.13	4550	10.0	78	236	410	721	1030	1400	2560
								80	241	416	722	1020	1380	2480
09456820	AGRIC RSCH SERV WATERSHED W-IV NR SAFFORD, AZ		5	28	1.19	3650	9.0	73	154	224	330	421	522	795
								76	173	269	421	565	718	1190
09457000	SAN SIMON RIVER NR SOLOMON, AZ		5	45	2192.00	4270	12.2	4840	7830	9950	12700	14900	17100	22300
								4970	8370	11100	14700	17700	20600	28400
09462200	AGRIC RSCH SERV WATERSHED W-II NR SAFFORD, AZ		5	29	1.07	3800	12.0	275	583	845	1240	1570	1940	2920
								258	536	764	1120	1430	1780	2730
09467120	SALT CREEK NR PERIDOT, AZ		3	12	30.30	3490	16.0	584	1700	2910	5050	7140	9700	17700
								559	1650	2870	5120	7430	10300	19700
09468300	SEVENMILE WASH TRIB NEAR GLOBE, AZ		3	14	0.83	4410	19.0	18	93	209	483	817	1300	3230
								22	106	227	487	790	1210	2790
09468500	SAN CARLOS RIVER NEAR PERIDOT, AZ		3	46	1027.00	4480	17.2	7220	15400	22500	33400	42700	53000	81200
								7060	15200	22400	34100	44600	56300	90600

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	02	05	010	025	050	0100	0500
09470500	SAN PEDRO RIVER AT PALOMINAS, AZ	5	36	741.00	4950	17.9	6390 6190	10100 9790	12800 12500	16300 16100	19000 19100	21800 22200	28500 29900
09470900	SAN PEDRO RIVER TRIB NR BISBEE, AZ	5	13	7.12	4770	16.0	544 495	921 859	1200 1160	1570 1630	1870 2050	2170 2490	2910 3770
09471000	SAN PEDRO RIVER AT CHARLESTON, AZ	5	60	1219.00	4840	16.5	6950 6860	12500 12300	17500 17100	26000 25200	34100 32800	43900 42000	75900 71300
09471180	AGRIC RSCH SERV WATERSHED W-III NR TOMBSTONE, AZ	5	14	3.47	4550	14.0	215 211	635 595	1090 982	1910 1660	2710 2300	3700 3090	6790 5460
09471200	AGRIC RSCH SERV WATERSHED W-I NR TOMBSTONE, AZ	5	11	57.70	4700	14.0	2590 2230	6780 5300	9850 7210	13500 9760	15900 11400	17900 13200	21500 16900
09471700	FENNER WASH NEAR BENSON, AZ	5	13	2.71	4180	12.3	165 165	432 430	699 692	1150 1130	1570 1530	2070 2010	3550 3410
09472000	SAN PEDRO RIVER NEAR REDINGTON, AZ	5	34	2939.00	4660	15.5	7750 7780	15200 15200	21400 21400	30900 30600	39000 38400	48100 47200	73000 70800
09472400	MAMMOTH WASH NEAR MAMMOTH, AZ	5	13	2.40	3700	13.8	145 147	532 495	1020 887	2000 1630	3050 2370	4430 3360	9190 6530
09472500	SAN PEDRO RIVER NR MAMMOTH, AZ	5	11	3610.00	4550	15.3	16400 14800	29300 25500	39200 33100	52800 44200	63800 53000	75300 63000	104000 87300
09473000	ARAVAIPA CREEK NEAR MAMMOTH, AZ	5	24	541.00	4530	16.2	4980 4780	9530 9000	13200 12300	18400 17100	22700 21100	27400 25500	39400 36900
09473200	GREEN LANTERN WASH NR WINKELMAN, AZ	5	12	3.63	2590	14.0	426 380	1400 1130	2530 1890	4660 3300	6850 4640	9620 6440	18700 11900
09473600	TAM O'SHANter WASH NR HAYDEN, AZ	5	13	4.37	3050	15.6	347 323	644 616	877 870	1210 1270	1470 1620	1760 2010	2490 3130
09478200	DURHAM WASH NEAR FLORENCE, AZ	5	17	15.60	3670	12.1	515 504	1640 1510	2920 2540	5310 4410	7720 6190	10700 8450	20600 15500
09478500	QUEEN CR AT WHITLOW DAMSITE NR SUPERIOR, AZ	5	16	144.00	3180	17.9	4050 3650	10600 8860	17000 13300	27900 21000	36100 27700	50100 36100	85800 59500

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	02	05	010	025	050	0100	0500
09478600	QUEEN CREEK TRIB NO.3 AT WHITLOW DAM, AZ	5	10	0.37	2320	12.0	67 64	130 138	181 211	256 332	317 448	384 575	558 973
09479200	QUEEN CREEK TRIB AT APACHE JUNCTION, AZ	2	15	0.51	1760	10.5	65 65	117 149	156 224	211 348	255 460	301 604	417 1020
09480000	SANTA CRUZ RIVER NEAR LOCHIEL, AZ	2	27	82.20	5150	18.2	1530 1490	2760 2710	3710 3700	5020 5120	6080 6320	7190 7600	10000 11000
09480500	SANTA CRUZ RIVER NEAR NOGALES, AZ	5	46	533.00	4850	18.7	4100 4040	7140 7070	9480 9430	12700 12800	15400 15600	18200 18600	25400 26300
09481500	SONOITA CREEK NEAR PATAGONIA, AZ	5	43	209.00	4800	19.3	2710 2660	5320 5180	7420 7190	10400 10100	12800 12500	15400 15100	21900 21600
09481700	CALABASAS CANYON NEAR NOGALES, AZ	5	12	10.30	4360	15.8	298 308	618 685	889 1040	1300 1600	1640 2110	2020 2650	3040 4250
09481750	SOPURI WASH AT AMADO, AZ	5	18	176.00	3840	15.5	1630 1640	4740 4500	8080 7300	14000 12100	19800 16500	26900 22100	49000 38300
09481800	DEMETRIE WASH TRIB NR CONTINENTAL, AZ	5	13	0.15	3620	14.5	25 26	57 68	86 113	131 187	171 261	217 343	343 605
09481900	OCOTILLO WASH NEAR CONTINENTAL, AZ	5	10	3.60	3280	14.1	100 122	669 610	1730 1340	4600 3110	8510 5280	14600 8720	42400 23000
09482000	SANTA CRUZ RIVER AT CONTINENTAL, AZ	5	32	1662.00	4350	18.1	4270 4410	8020 8490	11000 11900	15200 16700	18600 20700	22200 24800	31400 35700
09482200	FLATO WASH NR SAHUARITA, AZ	5	11	8.25	2820	11.6	529 482	889 847	1150 1160	1510 1650	1780 2090	2060 2550	2760 3920
09482330	PUMPING WASH NEAR VAIL, AZ	5	10	0.54	3010	11.2	112 102	227 213	323 316	464 485	584 642	714 818	1060 1350
09482350	SOUTH FORK AIRPORT WASH NEAR TUCSON, AZ	5	10	4.38	2740	11.0	172 182	679 634	1350 1150	2740 2130	4280 3130	6340 4460	13700 8840
09482370	NORTH FORK AIRPORT WASH NEAR TUCSON, AZ	5	12	5.28	2780	10.8	175 188	566 576	1020 991	1870 1720	2740 2430	3830 3300	7420 6000

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09482400	AIRPORT WASH AT TUCSON, AZ	5	10	15.20	2700	10.8	320 347	572 726	764 1100	1030 1670	1240 2200	1470 2740	2030 4380
09482450	WEST BRANCH SANTA CRUZ RIVER AT TUCSON, AZ	5	10	23.60	2800	11.2	173 261	319 644	432 1070	592 1680	721 2270	858 2850	1210 4670
09482480	BIG WASH AT TUCSON, AZ	5	11	2.75	2850	11.0	174 172	756 654	1580 1230	3370 2420	5430 3660	8280 5420	18900 11500
09482500	SANTA CRUZ RIVER AT TUCSON, AZ	5	61	2222.00	4050	16.9	5160 5240	8700 9050	11300 12000	14800 16100	17500 19400	20300 22600	27200 31300
09483040	WEST SPEEDWAY WASH NEAR TUCSON, AZ	5	11	0.46	2750	11.8	104 95	231 212	344 320	518 499	671 664	842 854	1320 1420
09483100	TANQUE VERDE CREEK NEAR TUCSON, AZ	5	16	43.00	4780	17.0	1180 1120	2200 2100	3010 2900	4150 4110	5080 5140	6080 6270	8620 9340
09483200	AGUA CALIENTE WASH TRIB NEAR TUCSON, AZ	5	11	2.04	3300	14.0	91 102	235 276	378 460	617 760	840 1050	1100 1370	1880 2350
09484000	SABINO CREEK NEAR TUCSON, AZ	5	43	35.50	6300	22.6	1030 1010	2390 2310	3650 3480	5670 5360	7490 7030	9560 8960	15500 14400
09484200	BEAR CREEK NEAR TUCSON, AZ	5	15	16.30	5860	20.6	264 295	700 793	1140 1300	1890 2120	2590 2880	3420 3740	5920 6330
09484500	TANQUE VERDE CREEK AT TUCSON, AZ	5	16	219.00	4340	16.7	2050 2030	5410 5090	8790 7910	14500 12600	19900 16700	26200 21700	45200 35900
09484570	MESCAL ARROYO NEAR PANTANO, AZ	5	11	38.40	4260	15.0	806 790	1660 1660	2390 2430	3480 3620	4400 4660	5410 5800	8130 9020
09484580	BARREL CANYON NEAR SONOITA, AZ	5	14	14.10	5000	16.0	473 463	1100 1070	1690 1640	2610 2530	3440 3330	4380 4240	7050 6830
09484600	PANIANO WASH NEAR VAIL, AZ	5	18	457.00	4500	15.4	4330 4120	10800 9740	17000 14600	27300 22700	36600 29600	47600 38100	79400 61300
09485000	RINCON CREEK NEAR TUCSON, AZ	5	23	44.80	4850	19.2	1040 1030	2980 2770	5010 4470	8550 7400	12000 10100	16100 13500	28800 23300

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES							
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500	
09485500	PANTANO WASH AT TUCSON, AZ	5	13	602.00	4560	17.1	1710 2020	4920 5450	8340 8810	14400 14200	20200 19100	27300 24900	49300 41900	
09485900	PIMA WASH NEAR TUCSON, AZ	5	12	4.93	4430	16.0	92 89	145 300	182 552	231 973	268 1400	306 1860	396 3440	
09485950	GERONIMO WASH NEAR TUCSON, AZ	5	12	2.08	3600	15.0	126 104	307 365	479 669	760 1240	1010 1840	1310 2610	2160 5140	
09486000	RILLITO CREEK NEAR TUCSON, AZ	5	61	892.00	4400	15.5	4980 4940	9130 9070	12300 12200	16700 16700	20200 20300	23800 24000	32800 33500	
09486300	CANADA DEL ORU NEAR TUCSON, AZ	5	10	250.00	4000	16.4	2010 2020	5410 5060	8870 7810	14800 12300	20400 16300	27100 21100	47100 34600	
09486500	SANTA CRUZ RIVER AT CORTARO, AZ	5	34	3503.00	4000	16.3	8140 8210	12700 13200	15900 17100	19900 22200	22800 26300	25800 30300	32700 40700	
09486700	CHILTEPINES WASH NEAR SASABE, AZ	5	13	7.13	3660	13.0	143 170	236 365	305 580	400 905	476 1220	555 1540	753 2550	
09486800	ALTAR WASH NEAR THREE POINTS, AZ	5	10	463.00	3920	15.6	5310 4760	10100 8720	14100 11800	19900 16500	24800 20400	30100 24900	44600 36700	
09487000	BRAWLEY WASH NEAR THREE POINTS, AZ	5	12	776.00	3710	14.6	4150 4100	6680 7000	8520 9430	11000 12900	12900 15800	15000 18900	20000 27200	
09487250	LOS ROBLES WASH NEAR MARANA, AZ	5	11	1170.00	3350	11.8	1080 1890	3010 5070	5040 8310	8590 13000	12000 17300	16200 21900	29100 35600	
09488500	SANTA ROSA WASH NR VAIVA VO, AZ	2	20	1782.00	2340	10.2	1450 2120	4490 6440	8000 11200	14700 20200	21600 29400	30400 41200	60400 80300	
09488600	SILVER REEF WASH NEAR CASA GRANDE, AZ	2	13	12.80	1620	8.5	274 264	667 696	1050 1140	1700 1900	2300 2640	3020 3550	5180 6390	
09489070	NORTH FORK OF EAST FORK BLACK RIVER NR ALPINE, AZ	HE	10	38.10	9060	27.5	218 213	603 536	1000 826	1690 1310	2360 1750	3150 2280	5570 3780	
09489080	HANNAGAN CREEK NR HANNAGAN MEADOW, AZ	HE	11	1.61	9160	30.0	16 15	39 36	60 54	95 83	126 108	162 137	264 217	

