TECHNICAL SERVICE CENTER
DENVER, COLORADO

UPPER GILA RIVER FLUVIAL GEOMORPHOLOGY STUDY

FLOOD FREQUENCY, FLOW DURATION AND TRENDS NEW MEXICO

PREPARED BY

FLUVIAL HYDRAULICS & GEOMORPHOLOGY TEAM
JOHN F. ENGLAND, JR., M.S., P.H., P.E.

US Department of the Interior
U.S. Bureau of Reclamation

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STATE OF NEW MEXICO
NEW MEXICO ENVIRONMENT DEPARTMENT
SURFACE WATER QUALITY BUREAU

RECLAMATION CONTRACT 00-GI 32-0060
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The State of New Mexico and Reclamation are Cost Share Partners in the Upper Gila River Fluvial Geomorphology Study. The views or findings of Reclamation presented in this deliverable do not necessarily represent those of the State of New Mexico.

UPPER GILA RIVER FLUVIAL GEOMORPHOLOGY STUDY

FLOOD FREQUENCY, FLOW DURATION AND TRENDS: NEW MEXICO

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THE FLUVIAL HYDRAULICS & GEOMORPHOLOGY TEAM

John F. England, Jr., M.S., P.H., P.E.
Hydraulic Engineer
Flood Hydrology Group, D-8530

PEER REVIEWED BY

Robert E. Swain, M.S., P.E.
Technical Specialist - Flood Hydrology
Flood Hydrology Group, D-8530

FLUVIAL HYDRAULICS & GEOMORPHOLOGY TEAM

The Fluvial Hydraulics & Geomorphology Team from the Technical Service Center is leading the Upper Gila Fluvial Geomorphology Study. The team consists of geomorphologists, engineers, and hydrologists. The members have expertise in water resources management, fluvial geomorphology, paleohydrology, hydraulics, sedimentation, photogrammetry, mapping, flood hydrology, surface water hydrology, and riparian vegetation management.

The team members are:

- Dr. Rodney J. Wittler, Hydraulic Engineer. (Hydraulics, Water Resources Management)
- Dr. Daniel R. Levish, Geologist. (Paleohydrology, Fluvial Geomorphology)
- Ms. Jeanne E. Klawon, Geologist. (Fluvial Geomorphology, Geology)
- Dr. Ralph E. Klinger, Geologist. (Paleohydrology, Fluvial Geomorphology)
- Dr. Blair P. Greimann, Hydraulic Engineer. (Hydraulics, Sediment Transport)
- Mr. John F. England, Jr., Hydraulic Engineer. (Flood Hydrology, Surface Water Hydrology)

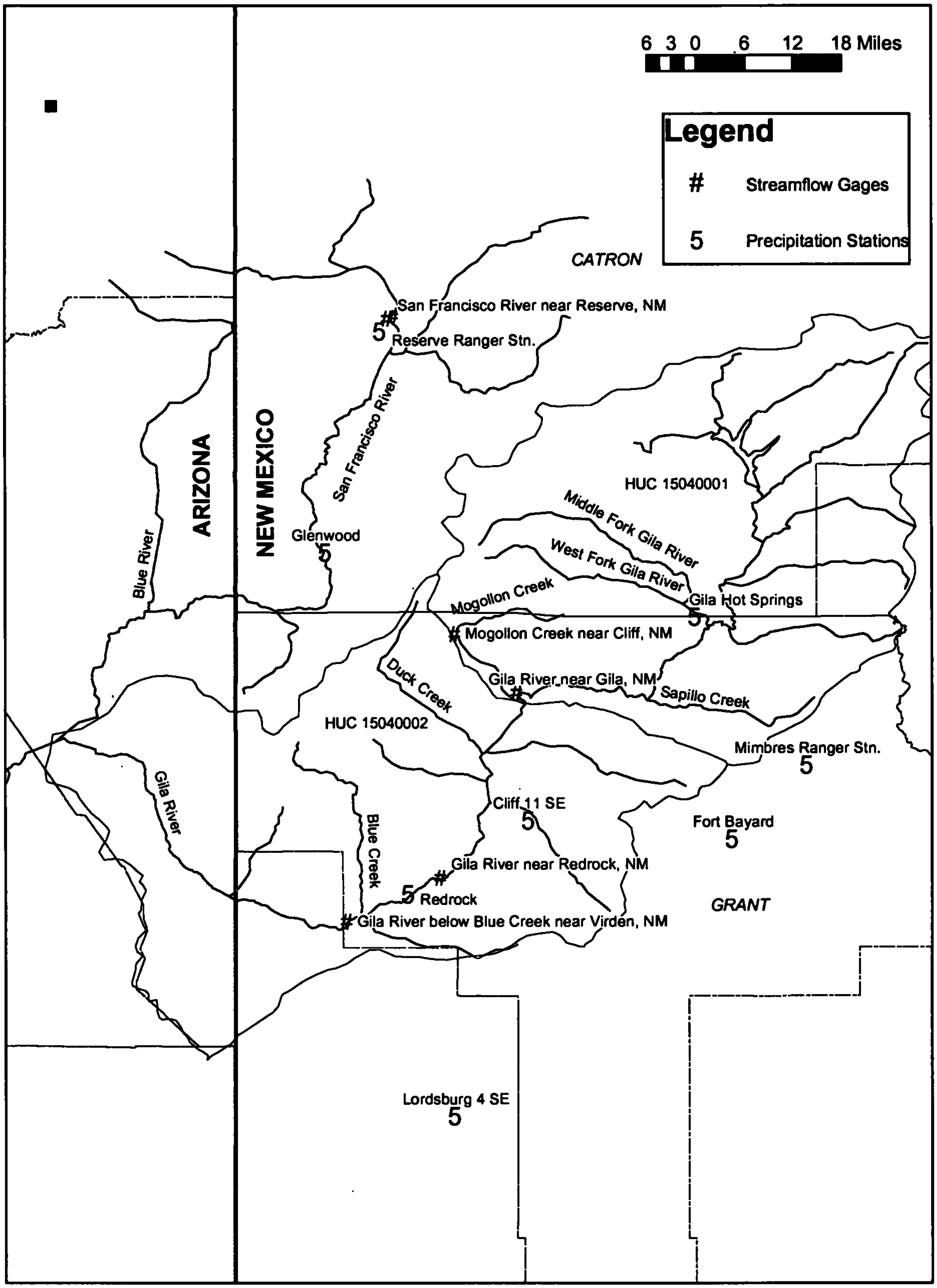

Figure 1. Location of precipitation gages, streamflow gaging stations, and tributaries within the Upper Gila River basin, New Mexico.

PRECIPITATION AND STREAMFLOW DATA DISCUSSION

The hydrology of the upper Gila River basin is investigated by reviewing, summarizing and interpreting available precipitation and streamflow data. Precipitation and streamflow data and sources used in subsequent analysis are presented. Historical flood data that are used in peak discharge frequency analysis are summarized. The largest floods and their hydroclimatology are also discussed.

PRECIPITATION DATA AND CLIMATE

The precipitation source for western New Mexico, including the Upper Gila River basin, is from prevailing westerly Pacific moisture, subtropical Pacific moisture, and some Gulf and subtropical Atlantic moisture (Kunkel, 1991). Five types of airmasses have been identified that influence the climate of the Gila River basin (Burkham, 1970): (1) cool, moist polar Pacific air from the northern Pacific Ocean; (2) warm, moist tropical Pacific air from the southern Pacific Ocean; (3) warm, moist tropical Gulf air from the Gulf of Mexico; (4) cold dry polar continental air from Canada; and (5) hot, dry tropical continental air from Mexico. Overall, precipitation in New Mexico is meager statewide. Annual precipitation ranges from 7 inches in the northwest to about 20 inches in some mountains. The annual average precipitation across the state is about 14 inches (Kunkel, 1991). Local topography and mountains significantly influence the regional weather and climate. Major storms that result in heavy precipitation and large-magnitude flooding in the Gila River basin usually occur in the fall and winter (late September through March). These storms are generally cold frontal systems colliding with warm, moist air or tropical storms (Hirschboeck, 1985). Extreme flood-producing storms are usually widespread and generally cover the majority of the upper Gila River basin in New Mexico (e.g., Aldridge and Hales, 1984). Summer, local convective thunderstorms are also common and can result in large flood peaks and localized flooding (e.g., Leopold, 1942).

Precipitation records used in this study were obtained from the National Climatic Data Center (NCDC) Climate Database records. These records were obtained on compact discs from Hydrosphere Corporation, and from the Western Regional Climate Center at the Desert Research Institute (http://www.wrcc.dri.edu/CLIMATEDATA.html). Gages that are within the National Weather Service Cooperative Network were analyzed. The data are located in two NWS climatic divisions: NM-04, Southwestern Mountains; and NM-08, Southern Desert. These divisions are based on the physiography of New Mexico. Data from eight stations were analyzed as part of this study (Table 1). The stations were selected based on two criteria: length of record and geographic location (Figure 1). Precipitation stations were selected that had at least a 40-year period of monthly precipitation totals available. The stations also had to be within the upper Gila River basin, or relatively close to the basin. The years analyzed for each station were selected based on the amount of missing daily and monthly data at that location. The NWS typical data selection standard to estimate monthly and annual precipitation statistics is to discount the month and year if more than five days are missing. In order to significantly extend the number of years of data available for trend analysis, a relatively liberal criterion was used to select the data. In general, if more than two or more months were missing, that year and season was excluded from the analysis. Because most of the stations are missing substantial amounts of data in the early part of their records (pre-1955), the number of years analyzed is significantly different than the period of record reported for each station (Table 1).

Table 1. NWS cooperative network precipitation gaging stations analyzed in this study.

State	COOP No.	Division No.	Station Name	Lat	Long	Elev. (ft, NGVD)	Period of Record	Years Analyzed (length)
29	3265	NM-04	Fort Bayard	32°48'00"	108°09'00"	6,160	1897-present	1923-2000 (78)
29	3530	NM-04	Gila Hot Springs	33°12'00"	108°13'00"	5,600	1915-present	1958-2000 (43)
29	7386	NM-04	Reserve Ranger Stn.	33°43'00"	108°47'00"	5,830	1906-present	1917-2000 (84)
29	1910	NM-08	Cliff 11 SE	32°52'00"	108°31'00"	4,780	1937-present	1945-2000 (56)
29	7340	NM-08	Redrock	32°42'00"	108°44'00"	4,150	1914-present	1949-2000 (52)
29	5079	NM-08	Lordsburg 4 SE	32°18'00"	108°39'00"	4,250	1914-present	1924-2000 (77)
29	5754	NM-04	Mimbres Ranger Stn.	32°56'00"	108°01'00"	6,240	1914-present	1939-2000 (60)
29	3577	NM-08	Glenwood	33°19'00"	108°53'00"	4,750	1939-2000	1949-1999 (51)

Annual precipitation in the region is subdivided into three seasons (Burkham, 1970): winter (November through April), spring (May through June) and summer (July through October). Annual and seasonal statistics for the stations are listed in Table 2. Annual and winter precipitation is generally greater at higher elevation sites, such as Fort Bayard, Reserve Ranger Station and Gila Hot Springs. On a seasonal basis, the majority of precipitation occurs in the July-October summer period (Table 2). The annual and seasonal precipitation at two sites, Fort Bayard and Gila Hot Springs, are shown in Figures 2 and 3. A 5-year moving average is used to smooth the data. Burkham (1970) used a 10-year smooth and suggested that the winter precipitation generally trended downward at Fort Bayard (and other sites) from 1920-1962. This trend has reversed (Figure 2). The Gila Hot Springs seasonality and magnitude are similar to that at Fort Bayard. While it appears that the Fort Bayard time series is more variable than the Gila Hot Springs, this is an artifact of different time scales used in the figures. The data for these two stations indicate that there has been a general increase in annual precipitation from about 1955 to 1985, and a decrease from 1985 to 2000. Tests for annual and seasonal precipitation trends and results are presented in subsequent sections of the report.

Table 2. Annual and seasonal precipitation statistics for the eight NWS Cooperative stations.

Station Name	Division No.	Elev. (ft, NGVD)	Mean (inches)				Standard Deviation (inches)				Coefficient of Variation			
			Annual	Winter	Spring	Summer	Annual	Winter	Spring	Summer	Annual	Winter	Spring	Summer
Fort Bayard	NM-04	6,160	15.59	4.35	1.30	9.94	3.95	2.18	1.06	3.19	0.25	0.50	0.81	0.32
Gila Hot Springs	NM-04	5,600	16.08	5.49	1.19	9.40	3.47	2.50	0.98	2.74	0.22	0.46	0.82	0.29
Reserve Ranger Stn.	NM-04	5,830	14.94	5.74	1.12	8.08	3.92	2.62	0.94	2.54	0.26	0.46	0.84	0.31
Cliff 11 SE	NM-08	4,780	14.28	4.97	0.97	8.46	4.06	2.54	0.95	2.83	0.28	0.51	0.97	0.33
Redrock	NM-08	4,150	12.66	4.34	0.77	7.55	3.71	2.23	0.82	2.92	0.29	0.51	1.07	0.39
Lordsburg 4 SE	NM-08	4,250	10.74	3.94	1.14	6.09	3.42	2.13	1.20	2.41	0.32	0.54	1.06	0.40
Mimbres Ranger Stn.	NM-04	6,240	16.71	4.98	1.65	10.39	4.43	2.56	1.45	3.42	0.26	0.51	0.88	0.33
Glenwood	NM-08	4,750	15.19	5.96	1.21	8.03	4.83	3.11	1.23	3.09	0.32	0.52	1.02	0.38

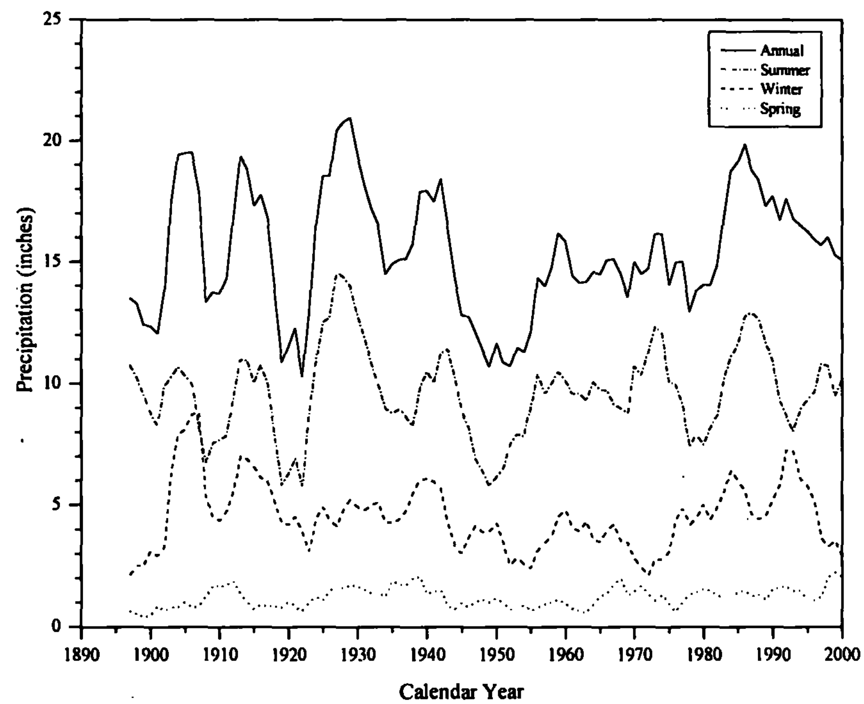

Figure 2. Annual and seasonal precipitation at Fort Bayard. Data are smoothed using a 5-year moving average.

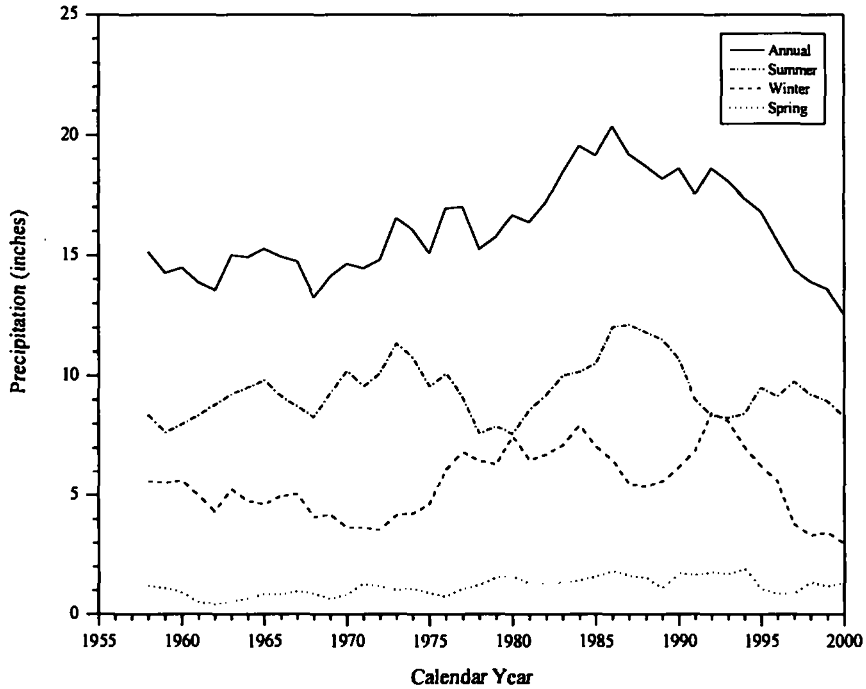

Figure 3. Annual and seasonal precipitation at Gila Hot Springs. Data are smoothed using a 5-year moving average. A shorter time scale is used than for the longer Fort Bayard gage shown in Figure 2.