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09489100	BLACK RIVER NEAR MAVERICK, AZ	HE	13	315.00	8700	27.2	1450 1400	3090 2870	4520 4070	6690 5900	8560 7420	10600 9150	16300 13800
09489200	PACHETA CREEK NEAR MAVERICK, AZ	HE	18	14.80	8810	30.3	101 99	182 182	244 250	330 349	399 433	472 522	655 758
09489499	BLACK R ABV WILLOW CR DIV NR POINT OF PINES, AZ	HE	22	560.00	8000	25.3	1990 1980	4350 4230	6440 6130	9640 9020	12400 11500	15600 14300	24100 21700
09489700	BIG BUNITO CREEK NR FORT APACHE, AZ	HE	18	119.00	7920	27.9	611 598	1150 1120	1570 1540	2180 2160	2680 2670	3200 3220	4560 4670
09490500	BLACK RIVER NEAR FORT APACHE, AZ	3	18	1232.00	7200	23.4	4850 4910	12300 12500	19600 19900	31800 32200	43000 43800	56100 56900	94600 96000
09490800	NORTH FORK WHITE RIVER NEAR GREEP, AZ	HE	10	39.00	9500	36.7	196 197	291 331	354 450	433 622	492 774	551 925	687 1350
09491000	NORTH FORK WHITE RIVER NEAR MCNARY, AZ	HE	29	66.00	9190	32.2	390 383	683 676	906 906	1210 1230	1460 1510	1720 1800	2370 2550
09492400	EAST FORK WHITE RIVER NR FORT APACHE, AZ	HE	18	38.80	8580	31.2	241 235	376 383	471 503	593 673	685 817	778 964	1000 1360
09494000	WHITE RIVER NEAR FORT APACHE, AZ	3,HE	18	632.00	7400	25.4	3270 3220	5340 5620	6830 7720	8810 10900	10300 13800	11900 16700	15700 25500
09494300	CARRIZO CR ABV CORDUROY CR NR SHOW LOW, AZ	3	13	225.00	6370	22.5	1960 1920	3870 4080	5440 6210	7730 9630	9650 13000	11700 16500	17200 27700
09496000	CORDUROY CREEK NEAR MOUTH, NEAR, SHOW LOW, AZ	3	24	203.00	6370	21.7	1020 1080	3810 3870	7350 7250	14500 13800	22200 20500	32300 29300	67600 58800
09496500	CARRIZO CREEK NEAR SHOW LOW, AZ	3	24	459.00	6320	22.0	2840 2830	7320 7310	11800 11800	19200 19300	26100 26400	34200 34600	58100 59400
09496600	CIBECUE 1 TRIB TO CARRIZO CR NR SHOW LOW, AZ	3	13	0.10	5390	18.0	45 38	96 77	140 109	206 165	263 217	327 280	500 472
09496700	CIBECUE 2 TRIB TO CARRIZO CR NR SHOW LOW, AZ	3	13	0.06	5240	18.0	42 35	71 57	93 75	122 105	146 135	170 170	229 283

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	U10	Q25	Q50	Q100	Q500
09496800	CARRIZO CREEK TRIB NR SHOW LOW, AZ	3	13	2.55	5810	20.0	310 267	729 594	1120 878	1740 1370	2300 1820	2940 2370	4750 3970
09497500	SALT RIVER NEAR CHRYSOTILE, AZ	3	52	2849.00	6730	22.8	9170 9190	21000 21200	32300 32900	51100 52200	68700 70400	89700 91800	154000 157000
09497800	CIBECUE CREEK NEAR CHRYSOTILE, AZ	3	17	295.00	5700	20.7	3630 3390	6920 6620	9560 9500	13300 14100	16500 18500	19800 23200	28400 37500
09497900	CHERRY CREEK NEAR YUUNG, AZ	3	13	62.10	6030	24.8	1380 1280	3220 2970	4930 4570	7640 7250	10100 9810	12800 12700	20700 21600
09497980	CHERRY CREEK NEAR GLOBE, AZ	3	10	200.00	5600	24.0	1970 1950	4300 4570	6360 7280	9530 11800	12300 16200	15300 21000	23800 36500
09498500	SALT RIVER NEAR ROOSEVELT, AZ	3	52	4306.00	6190	22.0	12800 12800	31800 31800	51500 51400	86500 85800	121000 120000	164000 161000	304000 294000
09498510	UPPER PARKER CR NR GLOBE, AZ (USFS)	3	33	1.09	6600	22.0	26 28	88 94	162 176	300 324	441 480	618 667	1190 1290
09498600	CRISTOPHER CREEK TRIB NR KOHL'S RANCH, AZ	3	10	0.66	6080	29.0	31 34	71 94	108 166	164 288	215 422	271 566	431 1080
09498800	TONTO CREEK NEAR GISELA, AZ	3	11	430.00	5810	24.7	8920 7680	21600 17500	33500 25900	52900 40400	70500 53300	90700 69100	149000 114000
09498870	RYE CREEK NEAR GISELA, AZ	3	11	122.00	4390	24.2	2840 2570	6390 5830	9580 8990	14600 14400	19000 19700	23900 25700	37700 44800
09498900	GOLD CREEK NEAR PAYSON, AZ	3	13	6.44	4590	21.0	226 218	845 769	1640 1430	3240 2720	4970 4070	7240 5850	15200 11900
09499000	TUNTO CREEK ABOVE GUN CR, NR ROOSEVELT, AZ	3	35	675.00	5020	23.9	9680 9270	21800 20600	32700 30700	49900 47100	65000 61800	82200 78900	130000 127000
09501100	THREE BAR D WATERSHED NR ROOSEVELT, AZ (USFS)	3	19	0.12	4300	16.0	4 5	14 18	27 38	52 75	79 118	115 171	238 366
09501300	TORTILLA CREEK AT TORTILLA FLAT, AZ	3	10	24.30	2690	15.0	1930 1580	5540 4210	9380 6730	16200 11600	22800 16200	30800 22200	55700 41200

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q5	Q10	Q25	Q50	Q100	Q500	
09502800	WILLIAMSON VALLEY WASH NR PAULDEN, AZ		1 11	255.00	5120	17.3	735 1750 1810	2720 2840	4340 4610	5830 6270	7590 8270	12900 14400	
09503000	GRANITE CREEK NR PRESCOTT, AZ		1 15	39.60	5900	22.1	715 298	2560 1510	4040 2570	5390 3630	6970 4830	11700 8780	
09503700	VERDE RIVER NEAR PAULDEN, AZ		1 13	2160.00	5410	16.3	982 1230	4060 5970	6730 10200	9280 14300	12400 19100	21900 34400	
09503720	HELL CANYON NEAR WILLIAMS, AZ		1 10	14.90	7110	24.1	341 300	1390 1080	2290 1730	3150 2320	4190 3090	7370 5310	
09503800	VOLUNTEER WASH NR BELLEMONT, AZ	HE	10	131.00	7620	25.7	375 418	1310 1420	2050 2150	2720 2790	3510 3510	5800 5520	
09504000	VERDE PIVER NR CLARKDALE, AZ		1,3 10	3150.00	5490	19.1	5140 4600	22700 18100	39000 30100	55400 41500	75900 56500	144000 103000	
09504400	MUNDUS CANYON TRIB NR SEDONA, AZ		3 12	1.19	6880	26.0	64 63	394 355	752 652	1140 963	1640 1360	3410 2700	
09504500	OAK CREEK NEAR CORNVILLE, AZ		3 34	357.00	6200	22.6	4320 4170	14600 13900	22400 21500	29400 28400	37400 36300	60200 59400	
09505200	WET BEAVER CREEK NEAR RIMROCK, AZ		3 14	111.00	6410	24.8	2320 2120	9500 8110	15700 13200	21600 18000	28700 23900	50700 41800	
09505238	BEAVER CREEK NO 5 NR FLAGSTAFF, AZ (USFS)		3 16	0.10	6420	24.0	6 7	31 39	53 71	76 106	104 146	194 288	
09505245	BEAVER CREEK NO 3 NR FLAGSTAFF, AZ (USFS)		3 18	0.60	5160	22.0	10 13	165 178	450 431	854 763	1510 1280	4710 3610	
09505250	RED TANK DRAW NEAR RIMROCK, AZ		3 18	49.40	5910	21.6	507 525	5130 4540	11700 9690	19700 15600	31400 24200	79700 57700	
09505290	S FURK RATTLESNAKE CN NR STONEMAN LK, AZ (USFS)	3,HE	18	2.80	7320	25.0	78 80	441 443	815 801	1210 1170	1710 1630	3430 3180	
09505300	RATTLESNAKE CANYON NEAR RIMROCK, AZ		3 18	24.60	6560	22.8	542 521	2940 2630	5370 4680	7870 6720	11100 9370	21900 17900	

STA NU.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09505320	BAR M CANYON NR STONEMAN LAKE, AZ (USFS)		3 14	25.70	7260	25.0	571 544	1870 1670	3420 2900	6460 5240	9690 7610	13900 10700	28600 21000
09505326	BEAVER CREEK NO 15 NR FLAGSTAFF, AZ (USFS)		3 13	0.30	6950	27.0	11 13	41 49	80 95	162 183	253 280	376 400	830 832
09505350	DRY BEAVER CREEK NEAR RIMROCK, AZ		3 15	142.00	6220	23.1	2880 2620	8550 7310	14900 12100	26700 20900	38700 29500	53900 40700	104000 75700
09505600	DIRTY NECK CANYON NR CLINTS WELL, AZ		3 11	3.42	7140	26.0	57 69	123 184	182 322	274 550	356 796	449 1050	713 1940
09505800	WEST CLEAR CREEK NR CAMP VERDE, AZ		3 11	241.00	6680	23.4	2750 2560	6560 6020	10200 9310	16300 14900	21900 20200	28600 26400	48400 45200
09505900	CUTTONWOOD WASH NR CAMP VERDE, AZ		3 12	0.64	3540	14.5	20 22	79 88	158 178	329 365	525 578	796 858	1830 1910
09507600	EAST VERDE RIVER NEAR PINE, AZ		3 13	6.65	6430	30.0	302 286	968 871	1760 1510	3280 2720	4900 3960	6980 5560	14200 10800
09507700	WEBBER CR ABV W FK WEBBER CR NR PINE, AZ		3 16	4.92	6980	27.5	94 104	295 328	529 593	977 1070	1450 1580	2050 2190	4110 4240
09507980	EAST VERDE RIVER NR CHILDS, AZ		3 14	328.00	5140	24.7	2740 2750	8240 8130	14500 14100	26200 24800	38100 35600	53400 49100	104000 92600
09508500	VERDE RIVER BLW TANGLE CR ABV HORSESHOE DAM, AZ		3 53	5499.00	5470	18.4	15800 15700	37700 37400	58400 58200	92100 92100	123000 124000	158000 159000	261000 265000
09510080	W FK SYCAMORE CR NR SUNFLOWER, AZ		3 13	9.80	5260	24.5	63 100	394 500	988 1120	2550 2500	4640 4180	7850 6600	22000 16400
09510100	E FK SYCAMORE CR NR SUNFLOWER, AZ		3 14	4.49	5760	24.5	30 50	158 230	362 493	850 1030	1460 1650	2340 2460	5910 5540
09510150	SYCAMORE CR NR SUNFLOWER, AZ		3 14	52.30	4260	23.5	971 954	3560 3320	6820 6110	13300 11500	20300 17200	29500 24600	61200 49200
09510170	CAMP CREEK NEAR SUNFLOWER, AZ		3 13	2.60	3520	20.0	92 95	207 255	310 452	472 814	614 1220	775 1680	1220 3380

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09510180	ROCK CR NR SUNFLOWER, AZ	3	10	15.20	3680	16.0	489 441	1330 1190	2200 2000	3690 3470	5100 4950	6800 6780	11900 12800
09510200	SYCAMORE CREEK NEAR FORT MCDOWELL, AZ	3	15	165.00	3820	21.2	1660 1690	5650 5630	10400 10200	19600 18900	29100 27900	41400 39300	82200 76700
09512100	INDIAN BEND WASH NEAR SCOTTSDALE, AZ	3	15	142.00	1780	10.9	288 459	2450 3110	7340 8220	23200 22300	48300 42300	92800 75900	342000 247000
09512300	CAVE CREEK. NR CAVE CREEK, AZ	3	18	121.00	3470	15.7	2010 1890	4900 4630	7730 7430	12500 12400	16900 17300	22200 23300	38100 42400
09512500	AGUA FRIA RIVER NEAR MAYER, AZ	3	36	588.00	5000	16.7	5400 5200	9600 9400	12800 12900	17300 18300	20900 23300	24800 28600	34500 44400
09512700	AGUA FRIA RIVER TRIB NO 2 NR ROCK SPRINGS, AZ	3	13	1.11	2140	16.2	317 270	583 497	796 713	1100 1120	1360 1570	1640 2120	2370 4110
09513650	AGUA FRIA RIVER AT EL MIRAGE, AZ	3	13	178.00	1790	10.0	419 602	1750 2760	3650 6100	7870 13100	12800 21400	19900 32300	47500 74900
09513780	NEW RIVER NR ROCK SPRINGS, AZ	3	14	67.30	3970	20.0	1580 1460	5760 4990	11100 9090	22300 17500	34700 26400	51500 38600	113000 80900
09513800	NEW RIVER AT NEW RIVER, AZ	3	15	85.70	3600	19.5	2100 1940	7220 6290	13600 11300	26400 21300	40300 31600	58800 45700	125000 93800
09513820	DEADMAN WASH NEAR NEW RIVER, AZ	3	16	11.10	1980	11.0	317 302	888 889	1510 1600	2620 2990	3730 4520	5110 6460	9570 13500
09513835	NEW RIVER AT BELL ROAD, NR PEORIA, AZ	3	12	187.00	2700	15.6	1470 1530	5110 5380	9650 10200	18800 19800	28800 30200	42100 43600	89700 91200
09513860	SKUNK CREEK NR PHUENIX, AZ	3	16	64.60	2180	12.2	1200 1130	4750 4300	9600 8370	20100 17100	32100 26700	48900 40400	113000 90400
09513890	NEW RIVER AT PEURIA, AZ	3	13	317.00	2320	13.3	3060 2930	10100 9590	18500 17500	35000 33200	52300 49700	74900 71400	153000 146000
09513910	NEW RIVER NEAR GLENDALE, AZ	3	17	323.00	2130	13.8	2390 2420	8380 8600	15900 16500	31100 32400	47600 49600	69600 72300	148000 153000

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09514200	WATERMAN WASH NEAR BUCKEYE, AZ	2	12	403.00	1570	9.2	1360 1360	3030 3250	4560 5260	7020 8760	9230 12200	11800 16400	19200 30000
09515500	HASSAYAMPA R. AT BOX DAMSITE, NR. WICKENBURG, AZ	3	33	417.00	4750	19.3	3090 3060	8220 8150	13600 13500	23200 23100	32700 32600	44500 44300	82500 81800
09515800	HARTMAN WASH NEAR WICKENBURG, AZ	3	12	5.57	2690	11.0	238 214	972 814	2000 1580	4260 3240	6890 5080	10600 7730	24900 17400
09516500	HASSAYAMPA RIVER NR MORRISTOWN, AZ	3	21	774.00	3190	16.9	1930 2260	6320 7830	11100 14700	19300 26700	27000 39200	36000 53400	61700 101000
09516600	OX WASH NEAR MORRISTOWN, AZ	3	13	6.31	2290	12.2	200 192	730 694	1410 1340	2830 2680	4400 4170	6520 6190	14300 13600
09516800	JACK RABBIT WASH NR TONUPAH, AZ	2	12	137.00	2260	9.2	481 524	2710 2470	6550 5310	16600 12200	29900 20400	50700 33500	145000 88100
09517000	HASSAYAMPA RIVER NR ARLINGTON, AZ	2,3	15	1470.00	3010	15.9	1220 1390	4480 4840	8450 8890	16100 16300	24000 23800	34000 33200	66600 63100
09517200	CENTENNIAL WASH TRIB NR WENDEN, AZ	2	13	2.79	2480	8.0	132 124	329 304	532 485	886 809	1230 1120	1660 1520	3020 2790
09517280	TIGER WASH NEAR AGUILA, AZ	2	13	85.20	2590	9.6	760 716	2260 2020	3950 3390	7090 5920	10300 8410	14400 11700	27900 22000
09517400	WINTERS WASH NEAR TONUPAH, AZ	2	14	47.80	1630	9.1	787 725	1180 1190	1460 1670	1810 2480	2080 3320	2350 4270	3020 7530
09517500	CENTENNIAL WASH NEAR ARLINGTON, AZ	2	15	1810.00	1870	8.2	1890 2040	5590 6150	9730 10900	17400 19400	25200 28100	35000 38800	67700 74500
09519600	RAINBOW WASH TRIB NR BUCKEYE, AZ	2	13	2.43	950	7.6	440 378	852 702	1190 964	1700 1430	2140 1850	2610 2360	3910 3950
09519750	BENDER WASH NEAR GILA BEND, AZ	2	13	68.80	1900	8.5	498 500	2000 1830	4070 3480	8580 6890	13800 10600	21100 15800	49000 34400
09519760	SAUCEDA WASH NEAR GILA BEND, AZ	2	13	126.00	1980	8.2	617 630	1510 1620	2420 2700	3990 4590	5510 6500	7360 8800	13300 16400

STA NO.	STATION NAME	REGION	YR	BASIN CHAR			FLOOD DISCHARGES						
				DA	EL	PR	Q2	Q5	Q10	Q25	Q50	Q100	Q500
09519780	WINDMILL WASH NR GILA BLEND, AZ	2	12	12.90	1050	6.1	242 243	1420 1210	3530 2690	9140 6380	16800 11000	28800 18400	84600 50200
09520100	MILITARY WASH NEAR SENTINEL, AZ	2	13	8.70	674	5.0	117 138	453 518	917 1020	1950 2060	3170 3220	4900 4800	11900 10800
09520130	DARBY ARROYO NEAR AJO, AZ	2	10	4.72	1920	8.1	521 430	1010 788	1440 1090	2080 1600	2650 2080	3280 2670	5080 4430
09520230	CRATER RANGE WASH NEAR AJO, AZ	2	13	1.49	1280	6.6	104 99	290 270	496 453	879 797	1270 1140	1780 1600	3480 3110
09520300	ALAMO WASH TRIB NEAR AJO, AZ	2	13	0.90	2040	9.7	179 155	318 269	428 361	589 522	723 668	870 845	1270 1390
09520350	MOHAWK PASS WASH AT MOHAWK, AZ	2	13	0.09	601	4.9	17 18	45 51	73 88	124 158	174 233	237 325	439 655
09520400	LIGURTA WASH AT LIGURTA, AZ	2	13	1.99	395	4.0	111 113	410 403	826 780	1760 1590	2890 2510	4530 3830	11400 9030
09535200	SELLS WASH TRIB AT SELLS, AZ	2	14	26.80	3360	11.4	1900 1610	2410 1960	2710 2190	3080 2670	3340 3100	3580 3630	4130 5230
09536100	PITCHFORK CANYON TRIB NR FORT GRANT, AZ	5	13	0.81	5210	15.0	123 118	235 243	325 362	454 554	560 735	674 932	968 1540
09536350	SURPRISE CANYON NEAR DOS CABEZAS, AZ	5	12	0.65	6280	18.0	39 51	91 144	138 252	212 428	279 606	354 795	567 1420
09537500	WHITEWATER DRAW NEAR DOUGLAS, AZ	5	51	1023.00	4740	14.8	1940 2050	2970 3400	3660 4530	4510 6020	5140 7310	5760 8470	7170 11800

Table 4.--Maximum observed discharge at gaging stations in Arizona

REGION OR MAIN STEM	STREAM: HE, high-elevation	PERIOD OF RECORD: Water years.
flood-frequency region; LCR, Little Colorado		
River main stem from Zuni River to mouth;		
GR, Gila River main stem.		

SEE FOOTNOTES AT END OF TABLE

STATION NUMBER	STATION NAME	REGION OR MAIN STEM STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
09371100	TEEC NOS PDS WASH NEAR TEEC NOS PDS, A7	HE	1967-75	16.00	9-12-70 1350
09371200	TSITAH WASH NEAR TEEC NOS PDS, A7	4	1968-75	24.50	8- -71 2580
09379030	BLAKE MOUNTAIN WASH NEAR CHINLF, A7	4	1967-75	80.70	8- -71 2180
09379060	LUKACHUKAI CREEK TRIR NR LUKACHUKAI, A7	4	1967-75	1.37	1- 6-65 227
09379080	CHITJE WASH TRTB NR ROCK POINT, AZ	4	1964-71	2.50	9- 5-70 216
09379100	LONG HOUSE WASH NEAR KAYENTA, AZ	4	1962-75	1.38	7-30-67 2060
09379200	CHITJE WASH NR MEXICAN WATER, AZ	4	1964-75	3300.00	9- 7-70 9880
09379560	FL CAPITAN WASH NEAR KAYENTA, AZ	4	1967-75	5.88	8-26-71 2340
09379980	JACK BENCH WASH TRTB NEAR PAGE, AZ	4	1962-75	0.08	- -62 200
09382000	PAPIA RIVER AT LEES FERRY, AZ	1	1924-75	1410.00	10- 5-25 16100
09383020	HOUSE ROCK WASH TRTB NR MARBLE CANYON, A7	1	1967-75	3.54	UNKNOWN 1610
09383220	LEF VALLEY CK ABV LEF VALLEY RFS NR GRFER, A7	HE	1967-72	1.30	9-11-69 A
09383220	LEF VALLEY CR TRTB NR GRFER, A7	HE	1967-72	0.50	8-28-67 5
09383400	LITTLE COLORADO RIVER AT GREFF, AZ	HE	1961-75	30.90	10-20-72 615
09383500	NUTRIOSO CR ABV NELSON RFS NR SPRINGERVILLE, A7	HE	1968-75	83.40	4-28-73 439
09383600	FISH CREEK NEAR FAGAR, A7	HE	1963-75	15.90	8- 1-64 236
09384000	LITTLE COLORADO R ABV LYMAN RES NR ST. JOHNS, AZ	HE	1940-75	747.00	7-25-40 16000
09384200	LYMAN RES TRTB NR ST. JOHNS, A7	4	1963-75	0.24	8-26-63 101
09385800	LITTLE COLORADO R TRTB NR ST. JOHNS, A7	4	1963-75	0.35	9- 4-65 326
09386500	LITTLE COLORADO R ABV TUNI R NR HUNT, AZ	LCK	1940-72	1/ 3680.00	9- 3-71 2/1310
09387600	REACON DRAW NEAR SAUNDERS, A7	4	1963-71	0.85	8- 2-63 423
09387980	TUNI RIVER AT MOUTH NR HUNT, A7	4	1940-72	1000.00	8- 9-49 3610
09388000	LITTLE COLORADO RIVER NEAR HUNT, A7	LCK	1929-33, 1940-72	6280.00	7-28-29 8000
09390500	SHOW LOW CREEK NEAR LAKESIDE, AZ	3, HE	1954-75	68.60	12-26-71 5450
09392500	SHOW LOW CREEK AT SHOW LOW, AZ	3	1941-54	87.00	1-18-52 6250
09392800	LONG LAKE TRTB NEAR SHOW LOW, AZ	3	1965-75	5.18	12-26-71 530
09393500	SILVER CREEK NEAR SNOWFLAKE, A7	3, 4	1920, 1929-75	886.00	12- 5-19 25000
09394500	LITTLE COLORADO R AT WOODRUFF, A7	LCK	1917, 1919-20, 1929-75	8100.00	12- 5-19 25000
09395100	CARR LAKE TRTB NR HOLBROOK, AZ	4	1964-75	1.19	8-12-66 140
09395850	BLACK CREEK TRTB NR WINDOW ROCK, A7	4	1963-75	0.28	8- -68 171
09395900	BLACK CREEK NEAR LUPTON, A7	HE	1964-75	500.00	8- 1-64 5470
09396400	DEAD WASH TRTB NEAR HOLBROOK, AZ	4	1963-75	1.00	8- -67 743
09396500	PUECO RIVER NEAR ADAMAMA, AZ	4	1940-49	2760.00	8-12-46 30000
09397000	LITTLE COLORADO RIVER AT HOLBROOK, A7	LCK	1923, 1950-75	11300.00	9-19-23 60000
09397200	PENANCE WASH NEAR JOSEPH CITY, AZ	4	1963-75	0.17	9- 9-64 120