STREAMFLOW DATA AND SEASONALITY

Three data sources from the U.S. Geological Survey were used to characterize streamflow in the Gila River basin:

- Annual peak discharge estimates at gaging stations;
- Daily mean discharge estimates at gaging stations; and
- Qualitative information from USGS Water-Supply Papers and other reports.

The USGS has published streamflow records from many gaging stations located in the Gila River basin upstream from the Arizona-New Mexico State line (e.g., Pope et al., 1998; Ortiz et al., 2001). Gaging stations have been established in New Mexico since 1888 (Frazier and Heckler, 1972). However, there are little to no systematic gaging records in the Upper Gila River basin in New Mexico prior to about 1905 (Reiland and Haynes, 1963). Including ditches, there are approximately 15 active gaging stations in the Upper Gila River basin in New Mexico (Ortiz et al., 2001). This study focuses on using data from five relatively long-term gaging stations located on the Gila and San Francisco Rivers, and Mogollon Creek (Table 3); the locations of these gaging stations are shown in Figure 1. Streamflow data from these gaging stations were used for peak discharge frequency and flow duration analyses. The station names, location, elevation and period of record at each site are summarized in Table 3.

Table 3. U.S. Geological Survey streamflow gaging stations analyzed in this study.

USGS Gaging Station No.	Station Name	Drainage Area	Lat.	Long.	Gage Elevation (feet, NGVD)	Hydrologic Unit Code	Period of Record (Water Years)
09430500	Gila River near Gila, NM	1,864 mi²	33°03'40"	108°32'12"	4,654.8	15040001	1928-2000
09430600	Mogollon Creek near Cliff, NM	69 mi²	33°10'00"	108°38'57"	5,440	15040001	1968-2000
09431500	Gila River near Redrock, NM	2,829 mi²	32°43'37"	108°40'30"	4,090	15040002	1905, 1911, 1929-1955, 1963-2000
09432000	Gila River below Blue Creek near Virden, NM	3,203 mi²	32°38'53"	108°50'43"	3,875	15040002	1927-1997, 1999-2000
09442680	San Francisco River near Reserve, NM	350 mi²	33°44'12"	108°46'14"	5,820	15040004	1959-2000

Streamflow data were obtained directly from the USGS National Water Information System (NWIS) Database. These data were cross-checked with those published in USGS Water-Data Reports and Water-Supply Papers, including: USGS (1954), Reiland and Haynes (1963), Patterson and Somers (1966), Aldridge and Hales (1984), Pope et al. (1998) and Ortiz et al. (2001). These sources indicate that there are major gaps in stream gaging in the Gila River basin through about 1927. Records are particularly fragmentary in the basin prior to about 1910. Historical information (discussed below) is used to supplement peak discharge estimates and extend record lengths for peak flow frequency estimation.

The Gila River basin in New Mexico is divided into three hydrologic units within the study area (Table 3, Figure 1). Three major factors can affect streamflow in the Upper Gila River basin: climate, especially precipitation and effects of mountain ranges on precipitation magnitude and distribution; surficial geology and soils; and basin location. Mogollon Creek and the three gages on the Gila River are located within the Southwest desert physiographic region; the San Francisco near Reserve gage is within the Southwest mountain physiographic region (Waltemeyer, 1996). The factor that is statistically significant in estimating floods in the Southwest desert region is drainage area; mean basin elevation and drainage area are significant factors in the Southwest mountain region (Waltemeyer, 1996). Mean daily streamflow can indicate flow and flood seasonality and highlight rainfall-dominated floods from snowmelt floods. For example, fall and winter storms repeatedly cause floods in the Gila River basin, shown by the highest maximum daily flows in Figure 4. Overall, mean daily streamflow on the Gila River and its tributaries is bimodal (Figures 4 and 5). On relatively smaller watersheds such as Mogollon Creek, flows are ephemeral in the summer season. On the much larger Gila River, notice that the streamflow behavior at the gage near Virden (Figure 6) is very similar to that near Gila (Figure 4). Winter floods produce larger peaks and maximum mean daily flows, but median flows are higher during late spring snowmelt runoff. The variability in the maximum discharge increases in the late summer as a result of summer thunderstorms and fall storms within the watershed.

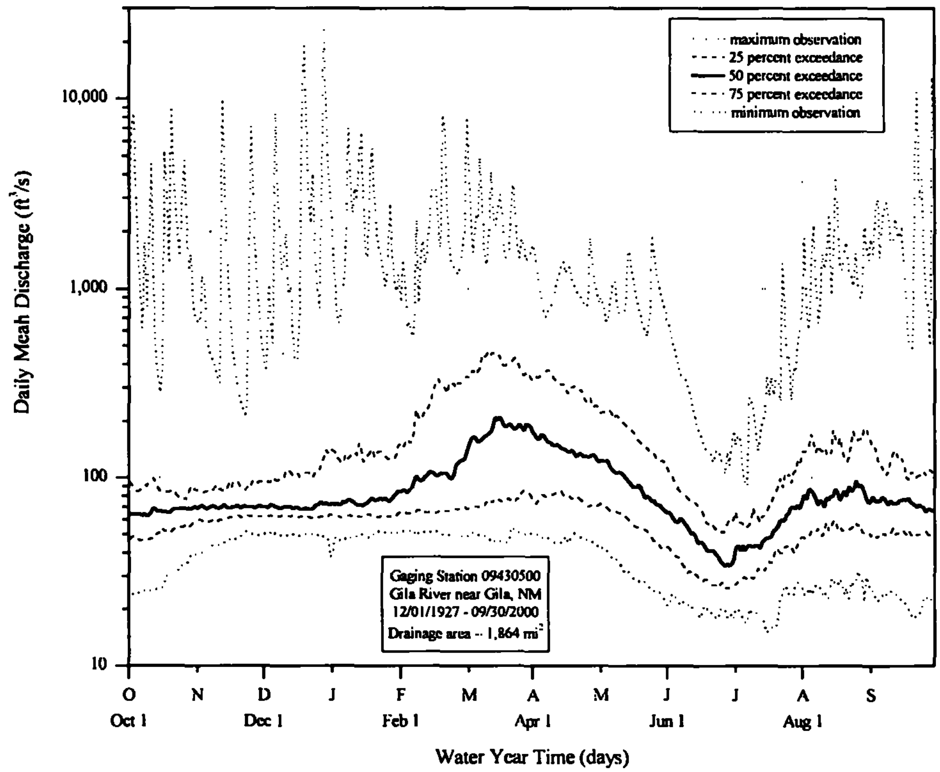

Figure 4. Mean daily flow duration hydrograph for the Gila River near Gila.

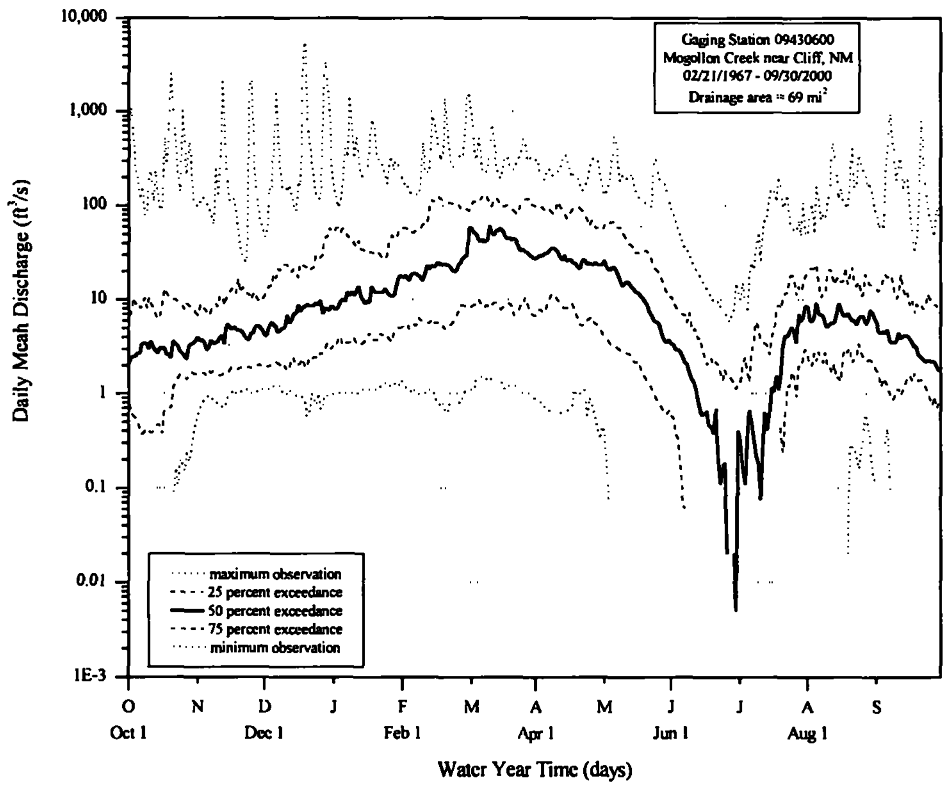

Figure 5. Mean daily flow duration hydrograph for Mogollon Creek near Cliff.

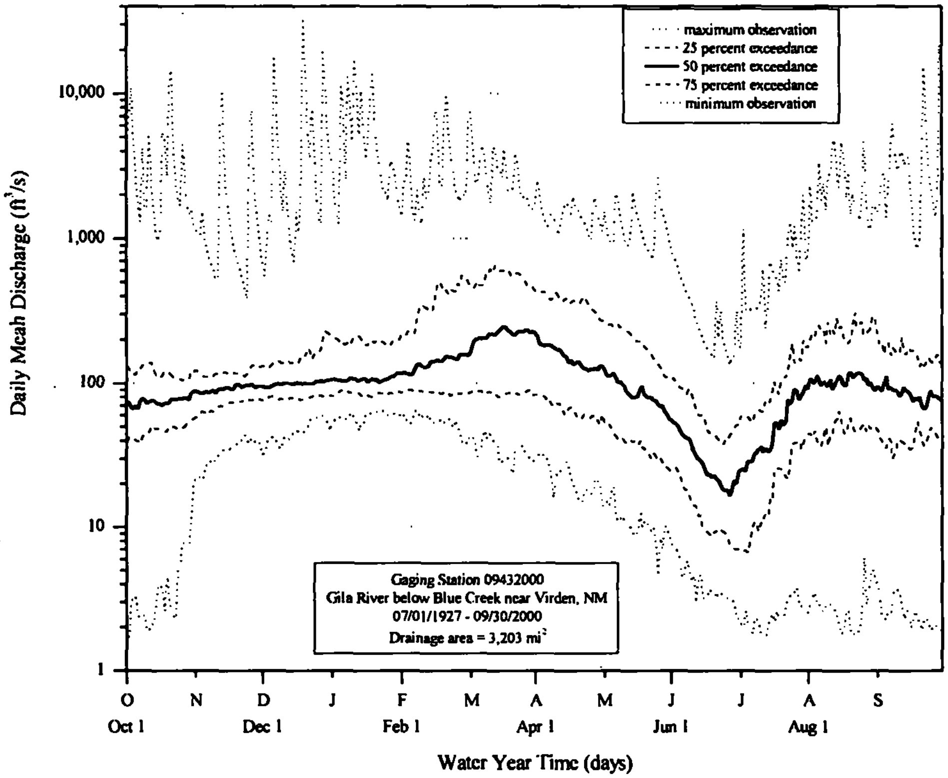

Figure 6. Mean daily flow duration hydrograph for the Gila River below Blue Creek near Virden.

LARGE FLOODS AND THEIR HYDROCLIMATOLOGY

In this study, peak discharge and *n*-day (*n*=1, 3, 5) annual maximum mean streamflow data are used to estimate flood magnitude and frequency. The largest observed floods in the gaging station records in the Upper Gila River basin, in terms of instantaneous peak discharge, occurred in December 1978, December 1984, September/October 1941, October 1983, October 1972 and August 1967 at the five sites. The three largest floods (peak discharge estimates) at each site are summarized in Table 4. Many other major floods have been documented in the Upper Gila River basin, including water years 1891, 1905, 1906, 1907, 1906, 1915, 1916, 1941, 1966 and 1973. The floods are summarized in Burkham (1970); data are provided in Pope et al. (1998) and Ortiz et al. (2001). Relevant historical floods are discussed in a subsequent section.

The origin of individual floods in New Mexico depends on the local topography and the moisture source (Kunkel, 1991). The largest of these storms and floods are documented in Burkham (1970), Aldridge and Hales (1984), Roeske et al. (1989) and Hjalmarson (1990). Hirschboeck (1985) developed a hydroclimatic classification system with nine categories that can be used to describe floods. The categories are: (1) tropical storm; (2) cutoff low; (3) front; (4) local convectional; (5) widespread synoptic; (6) monsoon frontal; (7) monsoon local; (8) monsoon widespread; and (9) snowmelt. The December 18-20, 1978 flood on the Gila River upstream of the San Francisco River had its source area in the wilderness area in New Mexico and in mountainous areas between Wilderness and Cliff, New Mexico. A persistent series of low-pressure centers off the southwest coast of California caused the flood (Aldridge and Hales, 1984). The flood is classified as caused by a front. The estimated recurrence interval for this flood was greater than 100 years. Precipitation from the storm of September 27-October 3, 1983 was the result of the interaction of a high-altitude, low-pressure trough with moist tropical air. On September 30, tropical Storm Octave arrived and brought additional moisture to the region. The most intense rainfall occurred on October 1 with most stations recording more than 2 inches of rain; a total maximum of 11 inches fell during the 7-day storm period (Roeske et al., 1989). This storm is classified as a tropical storm/cutoff low. Several gages set records for volume of runoff and peak discharge magnitude (Table 4). The 1984 storm caused the record peak discharge on the Gila River near Gila, and lower-ranked peak flows at other locations (Table 4). This storm is classified as a front, and the cause was similar to the December 1978 flood. The October 1972 and October 1941 storms were classified as cutoff lows. The 1941 storm caused the largest flood on the Gila River since before 1905. The August 1967 storm was classified as a local monsoon (Hirschboeck, 1985). Winter frontal storms, such as December 1978, can cause the largest peaks and volumes of floods along the Gila River. Note the shape of hydrograph for the largest recorded flood near Virden (Figure 6) is similar to that from upstream near Gila; the flood runoff lasted about four days.

Table 4. Largest floods at U.S. Geological Survey streamflow gaging stations analyzed in this study.

USGS Gaging Station No.	Station Name	Period of Record (Water Years)	Largest Peak Discharge and Date	Second Largest Peak Discharge and Date	Third Largest Peak Discharge and Date
09430500	Gila River near Gila, NM	1928-2000	35,200 ft^3/s 12/28/1984	32,400 ft^3/s 12/18/1978	25,400 ft^3/s 09/29/1941
09430600	Mogollon Creek near Cliff, NM	1968-2000	10,800 ft^3/s 08/12/1967	10,100 ft^3/s 12/18/1978	6,430 ft^3/s 12/28/1984
09431500	Gila River near Redrock, NM	1905, 1911, 1929-1955, 1963-2000	48,800 ft^3/s 12/19/1978	40,000 ft^3/s 09/29/1941	39,100 ft^3/s 12/28/1984
09432000	Gila River below Blue Creek near Virden, NM	1927-1997, 1999-2000	58,700 ft^3/s 12/19/1978	41,700 ft^3/s 09/29/1941	37,000 ft^3/s 12/28/1984
09442680	San Francisco River near Reserve, NM	1959-2000	9,830 ft^3/s 10/01/1983	7,870 ft^3/s 09/30/1983	7,000 ft^3/s 10/20/1972

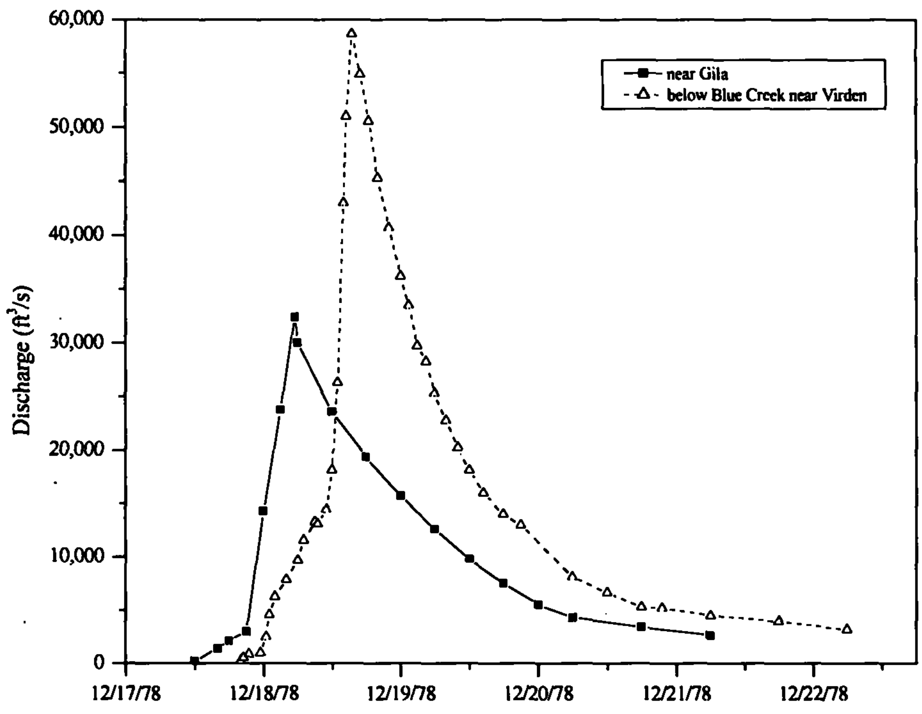

Figure 6. December 1978 flood hydrographs on the Gila River near Gila and below Blue Creek near Virden gages. Data from Aldridge and Hales (1984).