STATION NUMBER	STATION NAME	REGION OR MAIN STEM STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
09397500	CHEVELON CR PLW WILDCAT CANYON NR WINSLOW, AZ	3	1948-70	275.00	1-18-52 19900
09397800	ARROYO BANK CANYON NEAR HERER, AZ	3	1968-75	27.60	8- -64 666
09398000	CHEVELON CREEK NEAR WINSLOW, AZ	3,4	1916-20, 1920-72	794.00	1-19-52 25300
09398500	CLEAR CR BLW WILLOW CR NR WINSLOW, AZ	3	1948-75	321.00	1-18-52 16400
09399000	CLEAR CREEK NEAR WINSLOW, AZ	3,4	1920-34, 1936-75	607.00	4- 4-29 50000
09399250	JACKS CANYON TRIR NO. 2 NR WINSLOW, AZ	3	1963-75	321.60	8-21-63 9330
09399300	JACKS CANYON TRIR NR WINSLOW, AZ	4	1963-68	0.29	2- -68 192
09399400	JACKS CANYON CREEK NR WINSLOW, AZ	4	1970-75	280.00	10-20-72 2600
09399420	JACKS CANYON TRIR NO. 3 NR WINSLOW, AZ	4	1970-75	0.25	7-16-72 285
09400100	CANADU WASH TRIR NEAR CANADU, AZ	4	1963-75	11.10	7-17-65 1680
09400200	STEAMBOAT WASH TRIR NR CANADU, AZ	4	1963-75	0.32	8-13-64 383
09400290	TESHERITO WASH TRIR NR HOLBROOK, AZ	4	1963-75	16.40	9- 5-70 890
09400300	TESHERITO WASH NEAR HOLBROOK, AZ	4	1963-75	57.40	- -67 1580
09400530	COW CANYON NEAR WINSLOW, AZ	1	1963-75	3.53	7-30-64 253
09400560	ORAPI WASH TRIR NEAR ORAIRI, AZ	4	1963-75	1.76	9-19-65 383
09400565	POLARCA WASH TRIR NEAR CHINLE, AZ	4	1964-75	6.17	9- 7-75 1130
09400580	CASTLE ROUTE WASH NR WINSLOW, AZ	4	1964-75	5.53	7-15-75 860
09400590	RIO DE FLAG AT HIDDEN HOLLOW RD AT FLAGSTAFF, AZ	HE	1970-75	31.60	4-28-73 153
09400595	SCHUBT7 CANYON AT FLAGSTAFF, AZ	HE	1970-75	6.09	4-28-73 48
09400600	RIO DE FLAG AT FLAGSTAFF, AZ	HE	1964-75	51.00	4-28-73 235
09400650	SINCLAIR WASH AT FLAGSTAFF, AZ	1	1970-75	8.16	9- 5-70 401
09400660	ROCK AND ARROW WASH AT FLAGSTAFF, AZ	1	1969-75	2.14	8-15-71 73
09400680	SWITZER CANYON AT FLAGSTAFF, AZ	1	1969-75	1.87	9-12-69 112
09400700	SWITZER CANYON TRIR AT FLAGSTAFF, AZ	1	1968-75	1.20	8- 2-68 262
09400730	LOCKEY FANNING DIVERSION AT FLAGSTAFF, AZ	HE	1960-75	1.05	9-12-69 85
09400740	HAFENBERG WASH AT FLAGSTAFF, AZ	HE	1969-75	2.41	9-12-69 183
09400910	FAY CANYON NEAR FLAGSTAFF, AZ	1	1964-75	2.76	12-30-65 87
09401000	LITTLE COLORADO R AT GRAND FALLS, AZ	LGR	1923, 1926-60, 1970, 1972	21200.00	9-19-23 120000
09401100	DIMMICKTON WASH NR ORAIRI, AZ	4	1968-72	261.00	9- 5-70 28900
09401210	SLATE MOUNTAIN WASH NR FLAGSTAFF, AZ	1, HE	1962-75	5.49	4- -73 88
09401220	CLEAR WASH NEAR CAMERON, AZ	1	1967-75	556.00	9-11-69 10400
09401242	RESEARCHER WASH NEAR SHOHITU, AZ	4	1968-75	82.40	10-19-72 1870
09401245	KLETHA VALLEY TRIR NR KAYEUTIA, AZ	4	1962-75	0.77	8- -71 290
09401300	HARLIN WASH TRIR NR CEDAR RIDGE, AZ	4	1963-75	0.10	10-19-72 37
09401370	HARLIN WASH TRIR NO. 2 NR TURA CITY, AZ	4	1963-75	1.09	10-19-72 350

STATION NUMBER	STATION NAME	REGION OR MAIN STEM STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
09401400	MOHAVEPI WASH NEAR TUBA CITY, AZ	4	1941-75	2500.00	10-19-72 12100
09402000	LITTLE COLORADO R NR CAMERON, AZ	LCK	1947-75	26500.00	1-21-52 24900
09402100	FOREST BOUNDARY WASH NEAR CAMERON, AZ	1	1963-75	0.72	9-11-69 1150
09403000	BRIGHT ANGEL CREEK NEAR GRAND CANYON, AZ	1, ME	1924-73	101.00	8-19-36 4400
09403750	SAGEBRUSH DRAW NEAR FREDONTA, AZ	1	1963-75	0.68	UNKNOWN 150
09403780	KANAB CREEK NEAR FREDONIA, AZ	1	1964-75	1085.00	8-18-70 4450
09403800	RITTER SLEEPS WASH TRIB NR FREDONTA, AZ	1	1963-75	2.85	8-23-71 1950
09403930	WEST CATARACT CREEK NR WILLIAMS, AZ	1	1964-75	3.18	12- 6-66 151
09404050	SPLITTING VALLEY WASH TRIB NR WILLIAMS, AZ	1	1963-75	3.93	- -68 190
09404070	LITTLE RED HORSE WASH NR GRAND CANYON, AZ	1	1963-75	21.80	- -67 62
09404100	CATARACT CREEK NEAR GRAND CANYON, AZ	1	1968-75	1200.00	10- -72 1400
09404310	YANPAI CANYON TRIB NR PEACH SPRINGS, AZ	3	1964-75	0.20	7-30-66 177
09404340	TRUXTON WASH AT VALENTINE, AZ	3	1904, 1965-75	370.00	7-30-04 49000
09404350	VALENTINE WASH AT VALENTINE, AZ	3	1963-75	3.15	8-20-67 3800
09415000	VIPERIN RIVER AT LITTLEFIELD, AZ	1	1930-75	5090.00	12- 6-66 35200
09415050	RIC BEND WASH TRIB NR LITTLEFIELD, AZ	1	1963-75	7.27	- -70 250
09419590	DELTA TAL WASH TRIB NR CHLORIDE, AZ	1	1963-75	1.23	8-12-71 470
09421800	RINGBOLT WASH NEAR HOOVER DAM, AZ	1	1964-75	1.21	8-10-75 250
09423760	LITTLE MEADOW CREEK NR DATMAN, AZ	1	1965-75	8.47	8- -70 869
09423780	WALNUT CREEK NEAR KINGMAN, AZ	1	1965-75	31.30	8- -71 715
09423920	SACRAMENTO WASH NEAR YUCCA, AZ	1	1965-75	787.00	8-12-71 13000
09423900	SACRAMENTO WASH TRIB NR TUPACK, AZ	1	1963-75	14.70	- -72 500
09424200	CUTTINGWOOD WASH NO. 1 NR KINGMAN, AZ	3	1964-75	143.00	7-31-64 7000
09424407	MCCABYS WASH NEAR KINGMAN, AZ	3	1968-75	13.50	9-19-72 1000
09424410	RIC SANDY RIVER TRIB NR KINGMAN, AZ	3	1963-75	1.09	8- 2-64 353
09424430	KALISK SPRING CANYON TRIB NR WIKTEUP, AZ	3	1963-75	1.70	8-22-63 1310
09424450	RIC SANDY RIVER NEAR WIKTEUP, AZ	3	1967-75	2800.00	12- 7-66 28000
09424480	ASH CREEK NEAR KIRKLAND, AZ	3	1963-75	6.35	UNKNOWN 4000
09424700	IRON SPRING WASH TRIB NR BAGDAD, AZ	3	1964-75	0.64	9-25-64 150
09424900	SANTA MARIA RIVER NR BAGDAD, AZ	3	1967-75	1210.00	12- 7-66 13500
09425500	SANTA MARIA RIVER NR ALAMO, AZ	3	1939-66	1520.00	8-29-51 33600
09425910	RUI LARD WASH TRIB NO. 2 NR ALAMO, AZ	3	1968-75	1.40	7-17-69 432
09426000	PHIL WILLIAMS RIVER BELOW ALAMO DAM, AZ	3	3/1891, 1916, 1927, 1929-68	4730.00	2-21-91 200000
09427700	MURKYS HEAD WASH NEAR PARKER, AZ	2	1963-75	1.84	8-13-68 320
09428545	CUPNITCHAM WASH TRIB NEAR WENDEN, AZ	2	1964-75	0.77	8- 2-64 173

STATION NUMBER	STATION NAME	REGION OR MAIN STEM STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
09428550	ROUSE WASH TRIB NEAR BOUSE, AZ	2	1963-75	14.60	8-10-71 2920
09428800	TYSON WASH TRIB NR QUARTZSITE, A7	2	1963-75	13.70	8-3-74 980
09429150	CRFUSUTE WASH NEAR EHKENREPG, AZ	2	1965-75	1.08	8-10-71 580
09429400	INDIAN WASH TRIB NR YUMA, AZ	2	1963-75	2.56	9-13-66 90
09429510	MITTNY LAKE TRIB NR YUMA, AZ	2	1965-75	0.30	8-16-73 165
09432000	GILA R BLW BLUF CR NR VIRDEN, N. MEX.	GR	1927-75	3203.00	9-29-41 41700
09442000	GILA RIVER NEAR CLIFTON, A7	GR	1911-17, 1928-46, 1948-75	4010.00	10-21-72 33000
09444100	CAMPBELL BLUF CREEK NR ALPINE, A7 (USFS)	HE	1958-75	11.60	10-20-72 342
09444200	RLIVE RIVER NEAR CLIFTON, AZ	3	1966, 1968-75	506.00	10-20-72 30000
09444400	CHASE CREEK NR CLIFTON, AZ	3	1968-75	1.37	7-25-64 600
09444500	SAN FRANCISCO RIVER AT CLIFTON, AZ	3	1891, 1905-07, 1911-75	2764.00	12-3-06 70000
09445500	WILLOW CR NR POINT OF PINES NR MORENCI, AZ	3	1945-67	102.00	12-30-65 3710
09446000	WILLOW CR NR DOUBLE CIRCLE RANCH NR MORENCI, A7	3	1948-67, 1973	149.00	10-20-72 6500
09446500	EAGLE CR NR DOUBLE CIRCLE RANCH NR MORENCI, AZ	3	1948-67, 1973	377.00	12-30-65 13600
09447000	EAGLE CR ARV PUMPING PLANT NR MORENCI, A7	3	1932, 1944-75	613.00	12-30-65 21000
09448500	GILA R AT HEAD OF SAFFORD VALLEY NR SOLOMON, AZ	GR	1914-75	7896.00	1-19-16 100000
09451800	TOLLGATE WASH TRIB NR CLIFTON, A7	5	1963-75	0.12	10-19-72 63
09451900	AGRIC RSCH SERV WATERSHED W-T NR SAFFORD, AZ	5	1938-67	0.81	9-5-44 434
09456000	SAN SIMON RIVER NR SAN SIMON, AZ	5	1923, 1931-41	814.00	7-21-23 5350
09456400	GOLD GULCH NEAR ROWIE, A7	5	1963-75	15.00	8-18-71 2550
09456680	AGRIC RSCH SERV WATERSHED W-V NR SAFFORD, AZ	5	1939-67	1.13	7-22-55 671
09456820	AGRIC RSCH SERV WATERSHED W-TV NR SAFFORD, A7	5	1939-65, 1967	1.19	8-16-58 508
09457000	SAN SIMON RIVER NR SOLOMON, AZ	5	1931-75	2192.00	8-9-31 27500
09458200	DEADMAN CREEK NEAR SAFFORD, AZ	HE	1967-75	4.78	10-19-72 119
09460150	FRYE CREEK NEAR THATCHER, AZ	HE	1967-74	3.91	10-19-72 51
09462200	AGRIC RSCH SERV WATERSHED W-TI NR SAFFORD, A7	5	1939-67	1.07	9-28-41 997
09466500	GILA RIVER AT CALVA, AZ	GR	1916, 1930-75	11470.00	1-20-16 100000
09467120	SALT CREEK NR PERIDOT, A7	3	1964-75	30.30	10-19-72 3200
09468300	SEVENMILE WASH TRIB NEAR GLOBE, AZ	3	1962-75	0.83	UNKNOWN 526
09468500	SAN CARLOS RIVER NEAR PERIDOT, A7	3	1916, 1930-75	1027.00	3-14-41 40600
09469409	GILA RIVER ABOVE COULIDGE DAM, A7	GR	1906, 1914-75	12900.00	11-28-05 150000
09470000	GILA R AT WINKELMAN, A7 (INFLOW)	GR	1942-75	4/ 382.00	8-9-44 54500
09470500	SAN PEDRO RIVER AT PALOMITAS, AZ	5	1930-73, 1935-40, 1950-75	741.00	8-14-40 22000
09470800	CADDEN CANYON NR FORT HUACHUCA, AZ	5	1960-64	8.38	9-5-60 81
09470900	SAN PEDRO RIVER TRIB NR RISSEE, AZ	5	1963-75	7.12	9-4-65 1460

STATION NUMBER	STATION NAME	REGION OR MAIN STFM STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
09471000	SAN PEDRO RIVER AT CHARLESTON, AZ	5	1916-75	1719.00	9-28-26 98000
09471180	AGRIC PSCH SERV WATERSHED W-III NR TOMRSTONE, AZ	5	1950-67	3.47	7-10-55 2860
09471200	AGRIC PSCH SERV WATERSHED W-I NR TOMRSTONE, AZ	5	1957-67	57.70	8-17-57 20000
09471550	SAN PEDRO RIVER NR TOMRSTONE, AZ	5	1967-75	1740.00	7-20-74 18500
09471600	CANARY WASH NEAR BENSON, AZ	5	1963-75	0.79	- -63 84
09471700	FENNER WASH NEAR BENSON, AZ	5	1963-75	2.71	UNKNOWN 950
09472000	SAN PEDRO RIVER NEAR REDINGTON, AZ	5	1926, 1943-75	2939.00	9-28-26 90000
09472100	PECK CANYON TRIB NR REDINGTON, AZ	5	1968-75	8.02	8-12-72 4340
09472400	MAMMOTH WASH NEAR MAMMOTH, AZ	5	1963-75	2.40	UNKNOWN 3200
09472500	SAN PEDRO R NR MAMMOTH, AZ	5	1926, 1931-40	3610.00	9-28-26 90000
09473000	ARAVAIPA CREEK NEAR MAMMOTH, AZ	5	1919-21, 1931-41, 1966-75	541.00	8- 2-19 20000
09473200	GREEN LANTERN WASH NR WINKELMAN, AZ	5	1968-75	3.63	7-17-67 2650
09473500	SAN PEDRO RIVER AT WINKELMAN, AZ	5	1963-75	4471.00	12-22-65 16800
09473600	TAM O'SHANTER WASH NR HAYDEN, AZ	5	1963-75	4.37	8- 2-74 1570
09474000	GILIA R AT KELVTN, AZ	GR	1891, 1906, 1907, 1912-75	18010.00	11-28-05 5/190000 8- 8-30 6/42800
09478200	DURHAM WASH NEAR FLORENCE, AZ	5	1954-57, 1963-75	15.60	8-20-71 3500
09478500	QUEFEN CR AT WHITLOW DAMSITE NR SUPERIOR, AZ	5	1917-20, 1948-59	144.00	8-19-54 42900
09478600	QUEFEN CREEK TRIB NO. 3 AT WHITLOW DAM, AZ	5	1966-75	0.37	9-13-66 280
09479200	QUEFEN CREEK TRIB AT APACHE JUNCTION, AZ	5	1961-75	0.51	9-30-71 262
09480000	SANTA CRUZ RIVER NEAR LOCHTEL, AZ	5	1940-75	82.20	9-12-65 4910
09480500	SANTA CRUZ RIVER NEAR MORALES, AZ	5	1930-75	533.00	8- 1-74 17100
09481500	SUPUTTA CREEK NEAR PATAGONTIA, AZ	5	1930-72	209.00	9-30-46 14000
09481700	CALABASAS CANYON NEAR MORALES, AZ	5	1963-65, 1967-75	10.30	9- -69 1000
09481750	SOFUPI WASH AT AMADO, AZ	5	1948, 1954-58, 1964-75	176.00	8-15-48 16000
09481800	DEMETRIE WASH TRIB NR CONTINENTAL, AZ	5	1963-75	0.15	9- 7-75 110
09481900	OCOTILLO WASH NEAR CONTINENTAL, AZ	5	1954-57, 1963-68, 1970-74	3.60	7- -64 1840
09482000	SANTA CRUZ RIVER AT CONTINENTAL, AZ	5	1940-47, 1952-75	1462.00	12-20-67 18000
09482400	FLAJO WASH NR SAHUARITA, AZ	5	1965-75	8.25	7- 7-74 1170
09482530	PUMPING WASH NEAR VAIL, AZ	5	1966-75	0.54	7- -71 337
09482370	NORTH FORK AIRPORT WASH NEAR TUCSON, AZ	5	1961-75	5.28	8-22-61 1350
09482400	AIRPORT WASH AT TUCSON, AZ	5	1966-75	15.20	7-20-70 823
09482410	ROPER WASH AT TUCSON, AZ	5	1970-75	5.92	7-20-70 898
09482420	JULIAN WASH AT TUCSON, AZ	5	1970-75	5.92	7-10-70 1270
09482450	WEST BRANCH SANTA CRUZ RIVER AT TUCSON, AZ	5	1966-75	23.60	8-17-71 540
09482480	RIO WASH AT TUCSON, AZ	5	1965-75	2.75	8-17-71 3000

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09482500	SANTA CRUZ RIVER AT TUCSON, AZ	S	1915-75	222.00	8-23-61 16600
09483000	TUCSON ARROYO AT VINE AVE, AT TUCSON, AZ	S	1956-75	8.20	8-22-61 5000
09483025	SILVERCROFT WASH AT TUCSON, AZ	S	1969-75	2.74	7-20-70 1500
09483030	ANKLAM WASH AT TUCSON, AZ	S	1965-75	2.11	8-17-71 2420
09483040	WEST SPEEDWAY WASH NEAR TUCSON, AZ	S	1965-75	0.46	7- -73 238
09483100	TAMQUE VERDE CREEK NEAR TUCSON, AZ	S	1960-75	43.00	12-20-67 3080
09483200	AGUA CALIENTE WASH TRIB NEAR TUCSON, A7	S	1965-75	2.04	8-19-71 430
09483300	SARINO CREEK NEAR MT LEMMON, A7	HE	1951-59	3.19	8- -72 430
09484000	SARINO CREEK NEAR TUCSON, AZ	S	1933-75	35.50	3-23-54 344
09484200	REAR CREEK NEAR TUCSON, AZ	S	1960-74	16.30	9- 6-70 7730
09484500	TAMQUE VERDE CREEK AT TUCSON, AZ	S	1940-45, 1966-75	219.00	12-22-65 12200
09484510	VERTANA CANYON WASH NEAR TUCSON, A7	S	1965-75	6.46	12-22-65 260
09484560	CIENTEGA CREEK NEAR PANTANO, AZ	S	1968-75	289.00	7-19-74 2570
09484570	MESCAL ARROYO NEAR PANTANO, AZ	S	1965-75	38.40	UNKNOWN 27000
09484580	RATREL CANYON NEAR SONOITA, AZ	S	1962-75	14.10	8- -71 1900
09484590	DAVIDSON CANYON WASH NR VAIL, AZ	S	1968-75	50.50	7-20-70 6860
09484600	PANTANO WASH NEAR VAIL, AZ	S	1958-75	457.00	8-11-58 38000
09485000	RINCÓN CREEK NEAR TUCSON, AZ	S	1953-75	44.80	8-19-71 9660
09485100	SACUARO CORNERS WASH NEAR TUCSON, AZ	S	1965-74	0.17	8- -68 49
09485500	PANTANO WASH AT TUCSON, AZ	S	1940, 1958, 1965-75	602.00	8-12-58 20000
09485900	PITA WASH NEAR TUCSON, A7	S	1964-75	4.93	9- -64 195
09485950	REFUJIMO WASH NEAR TUCSON, A7	S	1964-75	2.08	10-19-72 195
09486000	RILITO CREEK NEAR TUCSON, A7	S	1915-75	892.00	8-12-71 705
09486300	CALAPA DFL URU NEAR TUCSON, AZ	S	1966-75	250.00	9-23-29 24000
09486500	SANTA CRUZ RIVER AT CORTARO, A7	S	1940-47, 1950-75	3503.00	12-20-67 13900
09486700	CHILTEPINES WASH NEAR SASARE, AZ	S	1963-75	7.13	8-14-40 17000
09486800	ALTA WASH NEAR THREE POINTS, AZ	S	1966-75	463.00	9-10-64 560
09487000	BRAWLEY WASH NEAR THREE POINTS, AZ	S	1940-75	776.00	9- 4-70 22000
09487100	LITTLE BRAWLEY WASH NR THREE POINTS, A7	S	1962, 1968-75	11.90	9- 4-70 13700
09487140	SAN JUAN WASH NEAR TUCSON, AZ	S	1969-75	0.45	9-26-62 13800
09487250	LOS BORLES WASH NEAR MARANA, A7	S	1962-75	1170.00	7-19-70 487
09487400	QUILTOA WASH TRIB NR OUTJONIA, AZ	2	1963-75	2.44	9-26-62 32000
09488500	SANTA ROSA WASH NR VAIVA VO, A7	2	1955-75	1782.00	7-24-64 715
09488600	SILVER RFEF WASH NEAR CASA GRANDE, A7	2	1963-75	12.80	9-27-62 53100
09489000	SANTA CRUZ RIVER NEAR LAVEN, A7	2	1940-46, 1948-75	8581.00	8- 3-71 1400
					9-20-62 9200