HISTORICAL FLOOD DATA

There is a limited amount of readily available information that documents historical (pre-gaging station) flooding, and periods of no flooding, in the upper Gila River basin upstream from the San Francisco River. The major sources of historical information and data used in this report were obtained from Patterson and Somers (1966), Burkham (1970), Aldridge and Hales (1984), Russell (1992) and Pope et al. (1998). The historical information in the Gila River basin, which includes large floods outside the period of record, helps to extend the record length, and place extreme floods within the record in their proper context. A longer record provides more assurance for peak discharge probability model selection and reduced variance of estimated extreme flood quantiles.

Censored data methods (e.g., Cohn et al., 1997; England, 1999) were used to "fill in" unobserved peak discharge estimates for the three gaging stations on the Gila River (Table 5). In this context, the term "censored data" means that some observations are missing or unknown. Instead of estimating a peak discharge for each of the unobserved floods at the five sites, data and information were analyzed to document that the unobserved (unmeasured) peak discharges were "less than" or did not exceed some level. This level for each gaging station is called a discharge threshold.

The historical information and data indicate large floods might have occurred in the Upper Gila River basin upstream from the confluence of the San Francisco River at Clifton, Arizona in water years 1891, 1905, 1906, 1907, and 1911. Storm summaries for many of these floods and others are in Durrenberger and Ingram (1978). Unfortunately, knowledge of historical information is inconsistent throughout this portion of the basin. There is good information in and near the Safford Valley in Arizona and near the Gila Hot Springs. However, there is little detailed information to document large floods and the lack of floods in the Gila basin upstream from the San Francisco River. The majority of available historical information is in Aldridge and Hales (1984), based on that provided by Mr. Dawson Campbell, the former custodian of the Gila Cliff Dwellings National Monument and owner of the Gila Hot Springs

Ranch (Russell, 1992). The key piece of information used is from Aldridge and Hales (1984, p. 16), and relates the December 1978 flood stage to previous largest floods at that location: "Mr. Campbell gave the following information. The flood crested after 2300 hours December 19, and water was two feet deep in a bathhouse built at Gila Hot Springs in the 1880's. No other flood had reached the bathhouse; the previous high stage in 1941 had been one foot below the bathhouse floor." The historical information for the Gila River below Blue Creek near Virden relates the October 1941 flood to previous floods and states that between 1891 and 1940, flood peaks have not exceeded the 1941 flood (Pope et al. (1998). The historical information was used to infer: (1) the length of the historical period; (2) a discharge threshold; and (3) number of floods exceeding the threshold at the three Gila River gaging stations.

The data for the historical period at each site are summarized in Table 5. Three types of data are typically presented in the U.S. Geological Survey reports: (1) dates, stages and sometimes discharges of observed floods prior to the gaging station period of record; (2) a large flood during the period of record that is known to be the "maximum stage and discharge since at least" some historic date; and (3) a large flood during the period of record that is known to be the "maximum stage and discharge since" some historic date. The information provided in (2) and (3) sometimes only refers to either stage or discharge, depending on the observation or estimate made. In addition, there is a very subtle difference between the information provided in (2) and (3). Data provided as (2) indicate a lack of information on any flood discharges or stages prior to the date stated. One does have knowledge of a flood in the historical year stated in (3). The information for cases (1) and (3) is typically stored in electronic format in the U.S. Geological Survey NWIS database. The data are generally summarized in two columns: discharge codes, where a "7" indicates that the discharge is a historic peak, and a "highest since" column, where the historic year is listed. These data need to be evaluated on an individual basis to estimate the historical period h and discharge threshold Q_o.

The estimates for the three Gila River stations were derived based on the available data and information in the basin. Peak discharge time series including historical data for each gage are shown in Figures 7 through 9. Because it was known when large floods occurred, the historical period at most sites was started one year after a major flood if the magnitude of that flood was unknown. For example, the 1942 flood on the Gila River near Virden was known to be *the largest since* 1891 (Pope et al., 1998 p. 243). Because the 1891 flood magnitude was unknown, the historical period was started in 1892. This was also done for the Gila River gages near Gila and near Redrock, because no other definitive information was available to compare the 1891 flood magnitude, and/or to extend the record prior to 1892. Discharge threshold levels were estimated directly from the discharge associated with historical information listed in Pope et al. (1998) and Ortiz et al. (2001). Based on the information and interpretations presented above, the historical flood observation period for the Gila River basin commences in 1892 for all three locations. It is assumed that unobserved floods in this time period were lower in magnitude than the discharge threshold at each site. Currently, there is insufficient flood data in this basin (less than 130 years) to reliably estimate extreme flood probabilities greater than about 1 in 200.

Table 5. Historical data summary for long-term gaging stations in the Upper Gila River Basin.

USGS Gaging Station Name	Gila River near Gila, NM	Gila River near Redrock, AZ	Gila River below Blue Creek near Virden, NM
USGS Gaging Station No	09430500	09431500	09432000
Systematic Record Length (s)	73 years	62 years	73 years
Historical Record Length (h)	36 years (1892-1927)	47 years (1892-1905, 1907-1910, 1912-1928, 1956-1962)	36 years (1892-1926, 1999)
Total Record Length (n)	109 years (1892-2000)	109 years (1892-2000)	109 years (1892-2000)
Discharge Threshold (Q_o)	25,400 ft³/s (09/29/1941 peak)	40,000 ft³/s (09/29/1941 peak)	41,700 ft³/s (09/29/1941 peak)
Number of Floods Equaling or Exceeding Q_o	3	2	2

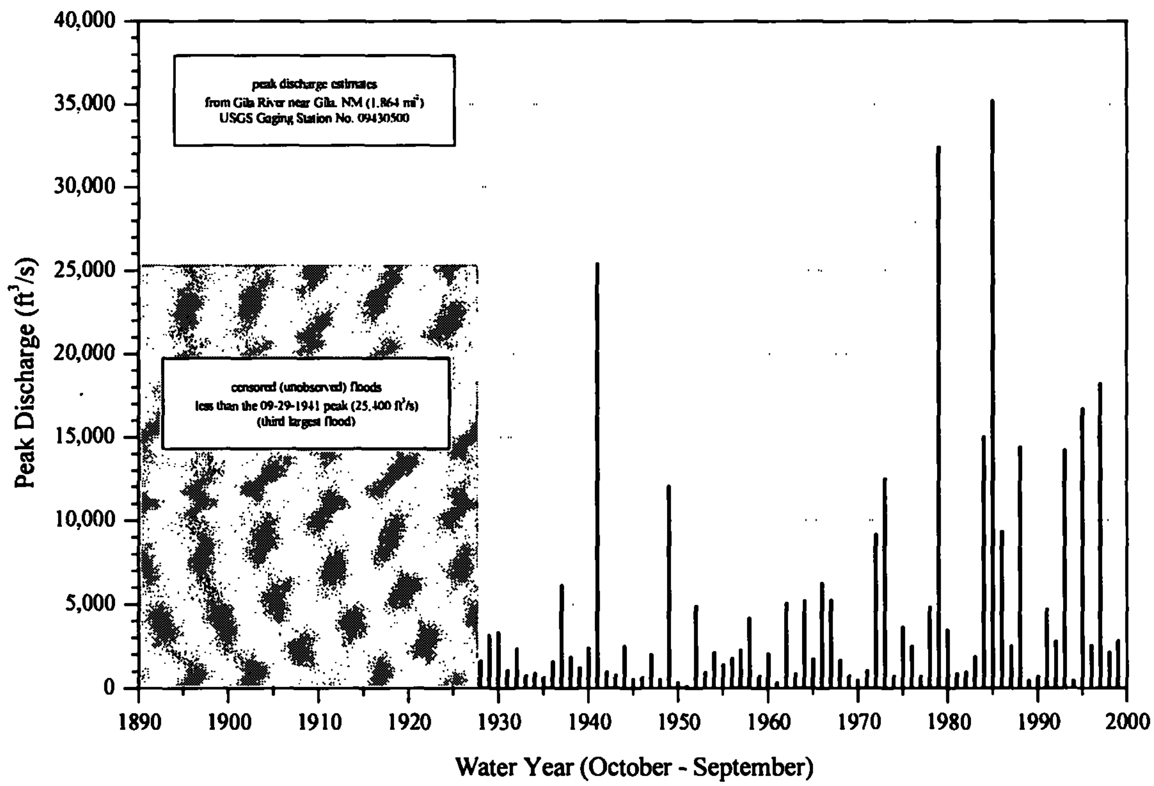

Figure 7. Peak discharge time series for the Gila River near Gila, NM.

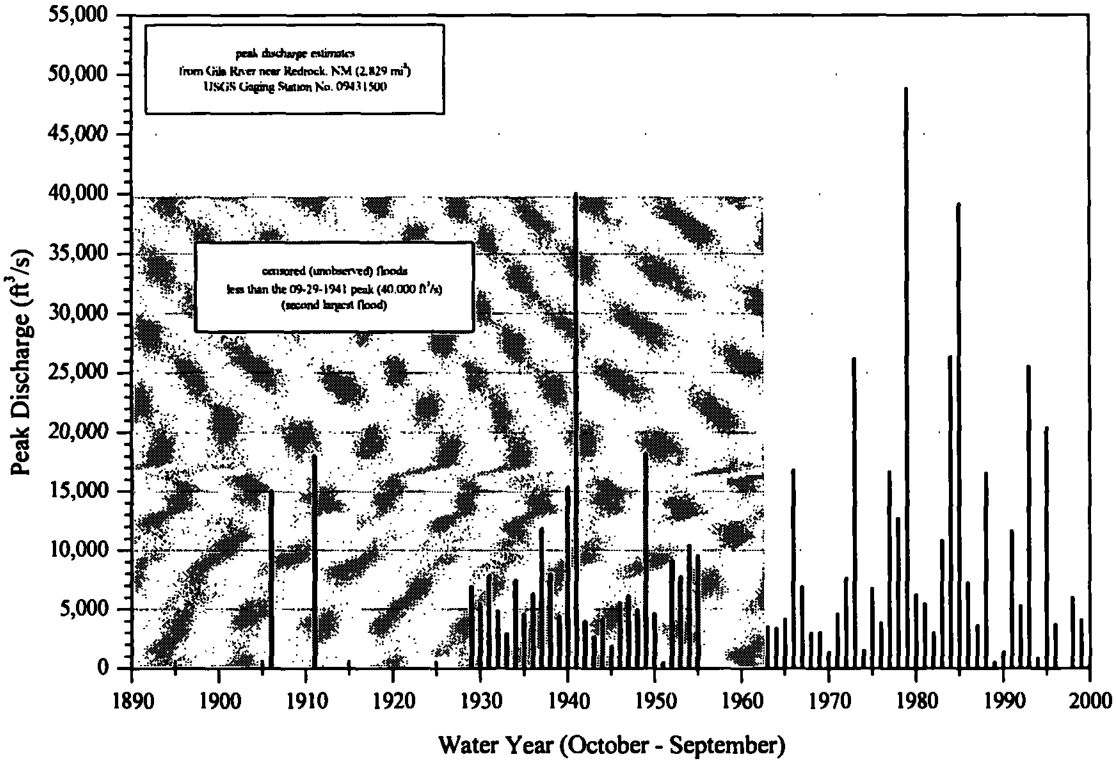

Figure 8. Peak discharge time series for the Gila River near Redrock, NM.

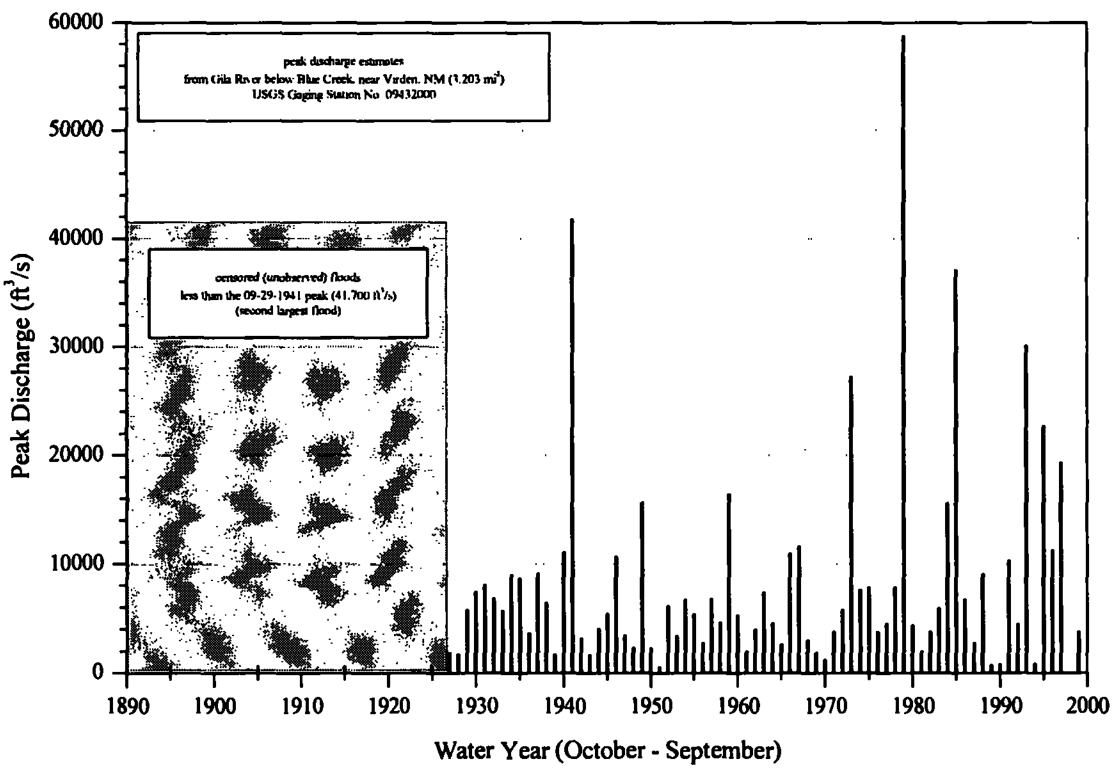

Figure 9. Peak discharge time series for the Gila River below Blue Creek near Virden, NM.

HYDROLOGIC ANALYSIS METHODS

Three analysis techniques were utilized for the Upper Gila River fluvial geomorphology study: (1) frequency analysis of flood peak discharge estimates at a site; (2) mean daily flow-duration estimates; and (3) testing streamflow and precipitation records for trends. In the context of the Upper Gila River fluvial geomorphology study, peak flow frequency estimates can be used for estimating stream bed shear stress and stream power (e.g., Costa and O'Connor, 1995). Flow-duration curves can be used to infer median river flow in a "typical" or "hypothetical" year, determine instream flow requirements for habitat (e.g., Milhous et al., 1990), or estimate effective discharge (e.g., FISRWG, 1998; Biedenharn et al., 2000).

FLOOD FREQUENCY

Flood frequency estimates were made for four variables: annual instantaneous peak discharge estimates, annual maximum mean daily flows, annual maximum 3-day mean flows and annual maximum 5-day mean flows. The data were assumed to follow a log-Pearson Type III (LP-III) distribution. The method of moments was used to estimate the LP-III parameters for peak discharge estimates using Expected Moments Algorithm (EMA) techniques (Cohn et al., 1997; England, 1999). The EMA procedure is an alternate method to IACWD (1982) for utilizing historical peak discharge information. Cohn et al. (1997) and England (1998) showed that the EMA estimator is an improvement over IACWD historical procedures. In the absence of historical information, EMA is identical to the Bulletin 17B parameter estimation (Cohn et al., 1997). Confidence intervals were estimated using the approach in Cohn et al. (2001). Because the record lengths were long, no regional skew weighting was performed. At-site estimates of the station skewness coefficients were used in the analysis.

Because the geomorphic and hydraulic reaches of interest are along the Gila River, flood frequency estimates were made only for the three Gila River gages. As discussed above, peak discharge data utilized to estimate flood frequency consist of annual peaks and historical data shown in Figures 7 through 9. The data are sufficient to define flood frequency relations to the 1 in 100 annual exceedance probability (100-year flood); the model and confidence intervals are tentatively extrapolated to 1 in 200.

FLOW DURATION

Mosley and McKerchar (1993, p. 8.27) provide a definition for flow duration: "A flow-duration curve (FDC) plots cumulative frequency of discharge, that is, discharge as a function of the percentage of time that the discharge is exceeded. It is not a probability curve, because discharge is correlated between successive time intervals, and discharge characteristics are dependent on the season of the year." Searcy (1959) and Vogel and Fennessey (1994) describe the theory and methods to construct flow-duration curves (FDCs). Flow-duration curve applications are presented and reviewed by Searcy (1959) and Vogel and Fennessey (1995).

Two types of simple FDCs were constructed: period-of-record FDCs and seasonal FDCs. The period-of-record FDC was constructed using flow data for all the years (entire period) that the gaging station is in operation. The seasonal FDC was constructed from all the data from the period of record for a particular season. Two seasonal FDCs were estimated: for the November-April winter season, and for the July through October summer season, as in Burkham (1970). These period-of-record and seasonal FDCs are dependent on the period used. In a strict sense, the flow-duration curve applies only to the period for which data were used to develop the curve (Searcy, 1959 p. 2).