09489070	N. FORK OF E. FORK BLACK RIVER NP ALPINE, AZ	HE	1966-75	38.10	4-17-73	1070
09489080	HANNAGAN CREEK NP HANNAGAN MEADOW, A7	HE	1965-75	1.61	10-19-72	70
09489100	BLACK RIVER NEAR MAVERTICK, A7	HE	1963-75	315.00	10-20-72	11100
09489200	PACHTA CREEK NEAR MAVERTICK, A7	HE	1958-75	14.80	5-13-73	323
09489499	BLACK R ARV WILLOW CR DIV NR POINT OF PINES, A7	HE	1954-75	560.00	10-19-72	17900
09489700	RIO RUNITO CREEK NR FORT APACHE, A7	HE	1958-75	119.00	10-20-72	1870
09490500	BLACK RIVER NEAR FORT APACHE, AZ	3	1958-75	1232.00	10-20-72	28400
09490800	NORTH FORK WHITE RIVER NEAR GREER, A7	HE	1966-75	38.00	4-28-73	510
09491000	NORTH FORK WHITE RIVER NEAR MCNARY, AZ	HE	1946, 1948-75	66.00	9-19-46	1290
09491800	NORTH FORK WHITE RIVER TRIR NR WHITE RIVER, AZ	3	1965-75	2.27	8- -71	110
09492400	FAST FORK WHITE RIVER NR FORT APACHE, AZ	HE	1958-75	38.80	8-17-61	663
09494000	WHITE RIVER NEAR FORT APACHE, AZ	3, HE	1958-75	632.00	7-22-67	11400
09494300	CARRIZO CR ARV CONDUROY CR NR SHOW LOW, AZ	3	1954-66	225.00	12-30-65	10000
09494500	CONDUROY CR ARV FORESTDALE CR, NR SHOW LOW, AZ	3	1953-61	57.00	11- 2-59	2210
09495500	FORESTDALE CR NEAR SHOW LOW, A7	3	1953-60	33.40	11- 2-59	1290
09496000	CONDUROY CREEK NEAR MOUTH, NEAR SHOW LOW, AZ	3	1952-75	203.00	1-18-52	10900
09496500	CARRIZO CREEK NEAR SHOW LOW, A7	3	1952-75	459.00	12-30-65	10900
09496600	CIPECUF 1 TRIB TO CARRIZO CR NR SHOW LOW, AZ	3	1958-70	0.10	12-30-65	23000
09496700	CIPECUF 2 TRIB TO CARRIZO CR NR SHOW LOW, AZ	3	1958-70	0.06	7-27-67	165
09496800	CARRIZO CREEK TRIB NR SHOW LOW, AZ	3	1963-75	2.55	8-20-63	120
09497500	SALT RIVER NEAR CHRYSOTILE, AZ	3	1916, 1925-75	2849.00	7-31-64	1260
09497800	CIPECUF CREEK NEAR CHRYSOTILE, A7	3	1959-75	295.00	1-19-16	74000
09497900	CHEPPY CREEK NEAR YOUNG, A7	3	1963-75	62.10	12-30-65	8800
09497980	CHEPPY CREEK NEAR GLOBF, A7	3	1966-75	200.00	10-19-72	7290
094984500	SALT RIVER NEAR ROUSEVELT, A7	3	1916, 1925-75	4306.00	10-19-72	8300
09498510	UPPER PARKER CR NR GLURE, AZ (USFS)	3	1935-67	1.09	3-14-41	117000
09498600	CHRISTOPHER CREEK TRIR NR KOHL'S RANCH, A7	3	1966-75	0.66	12-23-45	270
09498800	TONTI CREEK NEAR GISFLA, A7	3	1965-75	430.00	9- 5-70	265
09498870	RYE CREEK NEAR GISFLA, A7	3	1963, 1966-75	122.00	9- 5-70	38000
09498900	GOLD CREEK NEAR PAYSON, AZ	3	1963-75	6.44	9- 5-70	44000
09499000	TONTI CREEK ABOVE GUN CR, NR ROUSEVELT, AZ	3	1941-75	675.00	9- 5-70	2800
09501100	THREE BAR O WATERSHED NR ROUSEVELT, AZ (USFS)	3	1957-75	0.12	8- 4-59	53000
09501200	MESQUITE CREEK NP MUMMON FIAT DAM, A7	3	1963-67	4.26	9-13-66	99
09501300	TORTILLA CREEK AT TORTILLA FLAT, A7	3	1966-75	24.30	9- 1-71	4360
09502800	WILLIAMSON VALLEY WASH NR PAULDEN, A7	1	1965-75	255.00	12-30-65	7500
						3430

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09503000	GRANITE CREEK NR PRESCOTT, AZ	1	1933-07, 1963, 1966	39.60	8-19-63 6660
09503700	VERDE RIVER NEAR PAULDEN, AZ	1	1963-75	2160.00	12-30-65 6130
09503720	HELL CANYON NEAR WILLIAMS, AZ	1	1966-75	14.90	11-25-65 1080
09503740	HELL CANYON TRTB NR ASH FORK, AZ	1	1969-75	0.75	- -69 84
09503750	LIMESTONE CANYON NR PAULDEN, AZ	1	1960-75	14.50	8-12-71 4100
09503900	VOLUNTEER WASH NR BELLEFONT, AZ	HE	1966-75	131.00	12-7-66 1430
09504000	VERDE RIVER NR CLARKDALE, AZ	1,3	1916, 1918, 1920, 1966-75	3150.00	2-21-20 50600
09504100	HULL CANYON NR JFROME, AZ	3	1963-75	0.91	UNKNOWN 1500
09504400	MUNDS CANYON TRIR NR SFOONNA, AZ	3	1964-75	1.19	9-5-70 705
09504500	PAK CREEK NEAR CORNVILLE, AZ	3	1941-75	357.00	9-5-70 24700
09504800	PAK CREEK TRTB NR CORNVILLE, AZ	3	1963-75	0.05	8-8-69 53
09505200	WET REAVER CREEK NEAR RIMROCK, AZ	3	1962-75	111.00	9-5-70 7470
09505238	REAVER CREEK NO 5 NR FLAGSTAFF, AZ	3	1958-73	0.10	9-5-70 70
09505245	REAVER CREEK NO 3 NR FLAGSTAFF, AZ (USFS)	3	1958-75	0.60	8-3-64 405
09505250	PEP TANK DRAW NEAR RIMROCK, AZ	3	1958-75	49.40	9-5-70 10500
09505290	S FORK RATTLESNAKE CN NR STONEMAN LK, AZ (USFS)	3, HE	1958-75	2.80	9-5-70 1210
09505300	RATTLESNAKE CANYON NEAR RIMROCK, AZ	3	1958-75	24.60	9-5-70 3590
09505320	RAV N CANYON NR STONEMAN LAKE, AZ (USFS)	3	1962-75	25.70	9-5-70 4100
09505326	REAVER CREEK NO 15 NR FLAGSTAFF, AZ (USFS)	3	1963-75	0.30	9-5-70 84
09505350	DRY REAVER CREEK NEAR RIMROCK, AZ	3	1961-75	142.00	9-5-70 26600
09505600	DIRTY NECK CANYON NR CLINTS WELL, AZ	3	1965-75	3.42	9-5-70 210
09505800	WEST CLEAR CREEK NR CAMP VERDE, AZ	3	1965-75	241.00	10-19-72 210
09505900	CUTTINGWOOD WASH NR CAMP VERDE, AZ	3	1964-75	0.64	10-19-72 11300
09506000	VERDE RIVER NR CAMP VERDE, AZ	3	1934-45	4680.00	- -64 250
09507600	FAST VERDE RIVER NEAR PINE, AZ	3	1962-74	6.65	3-3-38 97000
09507700	WERBER CR AR W FK WERBER CR NR PINE, AZ	3	1959-74	4.92	9-5-70 1220
09507980	FAST VERDE RIVER NR CHILDS, AZ	3	1961-66, 1968-75	328.00	9-5-70 23500
09508300	WET BOTTOM CREEK NR CHILDS, AZ	3	1968-75	34.40	12-19-67 5990
09508500	VERDE RIVER RLW TANGLE CR ABV HORSESHOE DAM, AZ	3	1991, 1906, 1925-75	5499.00	2-24-91 150000
09510070	W FK SYCAMORE CR AR MCFARLAND CN NR SUNFLOWER, AZ	3	1964-74	4.58	9-5-70 1700
09510080	W FK SYCAMORE CR NR SUNFLOWER, AZ	3	1962-74	9.80	9-5-70 3480
09510100	F FK SYCAMORE CR NR SUNFLOWER, AZ	3	1962-75	4.49	9-5-70 1940
09510150	SYCAMORE CR NR SUNFLOWER, AZ	3	1962-75	52.30	9-5-70 16100
09510170	CAMP CREEK NEAR SUNFLOWER, AZ	3	1963-75	2.60	8-16-63 391
09510180	RICK CR NR SUNFLOWER, AZ	3	1963-72	15.20	12-22-65 1900

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09510200	SYCAHUE CREEK NEAR FORT MCDOWELL, A7	3	1961-75	165.00	9- 5-70
09512100	INDIAN BRND WASH NEAR SCOTTSDALE, AZ	3	1961-75	142.00	6-22-72
09512200	SALT R TRIR IN SOUTH MT PARK, AT PHOENIX, AZ	2	1961-75	1.75	9- 4-65
09512300	CAVE CREEK NR CAVE CREEK, AZ	3	1958-75	121.00	12-19-67
09512420	LYNX CREEK TRIR NR PRESCOTT, A7	3	1969-75	0.95	UNKNOWN
09512500	AGUA FRIA RIVER NEAR MAYEK, AZ	3	1940-75	588.00	9- 5-70
09512700	AGUA FRIA RIVER TRIR NO 2 NR ROCK SPRINGS, A7	3	1963-75	1.11	8- 2-64
09512800	AGUA FRIA RIVER NR ROCK SPRINGS, A7	3	1970-75	1130.00	9- 5-70
09513650	AGUA FRIA RIVER AT EL MIRAGE, AZ	3	1963-75	178.00	9- 5-70
09513780	NEW RIVER NR ROCK SPRINGS, A7	3	1962-75	67.30	9- 5-70
09513800	NEW RIVER AT NEW RIVER, AZ	3	1961-75	85.70	9- 5-70
09513820	DEADMAN WASH NFAP NEW RIVER, A7	3	1960-75	11.10	12-25-59
09513835	NEW RIVER AT RELL ROAD, NR PFORIA, A7	3	1963, 1965-75	187.00	12-19-67
09513860	SKUNK CREEK NR PHOENIX, AZ	3	1960-75	64.60	8- 1-64
09513890	NEW RIVER AT PFORIA, A7	3	1960-72	317.00	9- 5-70
09513910	NEW RIVER NEAR GLENDALF, A7	3	1943, 1955, 1960-75	323.00	8- -43
09513970	AGUA FRIA RIVER AT AVUNDALF, A7	3	1960-75	554.00	8- 6-70
09514200	WATERMAN WASH NEAR BUCKEYE, AZ	2	1964-75	403.00	9- 3-67
09514500	HASSAYAMPA RIVER NR WAGONER, A7	3	1940-66	78.70	4-16-41
09515500	HASSAYAMPA R. AT BOX DAMSITE, NR. WICKENBURG, AZ	3	1925, 1927, 1937-38, 1946-75	417.00	9- 5-70
09515600	HARTMAN WASH NEAR WICKENBURG, AZ	3	1964-75	5.57	8-10-67
09516500	HASSAYAMPA RIVER NR MORRISTOWN, AZ	3	1939-47, 1964-75	774.00	9- 5-70
09516600	OX WASH NEAR MORRISTOWN, A7	3	1963-75	6.31	8-26-64
09516800	JACK HARRIT WASH NR TUNOPAH, A7	2	1964-75	137.00	10- 7-72
09517000	HASSAYAMPA RIVER NR ARLINGTON, A7	2,3	1961-75	1470.00	9- 5-70
09517200	CENTENNIAL WASH TRIR NR WENDEN, AZ	2	1963-75	2.79	9- 5-70
09517280	TIGER WASH NFAP AGUILA, AZ	2	1963-75	85.20	8-20-70
09517400	WINTERS WASH NEAR TUNOPAH, A7	2	1962-75	47.80	10- 6-72
09517500	CENTENNIAL WASH NEAR ARLINGTON, AZ	2	1961-75	1810.00	7-23-61
09519600	RATNRUM WASH TRIR NR BUCKEYE, AZ	2	1963-75	2.43	9- 3-67
09519750	RENDER WASH NEAR GILA REND, AZ	2	1963-75	68.80	8- -71
09519760	SALCEDA WASH NFAP GILA REND, A7	2	1963-75	126.00	8- -70
09519780	WINDMILL WASH NR GILA REND, AZ	2	1964-75	12.90	12-19-67
09520100	MILITARY WASH NEAR SENTINEL, A7	2	1963-75	8.70	8- 2-74
09520110	HUT SHOT ARROYO NEAR AJO, A7	2	1966-75	0.44	9-13-66
					9-23-74

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09520130	DARBY ARROYO NEAR AJO, AZ	2	1966-75	4.72	9- 6-67 1670
09520160	GIRSON ARROYO AT AJO, AZ	2	1967-75	2.18	8- 2-70 1800
09520170	PJO CORNEZ NFAP AJO, A7	2	1967-75	243.00	8- 2-74 6000
09520200	BLACK GAP WASH NEAR AJO, A7	2	1962-75	12.10	7-14-67 837
09520230	CRAFTER RANGE WASH NEAR AJO, AZ	2	1963-75	1.49	9- 4-69 590
09520300	ALAMO WASH TRIR NEAR AJO, AZ	2	1963-75	0.90	8-31-72 510
09520350	MOHAWK PASS WASH AT MOHAWK, AZ	2	1963-75	0.09	8- 1-70 117
09520400	LICURTA WASH AT LICURTA, A7	2	1963-75	1.99	9-17-63 1590
09535200	SEILS WASH TRIR AT SELLS, AZ	2	1962-75	26.80	9-13-66 2800
09536100	PITCHFORK CANYON TRIR NR FORT GRANT, A7	5	1963-75	0.81	8-15-65 375
09536350	SURPRISE CANYON NEAR DRS CAREZAS, AZ	5	1963-75	0.65	7-15-69 191
09537200	LESITE CR NR MCNEAL, A7	5	1970-75	79.10	8-12-71 1760
09537400	WHITewater DRAW TRIB NO.2 NR DOUGLAS, AZ	5	1968-75	12.40	7-20-74 580
09537500	WHITewater DRAW NEAR DOUGLAS, AZ	5	1916-20, 1930-75	1023.00	8- 7-55 5060

1/ ABOUT 2,100 SQ MI IS NONCONTRIBUTING EXCEPT DURING YEARS OF HIGH RUNOFF.

2/ RESULT OF DAM FAILURE ON ZION RESERVOIR.

3/ RECORD CORRELATED WITH STATION 09426500.

4/ DRAINAGE AREA BELOW COOLIDGE DAM.

5/ OCCURRED PRIOR TO REGULATION BY COOLIDGE DAM.

6/ MAXIMUM SINCE REGULATION BEGAN IN 1920.

7/ DRAINAGE AREA BELOW WADSWELL DAM.

Table 5.--Peak-discharge measurements at ungaged sites in Arizona

REGION: HE, high-elevation flood-frequency region.

STREAM AND PLACE OF DETERMINATION	REGION	UPSTREAM AREA (SQ MI)	PEAK DISCHARGE DATE	FT ³ /S
SAN JUAN RIVER BASIN				
TSATLE CREEK AT TSATLE LAT. 36 16 45 LONG. 109 10 30	4	49.9	4- -73	535
THREE MILE WASH NEAR KAYENTA LAT. 36 42 55 LONG. 110 18 20	4	8.53	7 OR 8-68	2150
LITTLE COLORADO RIVER BASIN				
CARR LAKE DRAIN TRIBUTARY NO. 2 NEAR HOLBROOK LAT. 34 50 53 LONG. 109 57 32	4	3.14	7-28-64	1150
TOLTEC WASH NEAR WINSLOW LAT. 35 02 13 LONG. 110 44 06	4	--	8-12-64	1130
WALNUT CREEK AT WINONA LAT. 35 12 43 LONG. 111 25 13	4	--	4-28-73	821
RTD OF FLAG TRIBUTARY NO. 3 AT EAST FLAGSTAFF LAT. 35 12 54 LONG. 111 36 00	1	0.51	8- 2-68	180
KLEITHLA VALLEY TRIBUTARY NO. 2 NEAR TSEGI LAT. 36 28 10 LONG. 110 39 10	4	0.75	9- 2-72	1360
CLEAR CREEK BASIN				
WALHALLA GRADES WASH IN GRAND CANYON NATIONAL PARK LAT. 36 07 50 LONG. 111 56 55	HE, 1	4.54	12- 6-66	66
BRIGHT ANGEL CREEK BASIN				
FULLER CANYON NEAR N. RIM RANGER STA. IN GRAND CANYON NAT. PARK LAT. 36 12 30 LONG. 112 03 30	HE	3.49	12- 6-66	147
OUTLET CANYON NEAR N. RIM RANGER STA. IN GRAND CANYON NAT. PARK LAT. 36 15 25 LONG. 112 06 05	HE	9.42	12- 6-66	414

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE	FT ³ /S
SHINUMU CREEK BASIN				
SHINUMU CREEK IN GRAND CANYON NATIONAL PARK LAT. 36 15 00 LONG. 112 19 20	HE, 1	67.4	12- 6-66	1660
JUMBO WASH BASIN				
JUMBO WASH AT WILLOW REACH LAT. 35 51 20 LONG. 114 39 07	1	34.6	9- 8-75	2650
PIMA WASH BASIN				
PIMA WASH AT LAKE HAVASU CITY LAT. 34 28 44 LONG. 114 19 27	1	1.07	7-19-74	895
DAYTONA WASH BASIN				
DAYTONA WASH AT LAKE HAVASU CITY LAT. 34 28 27 LONG. 114 18 48	1	0.86	7-19-74	859
SACRAMENTO WASH BASIN				
TENNESSEE WASH NEAR CHLORIDE LAT. 35 25 02 LONG. 114 11 07	1	4.5	6- -67	1430
SACRAMENTO WASH NEAR TOPOCK LAT. 34 47 48 LONG. 114 29 13	1	1430	9- 6-39	15000
BILL WILLIAMS RIVER BASIN				
BRONCO CREEK NEAR WICKIUP LAT. 34 40 35 LONG. 113 35 45	3	19.0	8-18-71	73500
KIRKLAND CREEK AT YAVA LAT. 34 20 LONG. 112 53	3	335	3-14-41	4500

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MI)	DATE	PEAK DISCHARGE FT ³ /S
BILL WILLIAMS RIVER BASIN (CONTINUED)				
BIG SANDY RIVER BELOW HURRO CREEK AT SIGNAL LAT. 34 26 LONG. 113 38	3	2670	9- 6-39	100000
BILL WILLIAMS RIVER AT CONFLUENCE OF SANTA MARIA & BIG SANDY RIVERS LAT. 34 17 50 LONG. 113 31 10	3	4330	9- 6-39	77000
TYSUN WASH BASIN				
FRENCH CREEK NEAR QUARTZSITE LAT. 33 37 29 LONG. 114 12 59	2	61.5	9-17-63	1130
INDIAN WASH BASIN				
INDIAN WASH NEAR QUARTZSITE LAT. 33 12 55 LONG. 114 15 04	2	1.41	9-17-63	450
GILA RIVER BASIN				
RAILROAD WASH NEAR FRANKLIN LAT. 32 40 52 LONG. 109 04 55	5	190	9- 3-65	13100
CHASE CREEK NEAR METCALF TOWNSITE LAT. 33 06 58 LONG. 109 22 00	3	11.9	8-12-67	2930
EAGLE CREEK NEAR MORENO LAT. 33 07 13 LONG. 109 26 04	3	--	2-10-32	13000
HONITA CREEK NEAR SOLOMON LAT. 32 56 30 LONG. 109 30 20	3	310	10-20-72	10000
SAN SIMON RIVER NEAR ROMIE LAT. 32 23 05 LONG. 109 19 35	5	995	8-10-54	7310
HOLYOKE WASH NEAR RYCE LAT. 32 50 15 LONG. 109 47 57	3	0.85	7-17-74	1740

STREAM AND PLACE OF DETERMINATION

GILA RIVER BASIN
(CONTINUED)

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MT)	PEAK DISCHARGE DATE	FT ³ /S
BIG SPRING WASH NEAR RHYCF LAT. 32 56 36 LONG. 109 48 30	3	1.97	7-17-74	2900
PECK WASH NEAR RHYCF LAT. 32 56 50 LONG. 109 48 10	3	16.2	8-13-40	5500
BILLINGSLEY CREEK NEAR RHYCF LAT. 32 56 40 LONG. 109 51 17	3	3.4	8-13-40	3300
SAN PEDRO RIVER TRIBUTARY NEAR CHARLESTON LAT. 31 30 15 LONG. 110 09 50	5	4.21	8-12-72	3410
BARCUMART RIVER TRIBUTARY NEAR SONOITA LAT. 31 41 57 LONG. 110 25 36	5	7.68	7 OR 8-55	3110
DRAGON WASH AT ST. DAVID LAT. 31 50 33 LONG. 110 11 50	5	33.2	7-22-75	54000
SAN PEDRO RIVER TRIBUTARY NEAR BENSON LAT. 31 56 03 LONG. 110 17 07	5	6.57	7 OR 8-55	149
SAN PEDRO RIVER TRIBUTARY NO. 3 AT BENSON LAT. 31 57 23 LONG. 110 17 09	5	0.32	7-24-63	600
SAN PEDRO RIVER TRIBUTARY NEAR PIMERENE LAT. 32 11 05 LONG. 110 17 23	5	3.8	9-26-48	6700
QUEEN CREEK TRIBUTARY NO. 2 NEAR APACHE JUNCTION LAT. 33 26 LONG. 111 38	2	--	8-22-63	484
UNNAMED WASH NEAR GUADALUPE LAT. 33 21 32 LONG. 111 58 09	2	0.14	9-14-69	228
SUFFERING (BUJYAN) WASH NEAR ORACLE JUNCTION LAT. 32 42 37 LONG. 111 05 50	5	14.6	7- -54	3000
OLSEN WASH NEAR ORACLE JUNCTION LAT. 32 41 36 LONG. 111 05 07	5	6.64	8-10-71	3960

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MT)	PEAK DISCHARGE DATE FT ³ /S
GILA RIVER BASIN (CONTINUED)			
TWENTY-SEVEN WASH TRIBUTARY NO.1 NEAR CATALINA LAT. 32 30 10 LONG. 110 54 00	5	0.64	7-19/20-74 461
TWENTY-SEVEN WASH TRIBUTARY NO.2 NEAR CATALINA LAT. 32 20 15 LONG. 110 55 22	5	0.01	7-18-74 25
TWENTY-SEVEN WASH NEAR CATALINA LAT. 32 20 02 LONG. 110 55 30	5	4.19	7-19/20-74 1320
SANTA CRUZ RIVER NEAR NOGALES LAT. 31 20 04 LONG. 110 50 23	5	1004	12-20-67 17500
PECK CANYON NEAR NOGALES LAT. 31 30 00 LONG. 111 00 45	5	47.8	12-20-67 7000
SANTA CRUZ RIVER AT TUMACACORI NAT. MONUMENT LAT. 31 32 50 LONG. 111 02 45	5	1178	12-20-67 28500
NIGGER CANYON NEAR TUMACACORI LAT. 31 32 35 LONG. 111 02 31	5	3.22	8-12-69 2240
SANTA CRUZ RIVER TRIBUTARY NO.1 NEAR AMADO LAT. 31 45 LONG. 111 02	5	5.65	7 OR 8-55 2940
SANTA CRUZ RIVER TRIBUTARY NO.2 NEAR AMADO LAT. 31 45 50 LONG. 110 59 58	5	10.3	9-26-48 2000
SANTA CRUZ RIVER TRIBUTARY NO.3 NEAR AMADO LAT. 31 46 00 LONG. 111 01 40	5	--	7- -54 1800
LFE MOORE WASH NEAR SANHUAPITA LAT. 32 01 30 LONG. 110 57 07	5	142	7- 7-74 9150
DEMETER WASH TRIBUTARY NO. 2 NEAR CONTINENTAL LAT. 31 52 08 LONG. 111 05 40	5	0.67	8- 5-63 802
SANTA CRUZ RIVER TRIBUTARY NO. 4 NEAR AMADO LAT. 31 51 35 LONG. 110 50 31	5	1.2	7 OR 8-55 113