The cumulative distribution function (CDF) of the FDC was estimated directly via techniques outlined in Vogel and Fennessey (1994). The period-of-record FDC was estimated using three steps:

1. separate out the *s* mean daily flows for each season and year *i* of the *n* years of record ($i = 1, ..., n$);

2. combine the *s* seasonal flows for each year *i* into a single series (*ns*) and rank the entire seasonal mean daily flow *q(j)* series ($j = 1, ..., ns$), from largest to smallest magnitude; and

3. utilize a plotting position (equation 1) to estimate the percentage of time *p(j)* a particular flow *q(j)* was equaled or exceeded.

$$p(j) = \left(\frac{j}{ns+1}\right)100; \qquad j = 1,\ldots,ns \qquad (1)$$

Note that *q(1)* is the largest observation and *q(ns)* is the smallest mean daily streamflow observation. Likewise, *p(1)* and *p(ns)* are the smallest and largest percent exceedances, respectively. For the period of record analysis, one can just rank all the data directly.

In addition to the plotting position method, the probability density function (histogram) method is used to construct the FDC empirical probability density function (PDF), as suggested by Searcy (1959). Base-10 logarithms of the flows were used to estimate the bin width and 35 classes were used to estimate the PDF. The USGS program SWSTAT (Lumb et al., 1993) was used to estimate the histograms. The two different FDCs were compared to see if the USGS histogram method was adequate to estimate the PDF for later use in effective discharge calculations.

TRENDS

Because there have been interests in examining for possible decadal climate changes, concerns about anthropogenic activities (such as fire suppression, logging and/or grazing) in the upper Gila River basin in New Mexico, daily streamflow and precipitation records were analyzed for monotonic trends (increases or decreases) over time. Trend analyses were used to examine if there was a statistically significant increase (uptrend or positive trend) or decrease (downtrend or negative trend) in streamflow and precipitation over time. Trends were assessed using the nonparametric Mann-Kendall test (e.g., Helsel and Hirsch, 1992; Hirsch et al., 1993). This is a robust test that is appropriate when the variable of interest (streamflow or precipitation) is skewed and has extremes.

The Mann-Kendall test has been widely used in precipitation and streamflow analyses. Karl and Knight (1998) used the test to examine trends in annual and seasonal precipitation. Lins and Slack (1999) used this test to examine streamflow trends in the United States. Likewise, Liebermann et al. (1989) used the Mann-Kendall test to examine streamflow and dissolved solids trends; Lettenmaier et al. (1994) used the test to examine trends in monthly average temperature, precipitation, streamflow and average of the daily temperature range. Recently, Molnár and Ramírez (2001) used this test to examine trends in precipitation and runoff, including peak flow, in the Rio Puerco watershed. Rasmussen and Perry (2001) also used the Mann-Kendall test to study trends in peak flows for streams in Kansas. The trend analyses conducted here do not identify or differentiate the sources of any trends, such as climate fluctuations or anthropogenic activity, if any trends are identified. Simple comparisons and relationships between streamflow and precipitation are examined for locations where any trends are identified.

The general study methodology used by Lins and Slack (1999) was used here. This analysis focuses on annual trends; seasonal trends were not considered. Trends were examined for both precipitation and streamflow. Two sets of precipitation trend tests were run: (1) trends in precipitation totals for five groups; and (2) interdecadal precipitation trends. Annual trends in total precipitation were analyzed for the annual, winter (November-April), spring (May-June, and summer periods (July-October), and for the maximum one-day total. Seasons were selected based on those used in Burkham (1970). Interdecadal streamflow trends were examined for 30, 40, 50, 60 and 70-year periods ending in 2000, for the five precipitation totals if data are available for that period. Two sets of analyses for streamflow were performed: (1) trend tests for ten streamflow quantiles; and (2) examining interdecadal streamflow variability for up to five periods, and the total period of record. The streamflow quantiles that were analyzed included the annual minimum daily mean (Q0), the 90th (Q90), 70th (Q70), 50th (Q50), 30th (Q30), 10th (Q10), and annual maximum (Q100) daily mean flow percentiles, the annual mean, annual peak, and annual maximum 3-day mean flows. Where data are available, interdecadal streamflow trends were examined for 30, 40, 50, 60 and 70-year periods ending in 2000, for the ten streamflow quantiles. Similar to Liebermann et al. (1989) and Lins and Slack (1999), a trend was deemed statistically significant if $p \leq 0.05$, where p is the probability of obtaining the computed test statistic, or one even less likely, when the null hypothesis is true (Helsel and Hirsch, 1992). The computer techniques that were used to estimate Kendall's tau, p-level, and median slope are documented in Lumb et al. (1990, 1993) and Flynn et al. (1995).

RESULTS AND DISCUSSION

PEAK DISCHARGE FRQUENCY

A peak discharge frequency curve was constructed for the three gages listed in Table 5 and data presented above. The peak discharge LP-III model estimates may be used to estimate exceedance probabilities from 0.95 to 0.01 (1 in 100). The flood frequency results indicate that the LP-III model adequately fits the data at each location. Results for each site are summarized in Figures 10 through 12 and Tables 6 through 8. The results in Table 8 are considered to be statistically indistinguishable with those presented in Pope et al. (1998) for the Gila River below Blue Creek near Virden gage. There are minor differences in magnitudes for given probabilities at various sites. Overall, the empirical distributions (data plotted as solid squares) are similar at the three sites. It appears that both the upper and lower tails at this site are somewhat different than the surrounding stations. It was not possible to investigate this potential difference at this level of study. Hirschboeck (1985) classified causative mechanisms of floods in the Gila basin. Unfortunately, the period of record that was used in the classification was from 1950 to 1980, and excludes the largest four observations and eight out of the top ten largest peaks on the San Francisco River. The fifth largest peak (10/20/1972) and the ninth largest peak (12/19/1978) were classified as a cutoff low and front, respectively.

Because the records at all three sites are relatively long, the distributions are fairly well behaved over the magnitudes of interest. There is higher variability for the larger (50- and 100-year) return periods. For fluvial geomorphic analyses, the 2-year and 10-year flood estimates are well-defined at all three sites. The 2-year flood ranges from 1,970 to 6,390 ft³/s at the three locations. There is a slight decrease in flood frequency estimates between the Redrock and near Virden gages. The 100-year flood estimates generally increase from upstream to downstream locations, and ranged from 38,600 to 43,000 ft³/s. Peak flows at these locations are nearly equivalent. Appendix A contains the flood frequency calculation files.

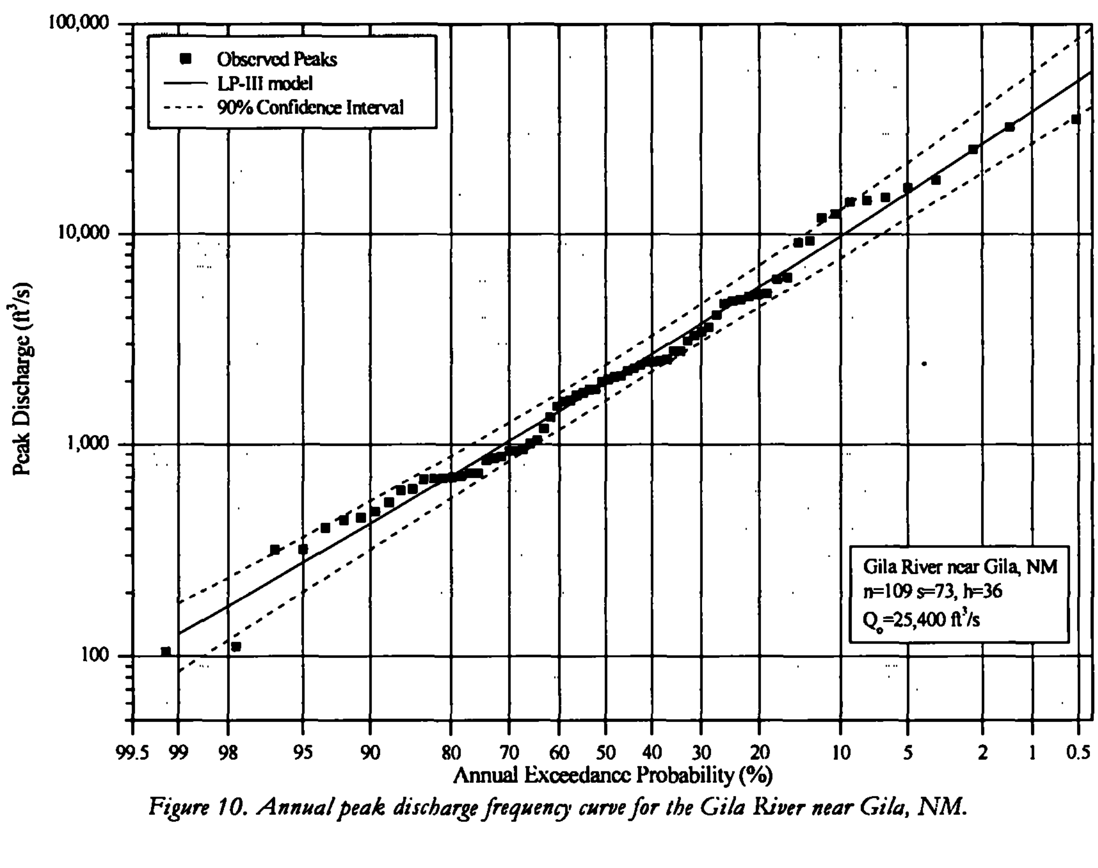

Figure 10. Annual peak discharge frequency curve for the Gila River near Gila, NM.

Table 6. Peak discharge frequency estimates for the Gila River near Gila, NM.

Annual Exceedance Probability (%)	Return Period (years)	Peak Discharge (ft³/s)		
		Model Estimate	5% Confidence Limit	95% Confidence Limit
50	2	1,970	1,620	2,390
20	5	5,620	4,540	7,140
10	10	9,800	7,700	13,100
4	25	18,100	13,500	25,500
2	50	26,900	19,500	39,500
1	100	38,600	27,200	59,000

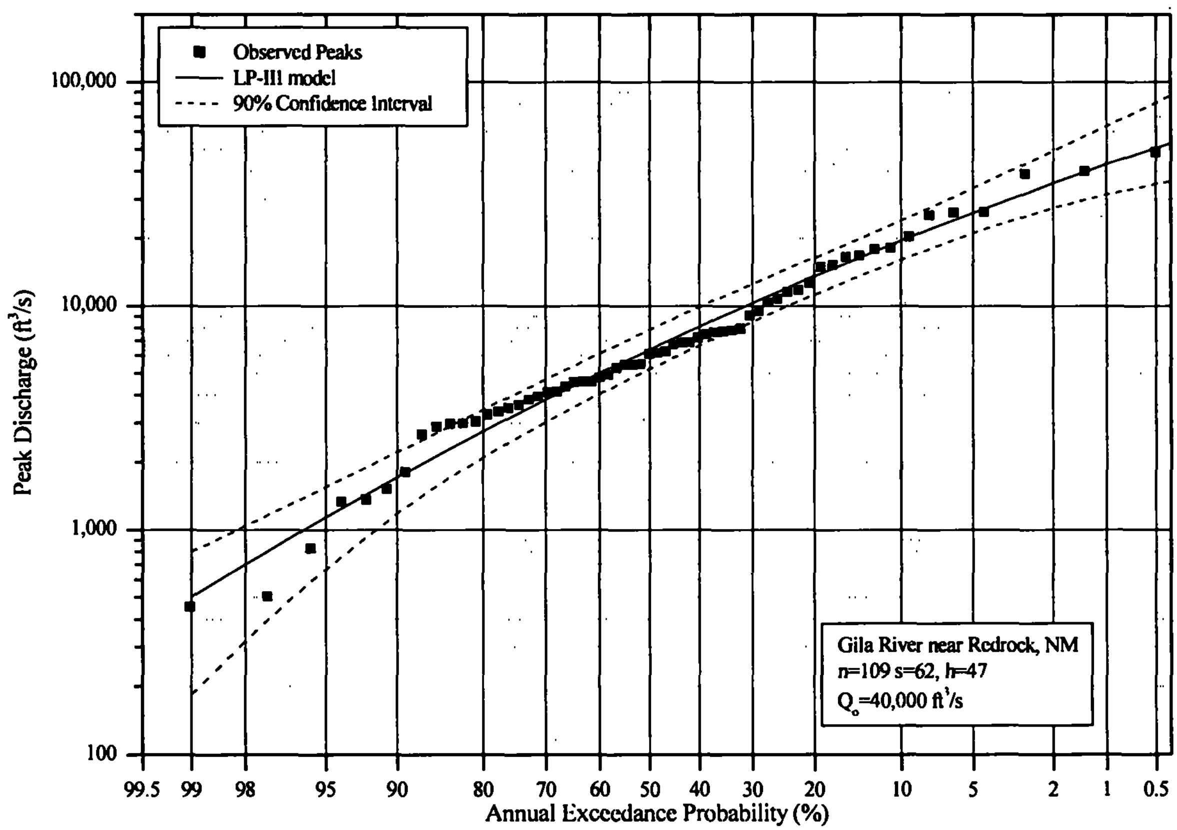

Figure 11. Annual peak discharge frequency curve for the Gila River near Redrock, NM.

Table 7. Peak discharge frequency estimates for the Gila River near Redrock, NM.

Annual Exceedance Probability (%)	Return Period (years)	Peak Discharge (ft³/s)		
		Model Estimate	5% Confidence Limit	95% Confidence Limit
50	2	6,390	5,220	7,850
20	5	13,600	11,300	16,500
10	10	19,700	16,200	24,100
4	25	28,300	22,800	37,100
2	50	35,400	27,500	49,400
1	100	43,000	31,600	63,800

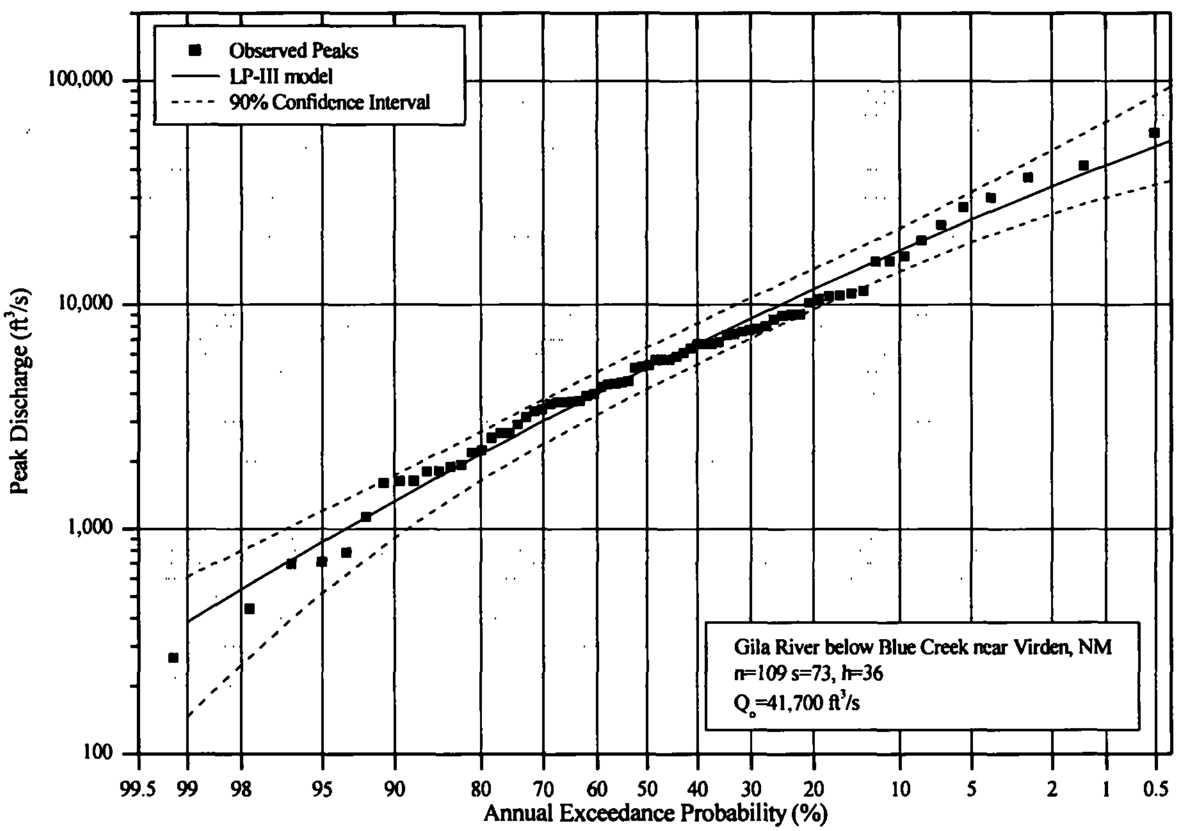

Figure 12. Annual peak discharge frequency curve for the Gila River near Virden, NM.

Table 8. Peak discharge frequency estimates for the Gila River near Virden, NM.

Annual Exceedance Probability (%)	Return Period (years)	Peak Discharge (ft³/s)		
		Model Estimate	5% Confidence Limit	95% Confidence Limit
50	2	5,200	4,200	6,440
20	5	11,700	9,540	14,400
10	10	17,500	14,100	22,000
4	25	26,200	20,500	35,500
2	50	33,700	25,400	49,000
1	100	42,000	30,000	65,700

FLOOD VOLUME FREQUENCY

Flood volume frequency curves were constructed for the three Gila River gages. The maximum 1-, 3- and 5-day mean flow volumes were calculated on an annual (water year) basis. The LP-III distribution was fit to each data set at the three sites, using methods in IACWD (1982). As no historical information was available for flow volumes, frequency analysis was performed based on the gaging record. No outliers were detected in any of the records, so high- and low-outlier adjustments were not needed. The 1-, 3- and 5-day frequency curves for each site are shown on Figures 13 through 15. The curves have similar shape at each site and between the three locations. The LP-III adequately fits the data at each site for Annual Exceedance Probabilities (AEPs) between about 90 percent and 2 percent. Flows for specific quantiles are listed with the flood frequency calculation input/output files attached as Appendix B.

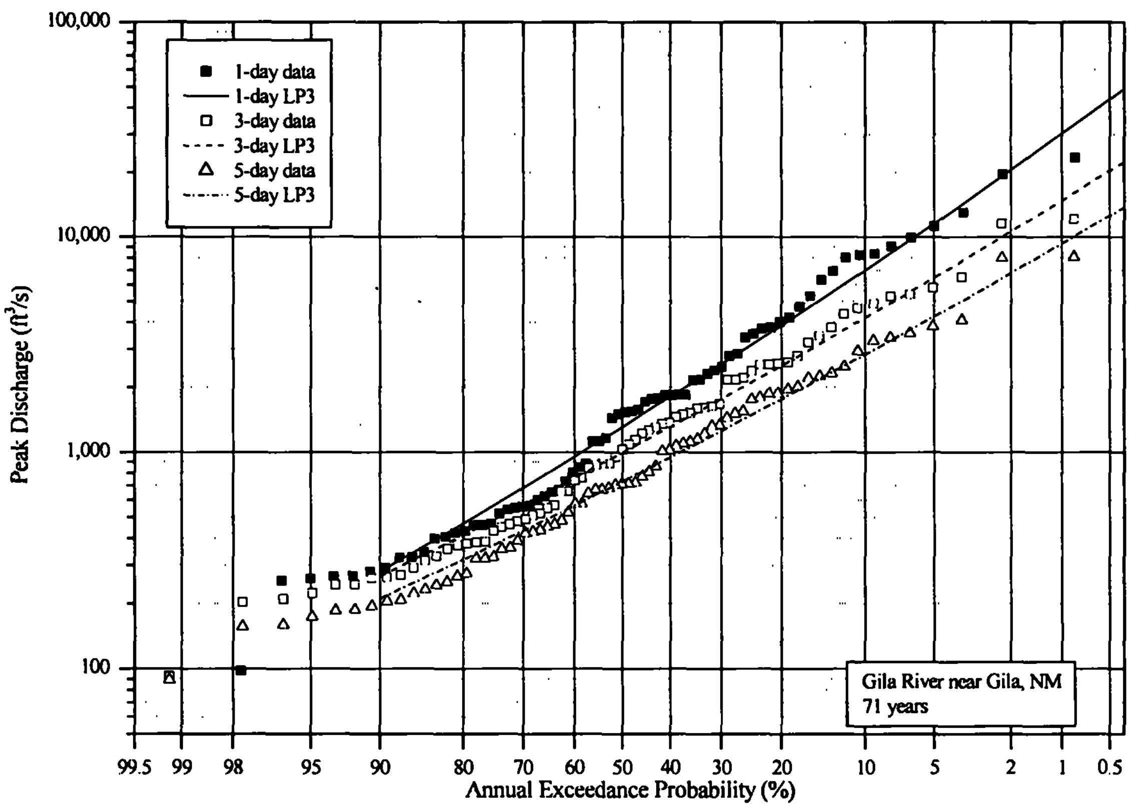

Figure 13. Annual maximum mean flood volume frequency curves for the Gila River near Gila, NM.

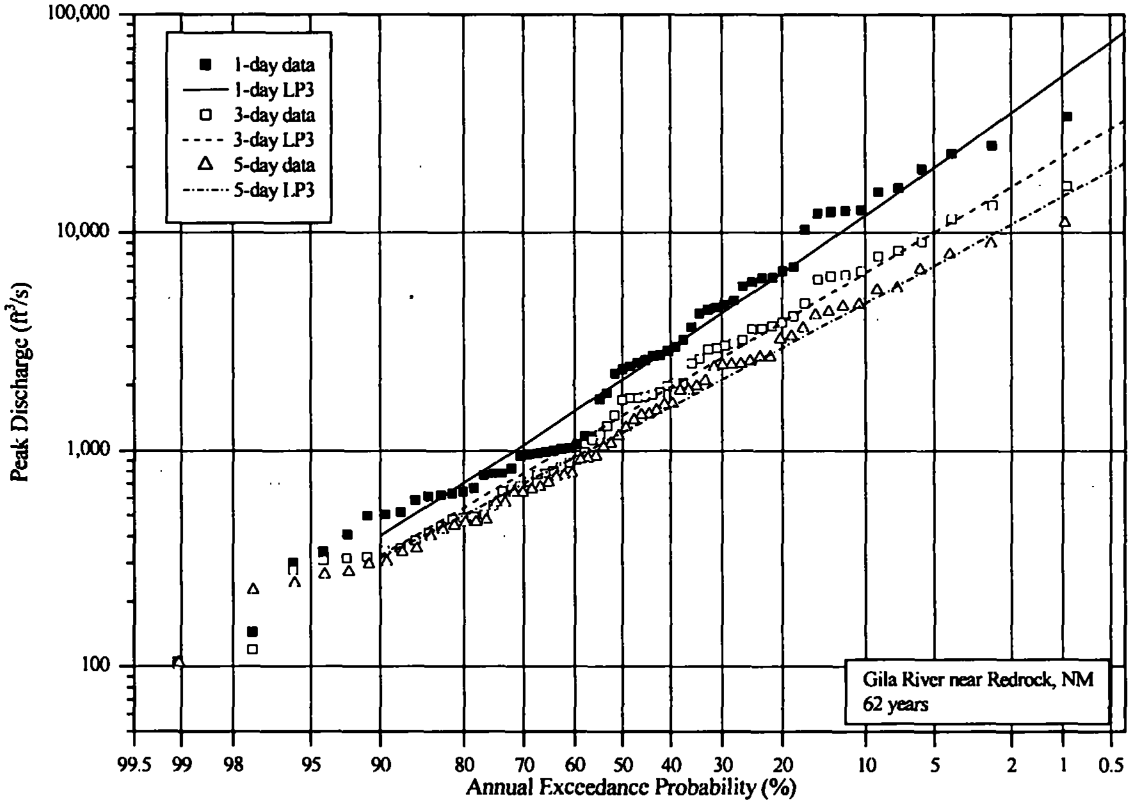

Figure 14. Annual maximum mean flood volume frequency curves for the Gila River near Redrock, NM.

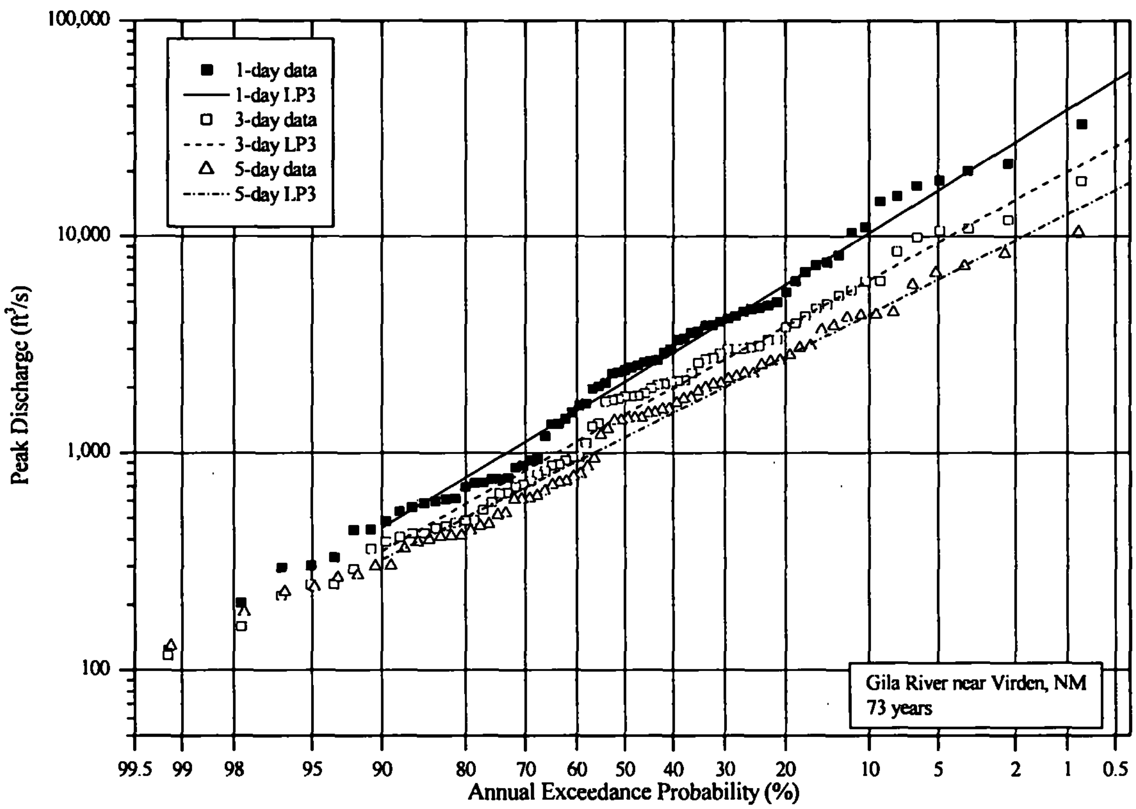

Figure 15. Annual maximum mean flood volume frequency curves for the Gila River near Virden, NM.

FLOW DURATION

Flow-duration curves were developed for each of the five locations listed in Table 3; these include the three Gila River gages, as well as Mogollon Creek near Cliff and the San Francisco River near Reserve. Two sets of flow-duration curves were made: a period-of-record annual FDC, and seasonal FDCs for winter (November-April) and summer (July-October) flows at each site. The period-of-record annual FDC (Figure 16) shows that mean daily flows are less than about 10,000 ft^3/s about 99.9 percent of the time, and less than 500 ft^3/s 90 percent of the time for all sites. Specific FDC percentiles of daily mean discharge for the period of record are summarized for each site in Table 9. The median flows (50 percent) range from about 6 to 93 ft^3/s for the water year. In general, these FDCs have complex shapes. The Redrock and Virden FDCs fall below that near Gila at about 20 percent of the time probably because of irrigation and other water withdrawals, and channel transmission losses. Mogollon Creek and the San Francisco River show similar behavior for larger flows in these relatively small watersheds. Because Mogollon Creek is an ephemeral stream, mean daily flows are zero about 10 percent of the time (Figure 16, Table 9). Mean daily flows for the November-April winter season are nearly always greater than the summer season (Figures 17 and 18). In some cases, the winter FDCs are higher than the annual FDCs for approximately 0.5 percent of time. Flow-duration curves were also computed using the USGS histogram method. It was found that using a standard (default) number of classes equal to 35, including minimum (zero) and maximum, with base-10 logarithms of flows, was adequate to describe the FDC. In making effective discharge calculations, one can use Results for the annual and seasonal FDCs, and comparison graphs between the PDF and CDF approaches are attached as Appendix C.

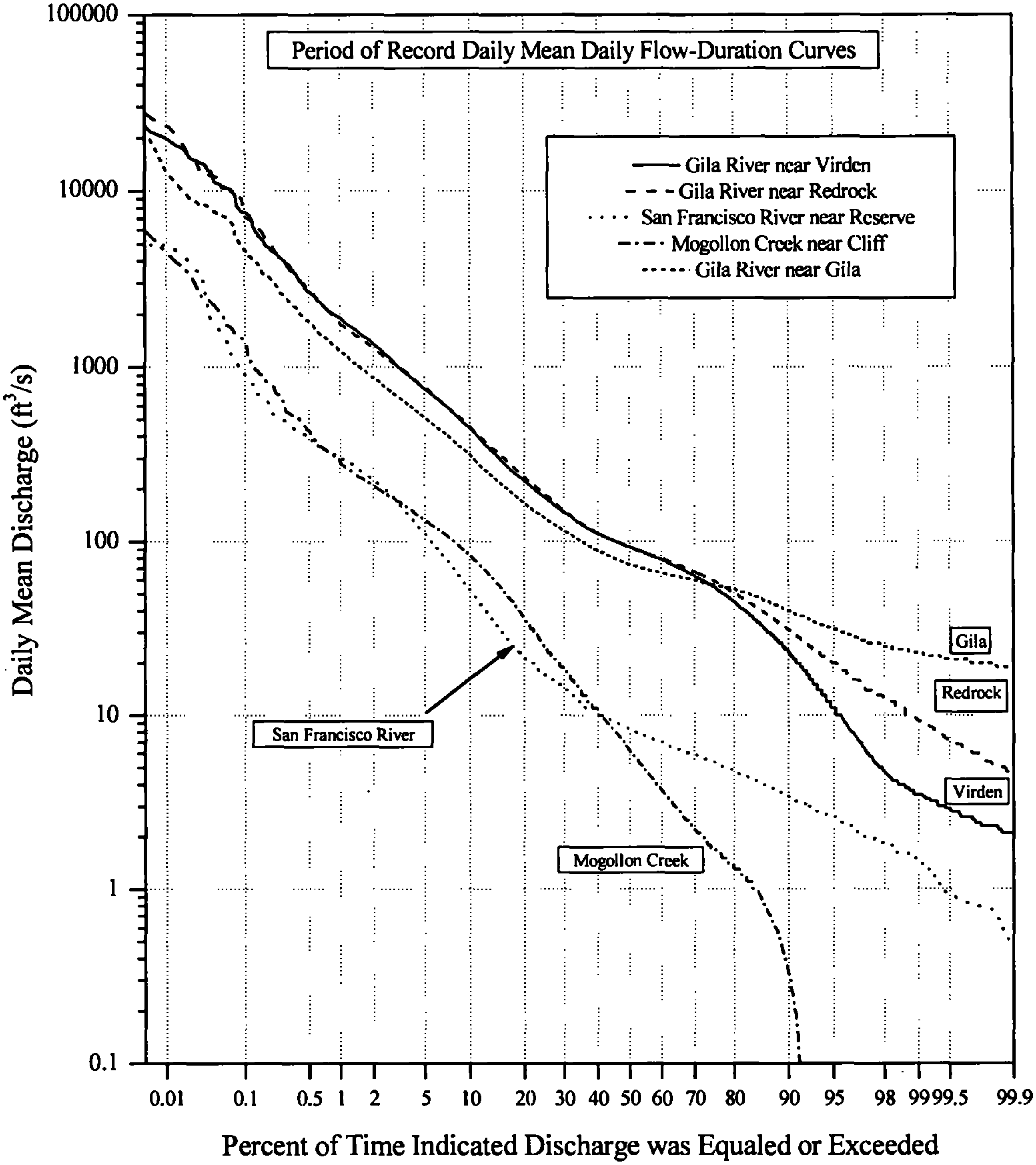

Figure 16. Period of record mean daily flow duration curves for five stations in the Upper Gila River basin.

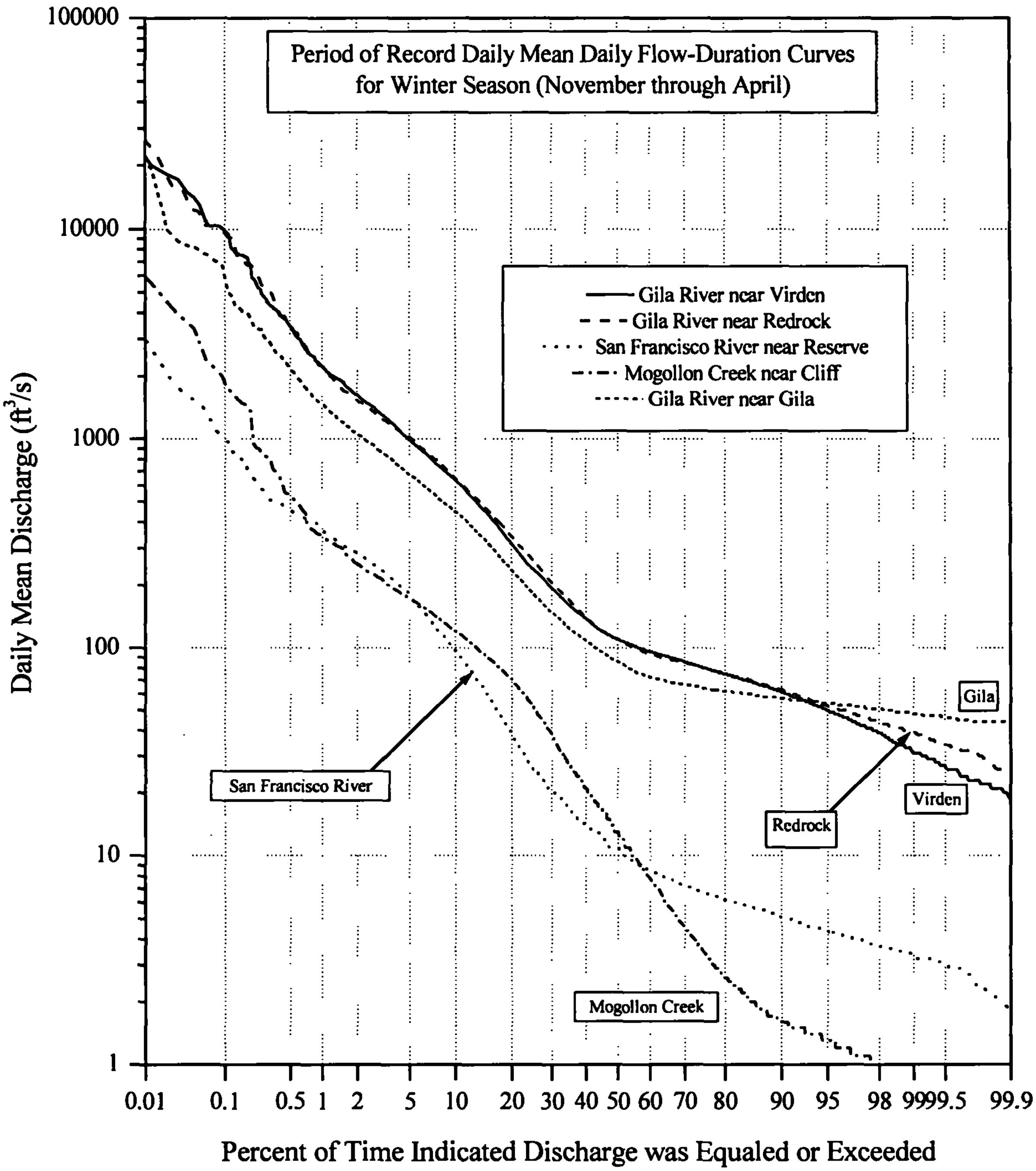

Figure 17. Winter season mean daily flow duration curves for five stations in the Upper Gila River basin.