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE	
			DATE	FT ³ /S
GILA RIVER BASIN (CONTINUED)				
CHICKEN WASH NEAR SAHAPITA LAT. 31 50 74 LONG. 110 58 11	5	0.24	8-18-66	68
PANTANO WASH TRIBUTARY AT TUCSON LAT. 32 11 05 LONG. 110 47 05	5	0.70	7-16-75	886
ATTEBURY WASH TRIBUTARY AT TUCSON LAT. 32 00 07 LONG. 110 49 30	5	0.17	7-16-75	164
ATTEBURY WASH AT TUCSON LAT. 32 11 04 LONG. 110 48 55	5	18.2	7-16-75	3080
CHOLLA WASH AT TUCSON LAT. 32 12 12 LONG. 111 00 40	5	0.66	8-17-71	726
ST. MARYS WASH AT TUCSON LAT. 32 13 35 LONG. 110 00 15	5	2.44	8- -69	365
GREASEWOOD WASH AT TUCSON LAT. 32 10 09 LONG. 111 01 42	5	0.53	8- -69	432
GREASEWOOD WASH TRIBUTARY NO. 1 AT TUCSON LAT. 32 10 09 LONG. 111 01 56	5	0.04	8- -69	63
GREASEWOOD WASH TRIBUTARY NO. 2 AT TUCSON LAT. 32 10 09 LONG. 111 01 32	5	0.11	8- -69	127
SANTA CRUZ RIVER TRIBUTARY NO. 1 NR. TUCSON LAT. 32 13 47 LONG. 111 03 44	5	2.69	7-20-70	1910
SANTA CRUZ RIVER TRIBUTARY NO. 1 NR. SILVER BELL RD NR TUCSON LAT. 32 10 50 LONG. 111 03 00	5	5.31	9-26-62	2740
SANTA CRUZ RIVER TRIBUTARY NO. 2 NEAR TUCSON LAT. 32 10 35 LONG. 111 05 10	5	1.26	9-26-62	940
SANTA CRUZ RIVER TRIBUTARY NO. 3 NEAR TUCSON LAT. 32 16 30 LONG. 111 04 00	5	3.98	9-26-62	3980

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MT)	PEAK DISCHARGE	
			DATE	FT ³ /S
GILA RIVER BASIN (CONTINUED)				
ARCAUTA WASH AT TUCSON LAT. 32 15 LONG. 110 53	5	3.49	7-19-66	658
RILLITO CREEK TRIBUTARY NO. 1 NEAR TUCSON LAT. 32 16 13 LONG. 110 58 31	5	0.07	9- 6-64	154
RILLITO CREEK TRIBUTARY NO. 2 NEAR TUCSON LAT. 32 16 20 LONG. 110 58 29	5	1.68	9- 6-64	2670
SANTA CRUZ RIVER TRIBUTARY NO. 4 NEAR CORTARO LAT. 32 18 30 LONG. 111 04 55	5	2.77	9-26-62	1400
COTTONWOOD WASH NEAR MAPANA LAT. 32 31 10 LONG. 111 08 00	5	8.06	9-13-62	5700
BAILEY WASH NEAR SASARE LAT. 31 36 10 LONG. 111 31 23	5	30.4	9- 5-70	12900
BRAWLEY WASH TRIBUTARY NO. 2 NEAR TUCSON LAT. 32 16 50 LONG. 111 10 56	5	0.008	9-26-62	69
BRAWLEY WASH NEAR TUCSON LAT. 32 16 45 LONG. 111 16 09	5	1077	9-26-62	30800
LOS ROBLES WASH NEAR MAPANA LAT. 32 28 00 LONG. 111 20 12	5	1350	9-26-62	32600
GREENE CANAL NEAR ELIY LAT. 32 35 17 LONG. 111 32 04	5	--	9-26/27-62	29100
GREENE WASH AT CHUICHU LAT. 32 40 08 LONG. 111 46 38	2.5	--	9-27-62	17200
SANTA CRUZ RIVER NEAR STANFIELD LAT. 32 52 LONG. 111 50	2	--	9-27/28-62	3080
GREENE WASH NEAR STANFIELD LAT. 32 52 46 LONG. 111 55 08	2.5	--	9-27/28-62	4300

STREAM AND PLACE OF DETERMINATION		REGION	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE	FT ³ /S
SILVER RIVER BASIN (CONTINUED)					
SANTA ROSA WASH NEAR STAMFIELD LAT. 32 52 46 LONG. 111 56 45		2	--	9-27-62	8430
EAST FORK BLACK RIVER NEAR ALPINE LAT. 33 45 35 LONG. 109 21 24		3	111	10-20-72	3780
WEST FORK BLACK RIVER NEAR ALPINE LAT. 33 45 36 LONG. 109 22 33		3	54.1	10-20-72	2050
AMOS WASH NEAR CEDAR CREEK LAT. 33 48 15 LONG. 110 07 35		3	21.1	8-12-71	8320
COPPER HILL WASH NEAR GLORE LAT. 33 24 LONG. 110 47		3	1.6	8-17-04	3200
PINAL CREEK BELOW COPPER HILL WASH AT GLORE LAT. 33 24 LONG. 110 48		3	33.4	8-17-04	13200
BLOODY TANKS WASH AT MIAMI LAT. 33 24 06 LONG. 110 51 47		3	18.2	7-20-54	2720
TONTON CREEK AT KUHLE'S RANCH LAT. 34 16 15 LONG. 111 05 30		3	24.0	9- 5-70	18400
CHRISTOPHER CREEK NEAR KUHLE'S RANCH LAT. 34 18 35 LONG. 111 02 45		3	24.4	9- 5-70	11900
HOUSTON CREEK NEAR GISELA LAT. 34 07 32 LONG. 111 15 26		3	56.2	12-22-65	4530
RYE CREEK NEAR PAYSON LAT. 34 06 08 LONG. 111 21 19		3	66.4	8-22-63	14300
BOONE MOORE WASH NEAR PAYSON LAT. 34 06 00 LONG. 111 21 19		3	3.10	8-22-63	1200
CLOVER WASH TRIBUTARY NEAR PAYSON LAT. 34 06 08 LONG. 111 21 30		3	0.89	8-22-63	355

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE FT ³ /S
GILA RIVER BASIN (CONTINUED)			
SLATE CREEK NEAR SUNFLOWER LAT. 33 57 20 LONG. 111 24 30	3	8.8	9- 5-70 4480
DAVIS WASH TRIBUTARY NEAR ROOSEVELT LAT. 33 56 58 LONG. 111 13 11	3	0.09	8-18-67 55
CRATIER WASH TRIBUTARY NEAR ROOSEVELT LAT. 33 3' 48 LONG. 111 14 18	3	0.26	8-18-67 221
LEWIS AND CLARK CREEK NEAR FORTILLA FLAT LAT. 33 32 20 LONG. 111 16 15	3	13.4	8-18-67 3310
MANZANITA CREEK AT PRESCOTT LAT. 34 31 54 LONG. 112 28 43	1	2.20	8-18-63 1280
ASPIN CREEK AT PRESCOTT LAT. 34 31 54 LONG. 112 28 40	1	4.99	8-18-63 1160
GRANITE CREEK AT PRESCOTT LAT. 34 32 24 LONG. 112 28 15	1	17.2	8-18-63 2750
MILLER CREEK NEAR PRESCOTT LAT. 34 37 06 LONG. 112 31 15	1	2.64	8-18-63 1310
MILLER CREEK AT PRESCOTT LAT. 34 37 15 LONG. 112 29 05	1	4.75	8-18-63 1580
MILLER CREEK ABOVE BUTTE CREEK AT PRESCOTT LAT. 34 32 52 LONG. 112 28 28	1	6.60	8-18-63 2960
WHITE CREEK AT PRESCOTT LAT. 34 32 33 LONG. 112 29 14	1	3.65	8-18-63 1830
SOLDIER WASH AT SEDONA LAT. 34 52 00 LONG. 111 46 03	3	--	7-14-75 2070
ROCKY GULCH NEAR PIMROCK LAT. 34 49 50 LONG. 111 29 39	3	1.42	9- 5-70 1550

STREAM AND PLACE OF DETERMINATION

REGION	DRAINAGE AREA (SQ MT)	PEAK DISCHARGE DATE	FT ³ /S
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GILA RIVER BASIN
(CONTINUED)

ROCKY GULCH TRIBUTARY NEAR RIMROCK
LAT. 34 46 55 LONG. 111 31 19

9- 5-70 980

FOSTER CANYON NEAR RIMROCK
LAT. 34 46 57 LONG. 111 30 58

8- 5-70 2260

WOODS CANYON NEAR SEDONA
LAT. 34 51 14 LONG. 111 33 06

9- 5-70 3900

SALT RIVER AT ARIZONA DAM
LAT. 33 31 LONG. 111 41

2-24-1891 300000

SHEA WASH TRIBUTARY NO. 1 NEAR SCOTTSDALE
LAT. 33 36 56 LONG. 111 48 34

6-22-72 86

SHEA WASH TRIBUTARY NO. 2 NEAR SCOTTSDALE
LAT. 33 36 56 LONG. 111 48 55

6-22-72 103

SHEA WASH TRIBUTARY NO. 3 NEAR SCOTTSDALE
LAT. 33 36 56 LONG. 111 49 00

6-22-72 80

INDIAN BEND WASH TRIBUTARY NO. 1 AT PARADISE VALLEY
LAT. 33 32 37 LONG. 111 58 33

6-22-72 88

INDIAN BEND WASH TRIBUTARY NO. 2 AT PARADISE VALLEY
LAT. 33 33 00 LONG. 111 58 31

6-22-72 144

INDIAN BEND WASH AT PARADISE VALLEY
LAT. 33 32 39 LONG. 111 56 07

6-22-72 13800

CUJATA CITY WASH AT PARADISE VALLEY
LAT. 33 31 32 LONG. 111 58 43

6-22-72 3000

CUJATA CITY WASH TRIBUTARY AT PARADISE VALLEY
LAT. 33 31 32 LONG. 111 59 42

6-22-72 244

DEEAMY DRAW AT PHOENIX
LAT. 33 31 12 LONG. 112 02 48

6-22-72 860

STREAM AND PLACE OF DETERMINATION	REGION	DRAINAGE AREA (SQ MI)	DATE	PEAK DISCHARGE FT ³ /S
GILA RIVER BASIN (CONTINUED)				
SWEETWATER WASH AT PHOENIX LAT. 33 36 14 LONG. 112 05 58	3	5.90	8- 5-74	2600
AGUA FRIA RIVER AT WADDFLL DAM LAT. 33 51 20 LONG. 112 15 58	3	1459	1-18-16	105000
ASH CREEK NEAR CORDES JUNCTION LAT. 34 26 05 LONG. 112 04 25	3	118	9- 5-70	9000
GILA RIVER TRIBUTARY NO. 1 NEAR BUCKEYE LAT. 33 18 29 LONG. 112 37 30	2	0.41	9-13-66	650
GILA RIVER TRIBUTARY NO. 2 NEAR BUCKEYE LAT. 33 17 32 LONG. 112 37 38	2	0.11	9-13-66	160
POWDER HOUSE WASH AT WICKFENBURG LAT. 33 58 17 LONG. 112 43 02	3	1.83	7-12-64	1980
SOLS WASH AT WICKFENBURG LAT. 33 58 20 LONG. 112 44 00	3	139	8-17-71	11300
CENTENNIAL WASH TRIBUTARY NO. 3 NEAR WENDEN LAT. 33 50 15 LONG. 113 29 11	2	4.95	8- -63	328
CENTENNIAL WASH NEAR SALOME LAT. 33 48 58 LONG. 113 34 52	2	637	8-14-63	4480
DELANFY WASH NEAR WINTERSBURG LAT. 33 26 31 LONG. 112 54 52	2	57.5	9- 5-62	480
RAINBOW WASH NEAR GILA REND LAT. 33 11 11 LONG. 112 42 11	2	45.0	9- 2/ 3-67	11900
SAND TANK WASH AT GILA REND LAT. 32 50 52 LONG. 112 42 18	2	265	8-14-64	5910

STREAM AND PLACE OF DETERMINATION

UPATNAGE
AREA
(SQ MT)

REGION

PEAK DISCHARGE
DATE FT³/S

TRIBUTARIES TO ALL-AMERICAN CANAL

WASH AT ALL-AMERICAN CANAL, NEAR YUMA
LAT. 32 40 30 LONG. 114 35 30

9- 5-39 5000

PICACHU WASH AT ALL-AMERICAN CANAL, NEAR YUMA
LAT. 32 47 45 LONG. 114 36 45

9- 5-39 37000

SAN SIMON WASH BASIN

SAN JUAN WASH NEAR SELLS
LAT. 31 56 15 LONG. 111 46 15

9-26-62 1600

ALI MOLINA WASH NEAR SELLS
LAT. 31 57 40 LONG. 111 02 35

9-26-62 430

SELLS WASH AT SELLS
LAT. 31 51 50 LONG. 111 53 55

9-26-62 17200

FORTUNA WASH NEAR YUMA
LAT. 32 40 02 LONG. 114 23 56

9-17-63 6430