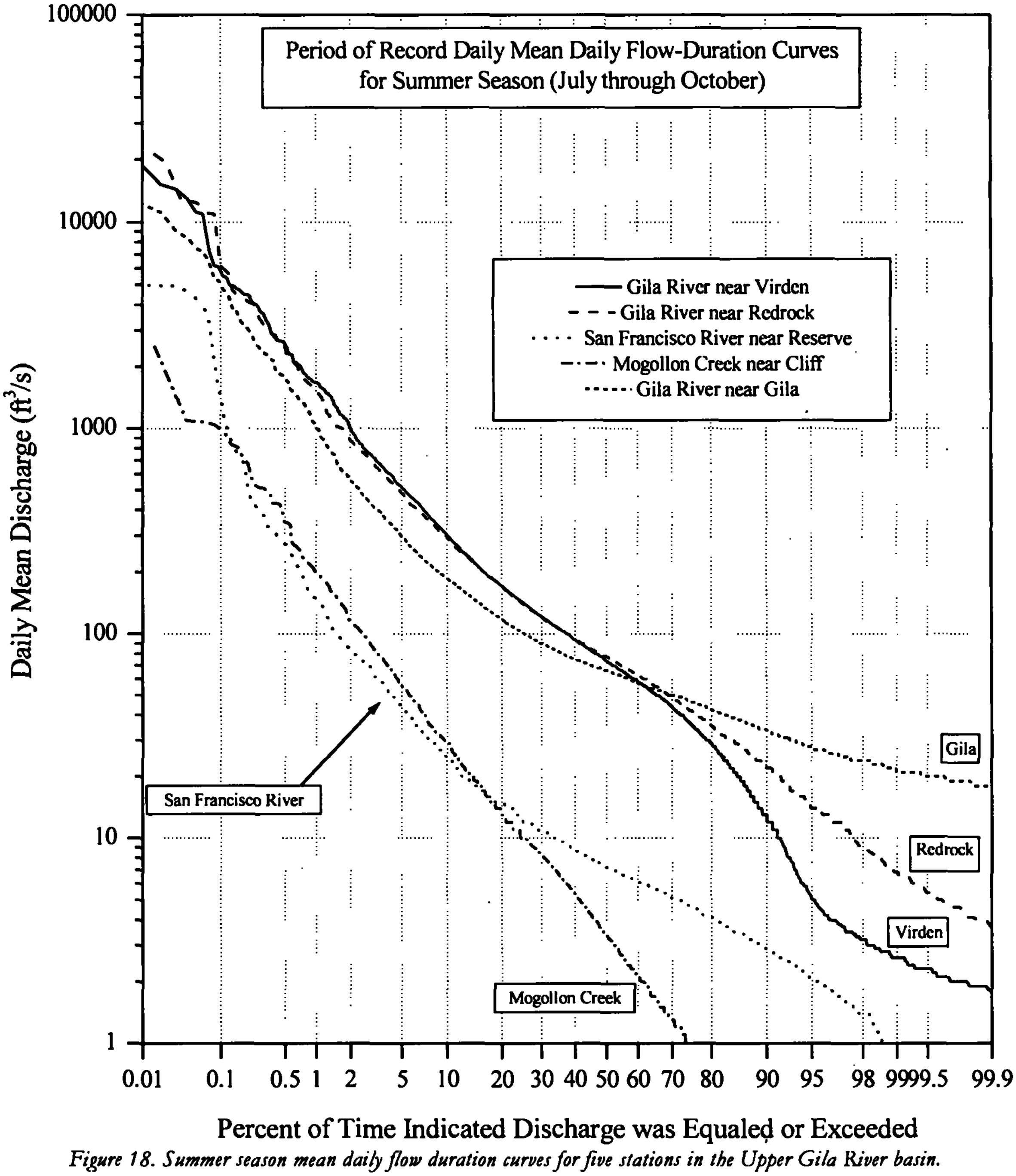

Figure 18. Summer season mean daily flow duration curves for five stations in the Upper Gila River basin.

Table 9. Period of record mean daily flow duration statistics for five stations in the Gila River basin.

parameter	Location				
	Gila River near Gila	Mogollon Creek near Cliff	Gila River near Redrock	Gila River near Virden	San Francisco River near Reserve
number of samples	26,603	12,276	23,011	26,603	15,190
mean (ft^3/s)	157.311	30.873	217.002	212.114	27.069
standard deviation (ft^3/s)	384.956	108.796	603.052	581.923	101.707
coefficient of variation	2.4471	3.524	2.779	2.7434	3.7573
skewness coefficient	22.5996	25.2458	21.6705	19.847	27.9167
lag-1 serial correlation coefficient	0.9233	0.8591	0.9247	0.9319	0.9116
minimum observation (ft^3/s)	15	0	3.0	1.7	0.24
99.99 percent exceedance (ft^3/s)	16	0	3.0	1.7	0.3
99.94 percent exceedance (ft^3/s)	18	0	4.1	1.9	0.4
99.7 percent exceedance (ft^3/s)	20	0	6.3	2.6	0.82
99 percent exceedance (ft^3/s)	23	0	9.2	3.5	1.4
96.75 percent exceedance (ft^3/s)	28	0	16	7.2	2.1
90 percent exceedance (ft^3/s)	40	0.3	31	23	3.4
80 percent exceedance (ft^3/s)	53	1.4	51	45	4.8
75 percent exceedance (ft^3/s)	57	1.7	60	55	5.4
70 percent exceedance (ft^3/s)	60	2.2	67	64	6
60 percent exceedance (ft^3/s)	66	3.8	80	79	7
50 percent exceedance (ft^3/s)	74	6.4	92	93	8.4
40 percent exceedance (ft^3/s)	89	10	112	111	10
30 percent exceedance (ft^3/s)	115	18	150	147	14
25 percent exceedance (ft^3/s)	135	25	186	178	17
20 percent exceedance (ft^3/s)	166	36	235	224	22
10 percent exceedance (ft^3/s)	313	83	454	448	53
3.25 percent exceedance (ft^3/s)	669	167	1,010	992	163
1 percent exceedance (ft^3/s)	1,240	291	1,779	1,900	301
0.3 percent exceedance (ft^3/s)	2,480	552	3,780	3,870	479
0.06 percent exceedance (ft^3/s)	7,170	1,900	10,500	10,400	1,490
0.01 percent exceedance (ft^3/s)	15,240	5,540	24,400	20,600	4,960
maximum observation (ft^3/s)	23,400	6,000	34,000	33,100	5,000

PRECIPITATION TRENDS

Precipitation trend analyses were carried out for the eight NWS cooperative sites listed in Table 1. Each site had a different period of record analyzed, but in most cases, records were long enough and most stations had overlapping periods. Precipitation trend analyses were carried out for annual, winter, spring and summer season total precipitation, and for one-day maximum annual total. As in Karl and Knight (1998), trends are reported for p-values ≤ 0.10. This is a slightly liberal criterion compared to the $p \leq 0.05$ criterion used by Lins and Slack (1999) for streamflow. Using this criterion, definitive positive and negative trends were found for the stations analyzed. Positive trends indicate an increase in precipitation over time, whereas negative trends indicate a decrease in precipitation over time. In terms of positive trends, consistent results were observed across several groups of stations for each of the cases analyzed: annual total trends, winter, spring and summer season precipitation trends, and one-day annual maximum trends. Negative trends were observed at two stations for the spring season. The trend analysis results, including p-values for all the cases considered in this report, are attached as Appendix D.

Positive trends in annual, winter, spring and summer total precipitation were found at seven stations (Table 10). No positive trends were found for these quantities at the Mimbres Ranger Station gage. Annual trends were consistently significant for the 1941-2000 period at Fort Bayard, Lordsburg and Cliff. For the 1951-2000 period, these three stations, as well as Redrock and Glenwood exhibited significant annual trends. Winter precipitation increased in the 1941-2000 period at Lordsburg and Cliff, and for the 1951-2000 period at and Fort Bayard, Lordsburg, Cliff, Redrock and Glenwood. Spring precipitation increased during the 1961-2000 period at Gila Hot Springs, Reserve and Cliff. Summer precipitation increased at Cliff and Glenwood for the approximate 1945-2000 period. These precipitation trends are similar to 1948-1997 annual trends found by Molnár and Ramírez (2001) for the Rio Puerco watershed, which is located northeast of the upper Gila River basin. The trends reverse the winter precipitation decreases reported by Burkham (1970, p. B5) for the Fort Bayard and Lordsburg gages, but are consistent with the 1950-1962 annual increase estimates at these locations. It appears that the annual precipitation increase at the Fort Bayard, Lordsburg, Cliff, Redrock and Glenwood stations for the 1951-2000 period is most likely due to the increase in winter precipitation, and summer precipitation contributions at Cliff and Glenwood. Further work is needed to define the hydroclimatology and specific meteorological causes of the annual and seasonal precipitation increases.

In terms of one-day annual maximum precipitation, positive trends were observed at four stations (Table 11). Overall, there were few trends identified from annual maximum precipitation as compared to the seasonal results. Trends in annual maximum precipitation are important as they may possibly cause increases in maximum streamflows. Because record lengths vary between locations, comparisons between locations are approximate. Consistent trends were noted for the 1951-2000 period at the Cliff and Mimbres Ranger Station gages. For the 1958-2000 period, Gila Hot Springs and Mimbres had significant trends. There were inconsistencies between concurrent records at these sites, as no trend was noted at the Gila gage for the 1961-2000 period. Molnár and Ramírez (2001) did not find any trends for annual maximum precipitation, averaged across the Rio Puerco watershed. However, Karl and Knight (1998) did note an increase in 1-day maximum precipitation for the 1910-1995 period for New Mexico.

Negative trends (downtrends) were identified at two stations for spring total precipitation (Table 12). These trends are inconsistent across stations analyzed. For Lordsburg, winter precipitation may have increased during this period to account for the statistically significant annual increase. At Mimbres, spring decreases were not matched by increases in annual or other seasonal totals. The factors leading to these decreases have not been identified. Data gaps and possible data errors may have contributed to these results.

Table 10. Trend results for precipitation stations where statistically significant ($p \leq 0.10$) positive trends are identified in annual and seasonal precipitation.

Station Name	Season	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Reserve Ranger Stn.	annual	0.132	0.085	0.030	1921	2000	80
Lordsburg	annual	0.133	0.087	0.029	1924	2000	77
Lordsburg	annual	0.147	0.072	0.033	1931	2000	70
Fort Bayard	annual	0.210	0.018	0.066	1941	2000	60
Lordsburg	annual	0.159	0.073	0.043	1941	2000	60
Cliff	annual	0.286	0.002	0.120	1945	2000	56
Glenwood	annual	0.273	0.005	0.144	1950	1999	50
Redrock	annual	0.197	0.045	0.075	1951	2000	50
Fort Bayard	annual	0.252	0.010	0.086	1951	2000	50
Cliff	annual	0.223	0.023	0.107	1951	2000	50
Lordsburg	annual	0.180	0.066	0.054	1951	2000	50
Glenwood	annual	0.246	0.026	0.164	1960	1999	40
Glenwood	spring	0.178	0.069	0.014	1950	1999	50
Gila	spring	0.183	0.098	0.019	1961	2000	40
Reserve Ranger Stn.	spring	0.190	0.087	0.016	1961	2000	40
Cliff	spring	0.192	0.083	0.018	1961	2000	40
Cliff	summer	0.152	0.100	0.037	1945	2000	56
Glenwood	summer	0.161	0.098	0.046	1949	1999	51
Lordsburg	winter	0.150	0.091	0.033	1941	2000	60
Cliff	winter	0.234	0.011	0.058	1945	2000	56
Glenwood	winter	0.213	0.030	0.075	1950	1999	50
Cliff	winter	0.190	0.052	0.053	1951	2000	50
Redrock	winter	0.199	0.042	0.048	1951	2000	50
Lordsburg	winter	0.207	0.034	0.056	1951	2000	50
Fort Bayard	winter	0.168	0.086	0.046	1951	2000	50
Glenwood	winter	0.218	0.049	0.101	1960	1999	40
Lordsburg	winter	0.249	0.025	0.077	1961	2000	40

Table 11. One-day annual maximum trend results for precipitation stations where statistically significant ($p \leq 0.10$) *positive trends are identified.*

Station Name	Season	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Reserve Ranger Stn.	maximum	0.147	0.073	0.004	1931	2000	70
Reserve Ranger Stn.	maximum	0.177	0.047	0.007	1941	2000	60
Cliff	maximum	0.251	0.010	0.011	1951	2000	50
Mimbres Ranger Stn.	maximum	0.362	0.000	0.014	1951	2000	50
Gila	maximum	0.207	0.052	0.011	1958	2000	43
Mimbres Ranger Stn.	maximum	0.196	0.076	0.009	1961	2000	40

Table 12. Trend results for precipitation stations where statistically significant ($p \leq 0.10$) *negative trends are identified.*

Station Name	Season	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Lordsburg	spring	-0.262	0.001	-0.015	1924	2000	77
Lordsburg	spring	-0.160	0.050	-0.008	1931	2000	70
Mimbres Ranger Stn.	spring	-0.215	0.014	-0.020	1939	2000	62
Mimbres Ranger Stn.	spring	-0.173	0.052	-0.015	1941	2000	60

STREAMFLOW TRENDS

Statistically significant positive and negative trends in streamflow were identified in records at four gaging stations: Gila River near Gila, Redrock and Virden, and the San Francisco River near Reserve. As in precipitation, a trend was labeled significant for p-values ≤ 0.10. In addition, positive trends indicate an increase in streamflow over time, whereas negative trends indicate a decrease in streamflow over time. No statistically significant ($p \leq 0.10$) trends were found for the Mogollon Creek near Cliff gage for the variables analyzed. Complete streamflow trend analyses results that were analyzed are attached as Appendix E.

In terms of flood discharge, including peak flow and annual maximum 1-day and 3-day estimates, positive trends were identified at the Gila and Virden gages (Table 13). Consistent trends were noted for 3-day maximum flow at both locations for the 1931-2000 and 1941-2000 periods. In addition, there were increases in peak flow, daily maximum and 3-day maximum at the Gila gage for 1931-2000, 1941-2000 and 1951-2000. These trends are similar to that found by Lins and Slack (1999), but opposite those found by Molnár and Ramírez (2001). Rasmussen and Perry (2001) found both increasing and decreasing peak flow trends in Kansas. Notably, there was no increase at the Virden gage for peak flow and 1-day maximum. Also, it is important that there were no significant trends identified for flood discharge quantities at the five gaging station locations for the recent 40-year (1961-2000) or 30-year (1971-2000) periods, and that no decreasing trends in peak flow were found at the five stations. Note that the missing data record at Redrock (1956-1962) precludes comparisons at this site to the gages near Gila and near

Virden. However, there is a definite consistency in the trend results between Gila and Virden gages, and is an assurance that anomalous results have not been obtained.

In attempting to understand the physical causes of increasing flood discharge trends at the Gila and Virden gages reported here, the precipitation trend results may be an initial first step in explaining the peak flow and maximum flow trends. It is known that both fall and winter storms have caused the largest floods at these sites. For the 1941-2000 and 1951-2000 periods, the precipitation records indicate definite increases in winter precipitation at Cliff, Redrock, and Glenwood, and may partly explain the 3-day maximum flow increase at the streamflow gages near Gila and near Virden. Annual maximum one-day precipitation trend increases (Table 11) at the Gila Hot Springs (1958-2000) and Mimbres Ranger Station (1948-2000) gages can also partly account for flow increases. Because there are only three long-term precipitation gages within the Upper Gila River basin study area, with few in the upper watershed (Figure 1), the precipitation gage data may be inadequate to explain the flood trends. Further work, consisting of investigating alternative sources of precipitation data, and making comparisons directly with flood runoff, may help better explain the flood trend relationships.

Table 13. Trend results for streamflow gaging stations where statistically significant ($p \leq 0.10$) positive trends in floods (peak, annual maximum and 3-day quantities) are identified.

Gaging Station	Percentile or Statistic	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Virden	3 day	0.144	0.079	18.121	1931	2000	70
Gila	3 day	0.205	0.012	16.188	1931	2000	70
Gila	maximum	0.183	0.026	20.000	1931	2000	70
Gila	peak	0.195	0.024	29.630	1931	2000	63
Virden	3 day	0.165	0.063	24.214	1941	2000	60
Gila	3 day	0.206	0.021	19.127	1941	2000	60
Gila	maximum	0.175	0.049	23.134	1941	2000	60
Gila	peak	0.195	0.038	36.872	1941	2000	54
Gila	3 day	0.197	0.045	24.017	1951	2000	50
Gila	maximum	0.189	0.054	34.615	1951	2000	50
Gila	peak	0.178	0.091	44.667	1951	2000	44

In contrast to flood discharge, many trends were noted for high and low flow percentiles, mean and minimum flows (Table 14) for the Virden and Gila gages. The percentiles analyzed are the same as those outlined by Lins and Slack (1999). Consistent increases were noted between the Gila and Virden gages for the 10, 30, 50, 70 and 90th percentiles, and the mean for the 1941-2000 and 1951-2000 periods. In addition the minimum (0th percentile) at both sites increased during the 1951-2000 period. The gaging station at Virden also had positive trends in the minimum, 10 and 30th percentile for the 1961-2000 period (Appendix E). Note that no positive, significant trends in percentiles were found for the Mogollon Creek or San Francisco River gaging stations. This may simply due to the shorter records at these sites. In addition, no trends were found for median and higher percentiles for the recent 1961-2000 and 1971-2000 periods.

Table 14. Consistent trend results for streamflow gaging stations where statistically significant ($p \leq 0.10$) positive trends in streamflow percentiles and low flows (minimum, 10p, 30p, 50p, 70p, 90p and mean quantities) are identified.

Gaging Station	Percentile or Statistic	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Virden	mean	0.141	0.085	1.141	1931	2000	70
Gila	mean	0.144	0.079	0.755	1931	2000	70
Virden	10p	0.352	0.000	0.643	1941	2000	60
Gila	10p	0.206	0.021	0.229	1941	2000	60
Virden	30p	0.287	0.001	0.792	1941	2000	60
Gila	30p	0.221	0.013	0.353	1941	2000	60
Virden	50p	0.193	0.030	0.735	1941	2000	60
Gila	50p	0.199	0.025	0.421	1941	2000	60
Virden	70p	0.186	0.036	1.085	1941	2000	60
Gila	70p	0.183	0.039	0.824	1941	2000	60
Virden	90p	0.178	0.045	2.973	1941	2000	60
Gila	90p	0.183	0.039	1.737	1941	2000	60
Virden	mean	0.200	0.024	1.918	1941	2000	60
Gila	mean	0.192	0.031	1.106	1941	2000	60
Virden	10p	0.455	0.000	0.962	1951	2000	50
Gila	10p	0.294	0.003	0.432	1951	2000	50
Virden	30p	0.407	0.000	1.205	1951	2000	50
Gila	30p	0.367	0.000	0.640	1951	2000	50
Virden	50p	0.313	0.001	1.353	1951	2000	50
Gila	50p	0.318	0.001	0.778	1951	2000	50
Virden	70p	0.277	0.005	2.010	1951	2000	50
Gila	70p	0.269	0.006	1.429	1951	2000	50
Virden	90p	0.195	0.046	4.229	1951	2000	50
Gila	90p	0.200	0.041	2.461	1951	2000	50
Virden	mean	0.233	0.018	2.764	1951	2000	50
Gila	mean	0.237	0.016	1.750	1951	2000	50
Virden	minimum	0.503	0.000	0.365	1951	2000	50
Gila	minimum	0.198	0.043	0.143	1951	2000	50

Negative trends (downtrends) were identified at the Gila River near Redrock and the San Francisco River near Reserve stations for relatively low flows and minimum streamflows (Table 15). Again, comparisons are difficult because of the broken record (missing data) at Redrock. However, the general decrease in precipitation during the 1931-1955 period (Burkham, 1970) may partly explain the Redrock streamflow decrease. The decrease in minimum flows on the San Francisco River for 1961-2000 and 1971-2000 is not readily explained by any precipitation decrease.

Table 15. Trend results for streamflow gaging stations where statistically significant (p≤0.10) negative trends are identified.

Gaging Station	Percentile or Statistic	Kendall's Tau	p-level	Median Slope of Trend	Start Year	End Year	No. Years
Redrock	10p	-0.533	0.000	-2.068	1931	1955	25
Redrock	30p	-0.440	0.002	-2.278	1931	1955	25
Redrock	50p	-0.373	0.009	-2.000	1931	1955	25
Redrock	70p	-0.413	0.004	-3.016	1931	1955	25
Redrock	mean	-0.287	0.047	-3.440	1931	1955	25
Redrock	minimum	-0.437	0.002	-0.756	1931	1955	25
San Francisco	minimum	-0.273	0.013	-0.036	1961	2000	40
San Francisco	minimum	-0.308	0.017	-0.045	1971	2000	30

CONCLUSIONS

1. Flooding in the Gila River basin is caused primarily by rains from fall and winter storm systems. These storms are generally cold frontal systems colliding with warm, moist air or tropical storms. Extreme flood-producing storms are widespread and generally cover the majority of the Upper Gila basin. Instantaneous peak discharge data confirm that the largest-magnitude floods occur in the fall and winter and are predominately from rainfall and rain on snow. The largest floods have occurred in water years 1941, 1979 and 1985.

2. The log-Pearson Type III distribution was fit to annual peak discharge estimates at the three Gila River gaging stations using the Expected Moments Algorithm and available historical information. The results indicated that the distribution adequately fit the data. Peak discharge probability estimates indicate the 2-year flood ranges between 1,970 and 6,390 ft^3/s and the 100-year flood ranges between 38,600 and 43,000 ft^3/s at the three locations. Flood volume frequency (1-, 3-, and 5-day annual maxima) estimates are consistent for the different durations at each site, as well as between gaging stations.

3. Period-of-record FDCs for the water year indicated that mean daily flows are typically less than about 500 ft^3/s for 90 percent of the time at all five gaging stations. Mean daily flows for the November-April winter season are nearly always greater than the summer July-October season. Mean daily flows are zero about 10 percent of the time at the Mogollon Creek near Cliff gage. There are no practical differences in using a plotting position to estimate the FDC or the USGS bin method with logarithmic class interval widths and 35 classes.

4. Significant, positive precipitation trends were found in annual, winter, spring and summer total precipitation at seven sites within and near the upper Gila watershed. The 1941-2000 and 1951-2000 periods had notable significant increases in precipitation at Lordsburg and Cliff, and at Fort Bayard, Lordsburg, Cliff, Redrock and Glenwood, respectively. Positive trends in annual maximum one-day total precipitation were notable at Gila Hot Springs (1958-2000) and at Mimbres Ranger Station (1951-2000 and 1961-2000 periods). There was no statistically significant increase in seasonal, annual or 1-day maximum precipitation at any of the eight stations analyzed for the 1971-2000 period.

5. There were significant positive trends in 3-day maximum flood discharge at the Gila River near Gila and Gila River near Virden gages. The trends were consistent for the 1931-2000 and 1941-2000 periods. In addition, there were increasing trends in peak flow, daily maximum and 3-day maximum at the Gila gage for 1931-2000, 1941-2000 and 1951-2000. These trends are similar to that found by Lins and Slack (1999), but opposite those found by Molnár and Ramírez (2001). Rasmussen and Perry (2001) found both increasing and decreasing peak flow trends in Kansas. There was no increase at the Virden gage for peak flow and 1-day maximum. Notably, there were no significant trends identified for flood discharge quantities at the five gaging station locations for the recent 40-year (1961-2000) or 30-year (1971-2000). Winter and annual 1-day maximum precipitation increases may partly explain flood discharge trend results. Many significant trends in high and low flow percentiles were also identified for the Gila and Virden gages.

This report was peer reviewed by Robert E. Swain, Technical Specialist, Flood Hydrology Group (D-8530). If you have any questions regarding the contents of this report, please contact John England at 303-445-2541 (jengland@do.usbr.gov).

REFERENCES

Aldridge, B.N., and Hales, T.A. (1984) Floods of November 1978 to March 1979 in Arizona and West-Central New Mexico. U.S. Geological Survey Water-Supply Paper 2241, 149 p.

Biedenharn, D.S., Copeland, Thorne, C.R., Soar, P.J., Hey, R.D. and Watson, C.C. (2000) Effective discharge calculation: A practical guide. U.S. Army Corps of Engineers, Engineer Research and Development Center, Coastal and Hydraulics Laboratory RECD/CHL Report TR-00-15, Vicksburg, MS, 48 p.

Burkham, D.E. (1970) Precipitation, Streamflow, and Major Floods at Selected Sites in the Gila River above Coolidge Dam, Arizona - Gila River Phreatophyte Project: U.S. Geological Survey Professional Paper 655-B, 33 p.

Cohn, T.A., Lane, W.L, and Baier, W.G. (1997) An algorithm for computing moments-based flood quantile estimates when historical information is available. Water Resour. Res. 33(9), pp. 2089-2096.

Cohn, T.A., Lane, W.L., and Stedinger, J.R. (2001) Confidence intervals for EMA flood quantile estimates. Water Resour. Res. 37(6), pp. 1695-1706.

Costa, J.E. and O'Connor, J.E. (1995) Geomorphically Effective Floods. In Costa, J.E. et al. (eds.) Natural and Anthropogenic Influences in Fluvial Geomorphology: The Wolman Volume, Geophysical Monograph Series, vol. 89, AGU, pp. 45-56.

Durrenberger, R.W., and Ingram, R.S. (1978) Major Storms and Floods in Arizona 1862-1977: Climatological Publications Precipitation Series No. 4, 44 p.

England, J.F. Jr. (1998) Assessment of Historical and Paleohydrologic Information in Flood Frequency Analysis. Unpublished M.S. Thesis, Department of Civil Engineering, Colorado State Univ., Fort Collins, Colorado, 292 p.

England, J.F. Jr. (1999) Draft User's manual for program EMA, At-Site Flood Frequency Analysis with Historical/Paleohydrologic Data. Flood Hydrology Group, Bureau of Reclamation, Denver, CO, 52 p.

Federal Interagency Stream Restoration Work Group (FISRWG) (1998) Stream Corridor Restoration Handbook: Principles, Processes and Practices. Natural Resource Conservation Service, USDA, Washington, D.C.

Flynn, K.M., Hummel, P.R., Lumb, A.M., and Kittle, J.L., Jr. (1995) User's manual for ANNIE, version 2, a computer program for interactive hydrologic data management. U.S. Geological Survey Water-Resources Investigations Report 95-4085, 211 p.

Frazier, A.H and Heckler, W. (1972) Embudo, New Mexico, Birthplace of Systematic Stream Gaging. U.S. Geological Survey Professional Paper 778, 23 p.

Helsel, D.M. and Hirsch, R.M. (1992) Statistical Methods in Water Resources, Studies in Environmental Science 49, Elsevier, Amsterdam, 529 p.

Hirsch, R.M., Helsel, D.R., Cohn, T.A. and Gilroy, E.J. (1993) Statistical Analysis of Hydrologic Data. In Handbook of Hydrology, Maidment, D.R. (ed.), McGraw-Hill, New York, Ch. 17, pp. 17.1-17.55.

Hirschboeck, K.K. (1985) Hydroclimatology of Flow Events in the Gila River Basin, Central and Southern Arizona. Ph.D. Thesis, University of Arizona, Tucson, Arizona, 335 p.

Hjalmarson, H.W. (1990) Flood of October 1983 and History of Flooding along the San Francisco River, Clifton, Arizona. U.S. Geological Survey Water-Resources Investigations Report 85-4225B, 42 p.

Interagency Committee on Water Data (IACWD) (1982) Guidelines for determining flood flow frequency: Bulletin 17-B. Hydrology Subcommittee, March 1982 (revised and corrected), 28 p. and appendices.

Karl, T.R. and Knight, R.W. (1998) Secular trends of precipitation amount, frequency and intensity in the United States. Bull. Am. Meteorol. Soc., 79(2), pp. 231-241.

Kunkel, K.E. (1991) General Climatology, New Mexico Floods and Droughts, in National Water Summary 1988-89-Hydrologic Events and Floods and Droughts, R.W. Paulson, E.B. Chase, R.S. Roberts, and D.W. Moody (compilers), U.S. Geological Survey Water-Supply Paper 2375, pp. 409-410.

Leopold, L.B. (1942) Areal extent of intense rainfalls, New Mexico and Arizona. Transactions, American Geophysical Union, vol. 23, pp. 558-566.

Lettenmaier, D.P., Wood, E.F., and Wallis, J.R. (1994) Hydro-climatological trends in the Continental United States, 1948-88. Journ. Climate 7(4), pp. 586-607.

Liebermann, T.D., Mueller, D.K., Kircher, J.E, and Choquette, A.F. (1989) Characteristics and Trends of Streamflow and Dissolved Solids on the Upper Colorado River Basin, Arizona, Colorado, New Mexico, Utah and Wyoming. U.S. Geological Survey Water-Supply Paper 2358, 64 p.

Lins, H.F. and Slack, J.R. (1999) Streamflow trends in the United States. Geophys. Res. Lett. 26(2), pp. 227-230.

Lumb, A.M., Kittle, J.L., Jr., and Flynn, K.M. (1990) Users manual for ANNIE, a computer program for interactive hydrologic analyses and data management. U.S. Geological Survey Water-Resources Investigations Report 89-4080, 236 p.

Lumb, A.M., Thomas, W.O., and Flynn, K.M. (1993) Users manual for SWSTAT, a computer program for interactive computation of surface-water statistics. U.S. Geological Survey Water-Resources Investigations Report 94-XXXX, Draft for Review Purposes Only, dated 10/14/1993, 48 p.

Milhous, R.T., Bartholomew, J.M., Updike, M.A., and Moos, A.R. (1990) Reference Manual for the Generation and Analysis of Habitat Time Series, Version II. Instream Flow Information Paper No. 27, U.S. Fish and Wildlife Service, Biol. Rep. 90 (16), 249 p.

Molnár, P. and Ramírez, J.A. (2001) Recent trends in precipitation and streamflow in the Rio Puerco basin. Journal of Climate, 14(10), pp. 2317-2328.

Mosley, M.P. and McKerchar, A.I. (1993) Streamflow. In Handbook of Hydrology, Maidment, D.R. (ed.), McGraw-Hill, New York, Ch. 8, pp. 8.1-8.39.

Ortiz, D., Lange, K. and Beal, L. (2001) Water Resources Data, New Mexico, Water Year 2000. U.S. Geological Survey Water-Data Report NM-00-1, 411 p.

Patterson, J.L. and Somers, W.P. (1966) Magnitude and frequency of floods in the United States – Part 9, Colorado River Basin. U.S. Geological Survey Water-Supply Paper 1683, 475 p.

Pope, G.L., Rigas, P.D., and Smith, C.F. (1998) Statistical summaries of streamflow data and characteristics of drainage basins for selected streamflow-gaging stations in Arizona through water year 1996: U.S. Geological Survey Water-Resources Investigations Report 98-4225, 907 p.

Rasmussen, T.J. and Perry, C.A. (2001) Trends in peak flows of selected streams in Kansas. U.S. Geological Survey Water-Resources Investigations Report 01-4203, 62 p.

Reiland, L.J., and Haynes, G.L., Jr. (1963) Flow Characteristics of New Mexico Streams; Flow-Duration, High Flow, and Low-Flow Tables for Selected Stations through Water Year 1959: New Mexico State Engineer Special Report, 342 p.

Roeske, R.H., Garrett, J.M., and Eychaner, J.H. (1989) Floods of October 1983 in southeastern Arizona. U.S. Geological Survey Water-Resources Investigations Report 85-4225-C, 77 p.

Russell, P. (1992) Gila Cliff Dwellings National Monument: An Administrative History. Southwest Cultural Resources Center Professional Papers No. 46, Southwest Region, Division of History, Santa Fe, NM.

Searcy, J.K. (1959) Flow-Duration Curves. Manual of Hydrology: Part 2. Low-Flow Techniques. U.S. Geological Survey Water-Supply Paper 1542-A, 33 p.

U.S. Geological Survey (USGS) (1954) compilation of records of surface waters of the United States through September 1950, Part 9, Colorado River Basin. U.S. Geological Survey Water-Supply Paper 1313, 749 p.

Vogel, R.M. and Fennessey, N.M. (1994) Flow Duration Curves I: New Interpretation and Confidence Intervals. Journ. of Water Resour. Plann. Mgmt., ASCE, 120(4), pp. 485-504.

Vogel, R.M. and Fennessey, N.M. (1995) Flow Duration Curves II: A Review of Applications in Water Resources Planning. Water Resources Bulletin, AWRA, 31(6), pp. 1029-1039.

Waltemeyer, S.D. (1996) Analysis of the magnitude and frequency of peak discharge and maximum observed peak discharge in New Mexico. U.S. Geological Survey Water-Resources Investigations Report 96-4112, 79 p.

APPENDIX A
PEAK DISCHARGE FREQUENCY INPUT/OUTPUT

```
*****************************************************
*      EXPECTED MOMENTS ALGORITHM PROGRAM EMA       *
*       COMPUTES EXCEEDENCE PROBABILITIES AND       *
* RETURN PERIOD ESTIMATES VIA PLOTTING POSITIONS,   *
*                                                   *
* AND COMPUTES MOMENTS, PARAMETERS, AND QUANTILES   *
*           ASSUMING A P-III DISTRIBUTION           *
*          FOR  HISTORICAL, PALEOHYDROLOGIC         *
*            AND SYSTEMATIC PEAK FLOW DATA          *
*                                                   *
*              USBR VERSION **BETA** 1.0            *
*              VERSION DATE: 07-06-1999             *
*****************************************************


  EMA Program Input File Name is:   gila-em1.in
  EMA Program Output File Name is:    gila-em1.out
  EMA Program Spreadsheet File Name is:    gila-em1.ss

   EMA Run Date is   7/26/2002
   EMA Run Time is   2:51:38:06 pm

     Gila River  near Gila, NM run 1
     Historical Information to 1892, threshold based on 1941 flood 25,400

              INPUT AND CALCULATED CONSTANTS

  Number of User-Input Bounds is:    1

Bound     nh    neprim      tl           tu          nn     kk    kt     pe
  1        36     0          0.00    25400.00       109     3     0  0.027523

     Alpha        ns        ne       nqt    nfb_sum   kk_sum    n_qmax
      .400        73         3        73      74         3          109

   User has selected the Cunnane plotting position
   for estimating exceedance probabilities and relative goodness-of-fit

   User has selected log-Pearson Type III distribution
                  (Base 10 logarithms)

     rskew     rwgt       bias     tol    log
     0.000     0.000      1.0    0.1E-05   1

     run mode       conf lim type
        1                1

  Input no. of discharges to estimate exceed. prob  2

  Input Discharge Values
       32400.00
       35200.00

  INPUT YEAR AND DISCHARGE VALUES FOR PLOTTING
       Year    Discharge      tl             tu
       1928      1600.00      1600.00      1600.00
       1929      3100.00      3100.00      3100.00
       1930      3300.00      3300.00      3300.00
       1931      1050.00      1050.00      1050.00
       1932      2310.00      2310.00      2310.00
       1933       732.00       732.00       732.00
       1934       875.00       875.00       875.00
       1935       615.00       615.00       615.00
       1936      1520.00      1520.00      1520.00
       1937      6110.00      6110.00      6110.00
       1938      1820.00      1820.00      1820.00
```

1939	1190.00	1190.00	1190.00
1940	2370.00	2370.00	2370.00
1941	25400.00	25400.00	25400.00
1942	930.00	930.00	930.00
1943	730.00	730.00	730.00
1944	2500.00	2500.00	2500.00
1945	530.00	530.00	530.00
1946	605.00	605.00	605.00
1947	1980.00	1980.00	1980.00
1948	480.00	480.00	480.00
1949	12000.00	12000.00	12000.00
1950	318.00	318.00	318.00
1951	105.00	105.00	105.00
1952	4870.00	4870.00	4870.00
1953	930.00	930.00	930.00
1954	2100.00	2100.00	2100.00
1955	1350.00	1350.00	1350.00
1956	1760.00	1760.00	1760.00
1957	2230.00	2230.00	2230.00
1958	4120.00	4120.00	4120.00
1959	682.00	682.00	682.00
1960	2040.00	2040.00	2040.00
1961	318.00	318.00	318.00
1962	5040.00	5040.00	5040.00
1963	842.00	842.00	842.00
1964	5160.00	5160.00	5160.00
1965	1710.00	1710.00	1710.00
1966	6240.00	6240.00	6240.00
1967	5210.00	5210.00	5210.00
1968	1620.00	1620.00	1620.00
1969	702.00	702.00	702.00
1970	439.00	439.00	439.00
1971	1010.00	1010.00	1010.00
1972	9130.00	9130.00	9130.00
1973	12500.00	12500.00	12500.00
1974	712.00	712.00	712.00
1975	3620.00	3620.00	3620.00
1976	2460.00	2460.00	2460.00
1977	696.00	696.00	696.00
1978	4790.00	4790.00	4790.00
1979	32400.00	32400.00	32400.00
1980	3430.00	3430.00	3430.00
1981	862.00	862.00	862.00
1982	944.00	944.00	944.00
1983	1830.00	1830.00	1830.00
1984	15000.00	15000.00	15000.00
1985	35200.00	35200.00	35200.00
1986	9320.00	9320.00	9320.00
1987	2460.00	2460.00	2460.00
1988	14400.00	14400.00	14400.00
1989	451.00	451.00	451.00
1990	687.00	687.00	687.00
1991	4670.00	4670.00	4670.00
1992	2780.00	2780.00	2780.00
1993	14200.00	14200.00	14200.00
1994	404.00	404.00	404.00
1995	16700.00	16700.00	16700.00
1996	2530.00	2530.00	2530.00
1997	18200.00	18200.00	18200.00
1998	2120.00	2120.00	2120.00
1999	2780.00	2780.00	2780.00
2000	111.00	111.00	111.00

SORTED DISCHARGE VALUES, CALCULATED EXCEEDANCE PROBABILITIES
AND RETURN PERIOD ESTIMATES

i	Year	Discharge	Exceed. Prob. P (%)	Rt. Per. T
1	1985	35200.00	0.5161	193.7778
2	1979	32400.00	1.3761	72.6667
3	1941	25400.00	2.2362	44.7179

4	1997	18200.00	3.5835	27.9059
5	1995	16700.00	4.9688	20.1257
6	1984	15000.00	6.3541	15.7380
7	1988	14400.00	7.7394	12.9210
8	1993	14200.00	9.1247	10.9593
9	1973	12500.00	10.5099	9.5148
10	1949	12000.00	11.8952	8.4067
11	1986	9320.00	13.2805	7.5298
12	1972	9130.00	14.6658	6.8186
13	1966	6240.00	16.0511	6.2301
14	1937	6110.00	17.4364	5.7351
15	1967	5210.00	18.8217	5.3130
16	1964	5160.00	20.2070	4.9488
17	1962	5040.00	21.5923	4.6313
18	1952	4870.00	22.9776	4.3521
19	1978	4790.00	24.3629	4.1046
20	1991	4670.00	25.7482	3.8838
21	1958	4120.00	27.1335	3.6855
22	1975	3620.00	28.5188	3.5065
23	1980	3430.00	29.9041	3.3440
24	1930	3300.00	31.2894	3.1960
25	1929	3100.00	32.6747	3.0605
26	1999	2780.00	34.0600	2.9360
27	1992	2780.00	35.4453	2.8213
28	1996	2530.00	36.8305	2.7151
29	1944	2500.00	38.2158	2.6167
30	1987	2460.00	39.6011	2.5252
31	1976	2460.00	40.9864	2.4398
32	1940	2370.00	42.3717	2.3601
33	1932	2310.00	43.7570	2.2853
34	1957	2230.00	45.1423	2.2152
35	1998	2120.00	46.5276	2.1493
36	1954	2100.00	47.9129	2.0871
37	1960	2040.00	49.2982	2.0285
38	1947	1980.00	50.6835	1.9730
39	1983	1830.00	52.0688	1.9205
40	1938	1820.00	53.4541	1.8708
41	1956	1760.00	54.8394	1.8235
42	1965	1710.00	56.2247	1.7786
43	1968	1620.00	57.6100	1.7358
44	1928	1600.00	58.9953	1.6951
45	1936	1520.00	60.3806	1.6562
46	1955	1350.00	61.7659	1.6190
47	1939	1190.00	63.1512	1.5835
48	1931	1050.00	64.5364	1.5495
49	1971	1010.00	65.9217	1.5170
50	1982	944.00	67.3070	1.4857
51	1953	930.00	68.6923	1.4558
52	1942	930.00	70.0776	1.4270
53	1934	875.00	71.4629	1.3993
54	1981	862.00	72.8482	1.3727
55	1963	842.00	74.2335	1.3471
56	1933	732.00	75.6188	1.3224
57	1943	730.00	77.0041	1.2986
58	1974	712.00	78.3894	1.2757
59	1969	702.00	79.7747	1.2535
60	1977	696.00	81.1600	1.2321
61	1990	687.00	82.5453	1.2115
62	1959	682.00	83.9306	1.1915
63	1935	615.00	85.3159	1.1721
64	1946	605.00	86.7012	1.1534
65	1945	530.00	88.0865	1.1352
66	1948	480.00	89.4718	1.1177
67	1989	451.00	90.8571	1.1006
68	1970	439.00	92.2423	1.0841
69	1994	404.00	93.6276	1.0681
70	1961	318.00	95.0129	1.0525
71	1950	318.00	96.3982	1.0374
72	2000	111.00	97.7835	1.0227
73	1951	105.00	99.1688	1.0084

Initial EMA Calculated Moments

Mean	Variance	Skew
3.318524	0.300608	0.179904

Number of Iterations for EMA Convergence is: 20

EMA CALCULATED MOMENTS
(Log-10 Moments)

Mean	Variance	Std. Dev	Skew
3.303810	0.284408	0.533299	0.106701

The user chose rskew = 0.000 and rwgt = 0.0
The EMA Moments reflect this regional skew adjustment

FINAL PIII/LP-III PARAMETERS

Location (Tau)	Shape (Alpha)	Scale (Beta)
-6.692342	351.336704	0.028452

QUANTILES OF THE LOG-PEARSON TYPE III DISTRIBUTION

i	Q	EXCEED PROB P (%)	T
1	127.40	99.00000	1.010
2	152.01	98.50000	1.015
3	173.50	98.00000	1.020
4	193.09	97.50000	1.026
5	245.49	96.00000	1.042
6	277.38	95.00000	1.053
7	423.39	90.00000	1.111
8	493.94	87.50000	1.143
9	564.99	85.00000	1.176
10	637.44	82.50000	1.212
11	711.92	80.00000	1.250
12	789.01	77.50000	1.290
13	869.21	75.00000	1.333
14	953.01	72.50000	1.379
15	1040.93	70.00000	1.429
16	1133.49	67.50000	1.481
17	1165.48	66.66670	1.500
18	1231.28	65.00000	1.538
19	1334.91	62.50000	1.600
20	1445.11	60.00000	1.667
21	1562.66	57.50000	1.739
22	1688.49	55.00000	1.818
23	1823.65	52.50000	1.905
24	1969.37	50.00000	2.000
25	2127.10	47.50000	2.105
26	2298.56	45.00000	2.222
27	2485.81	42.50000	2.353
28	2691.36	40.00000	2.500
29	2918.29	37.50000	2.667
30	3170.41	35.00000	2.857
31	3452.56	32.50000	3.077
32	3770.94	30.00000	3.333
33	4133.65	27.50000	3.636
34	4551.57	25.00000	4.000
35	5039.61	22.50000	4.444
36	5618.98	20.00000	5.000
37	6320.99	17.50000	5.714
38	7194.23	15.00000	6.667
39	8319.20	12.50000	8.000
40	9841.54	10.00000	10.000
41	12060.92	7.50000	13.333
42	15735.64	5.00000	20.000

43	18060.91	4.00000	25.000
44	23754.15	2.50000	40.000
45	26874.72	2.00000	50.000
46	33319.13	1.33334	75.000
47	38558.99	1.00000	100.000
48	53812.58	0.50000	200.000
49	80898.95	0.20000	500.000
50	107947.59	0.10000	1000.000
51	142017.22	0.05000	2000.000
52	200390.99	0.02000	5000.000
53	256954.38	0.01000	10000.000

RELATIVE GOODNESS-OF-FIT

i	Exceed. Prob	Q Observed	Q Estimated	Relative Difference
1	0.0051606	35200.00	53028.09	0.5065
2	0.0137615	32400.00	32778.65	0.0117
3	0.0223624	25400.00	25277.61	-0.0048
4	0.0358347	18200.00	19292.66	0.0600
5	0.0496877	16700.00	15797.87	-0.0540
6	0.0635406	15000.00	13482.26	-0.1012
7	0.0773936	14400.00	11803.68	-0.1803
8	0.0912465	14200.00	10515.70	-0.2595
9	0.1050995	12500.00	9487.76	-0.2410
10	0.1189524	12000.00	8643.29	-0.2797
11	0.1328054	9320.00	7934.01	-0.1487
12	0.1466583	9130.00	7327.72	-0.1974
13	0.1605113	6240.00	6802.04	0.0901
14	0.1743642	6110.00	6340.82	0.0378
15	0.1882172	5210.00	5932.12	0.1386
16	0.2020701	5160.00	5566.87	0.0789
17	0.2159231	5040.00	5238.03	0.0393
18	0.2297760	4870.00	4940.08	0.0144
19	0.2436290	4790.00	4668.57	-0.0254
20	0.2574819	4670.00	4419.92	-0.0536
21	0.2713348	4120.00	4191.16	0.0173
22	0.2851878	3620.00	3979.87	0.0994
23	0.2990407	3430.00	3783.98	0.1032
24	0.3128937	3300.00	3601.76	0.0914
25	0.3267466	3100.00	3431.75	0.1070
26	0.3405996	2780.00	3272.68	0.1772
27	0.3544525	2780.00	3123.46	0.1235
28	0.3683055	2530.00	2983.15	0.1791
29	0.3821584	2500.00	2850.92	0.1404
30	0.3960114	2460.00	2726.05	0.1081
31	0.4098643	2460.00	2607.89	0.0601
32	0.4237173	2370.00	2495.89	0.0531
33	0.4375702	2310.00	2389.54	0.0344
34	0.4514232	2230.00	2288.40	0.0262
35	0.4652761	2120.00	2192.05	0.0340
36	0.4791291	2100.00	2100.15	0.0001
37	0.4929820	2040.00	2012.37	-0.0135
38	0.5068350	1980.00	1928.41	-0.0261
39	0.5206879	1830.00	1848.00	0.0098
40	0.5345409	1820.00	1770.90	-0.0270
41	0.5483938	1760.00	1696.88	-0.0359
42	0.5622468	1710.00	1625.76	-0.0493
43	0.5760997	1620.00	1557.33	-0.0387
44	0.5899527	1600.00	1491.42	-0.0679
45	0.6038056	1520.00	1427.88	-0.0606
46	0.6176586	1350.00	1366.56	0.0123
47	0.6315115	1190.00	1307.32	0.0986
48	0.6453645	1050.00	1250.03	0.1905
49	0.6592174	1010.00	1194.58	0.1828
50	0.6730704	944.00	1140.85	0.2085
51	0.6869233	930.00	1088.73	0.1707
52	0.7007763	930.00	1038.13	0.1163
53	0.7146292	875.00	988.95	0.1302
54	0.7284822	862.00	941.10	0.0918
55	0.7423351	842.00	894.49	0.0623

56	0.7561881	732.00	849.04	0.1599
57	0.7700410	730.00	804.65	0.1023
58	0.7838940	712.00	761.25	0.0692
59	0.7977469	702.00	718.75	0.0239
60	0.8115999	696.00	677.07	-0.0272
61	0.8254528	687.00	636.11	-0.0741
62	0.8393058	682.00	595.77	-0.1264
63	0.8531587	615.00	555.96	-0.0960
64	0.8670117	605.00	516.54	-0.1462
65	0.8808646	530.00	477.38	-0.0993
66	0.8947176	480.00	438.31	-0.0869
67	0.9085705	451.00	399.11	-0.1151
68	0.9224235	439.00	359.48	-0.1811
69	0.9362764	404.00	318.99	-0.2104
70	0.9501294	318.00	276.98	-0.1290
71	0.9639823	318.00	232.25	-0.2697
72	0.9778353	111.00	182.17	0.6412
73	0.9916882	105.00	117.93	0.1231

GOODNESS-OF-FIT
Via Average Relative Deviations (ARD) and Mean Squared Deviations (MSD)

Number of observations: 73
Number of observations that exceed any threshold/bound: 3

All Observations

ARD	MSD
0.1117	0.0233

Maximum Observed

ARD_Q1	MSD_Q1
0.5065	0.2565

Above-Threshold Values

ARD_QK	MSD_QK
0.1743	0.0856

NON-EXCEEDANCE PROBABILITY TEST FOR LARGEST OBSERVATION

n_Qmax	Q_max	cdf	Ret. Per.	p*
109	35200.00	0.988020	83.471	0.269

p* is within acceptable range (0.05, 0.95)

Probability Plot Correlation Statistic
for Observations below all Thresholds/Bounds is 0.9839

ESTIMATED EXCEEDANCE PROBABILITIES FROM FITTED DISTRIBUTION

i	Input Q	Exceed Prob P (%)	T
1	32400.00	1.40729	71.059
2	35200.00	1.19803	83.471

Total EMA Program Run time: 0.010 seconds

Gila R nr Gila CI run 1

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.3038	0.5333	0.0000	0.0000	0.1067

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
				0.99000	127	85	178
				0.98000	174	120	236
				0.97500	193	135	261
				0.96000	246	176	325
				0.95000	277	201	364
				0.90000	423	319	540
				0.80000	712	560	882
				0.70000	1041	838	1272

0.60000	1445	1180	1755
0.57040	1585	1298	1924
0.50000	1969	1621	2392
0.42960	2450	2019	2988
0.40000	2691	2217	3291
0.30000	3771	3089	4677
0.20000	5619	4537	7142
0.10000	9841	7703	13089
0.05000	15735	11921	21883
0.04000	18060	13541	25467
0.02500	23753	17430	34463
0.02000	26874	19523	39506
0.01000	38558	27179	58957
0.00500	53812	36852	85409
0.00200	80900	53428	134531
0.00100	107950	69451	185630
0.00050	142023	89097	252209
0.00010	256980	152533	489636

```
****************************************************
*     EXPECTED MOMENTS ALGORITHM PROGRAM EMA       *
*      COMPUTES EXCEEDENCE PROBABILITIES AND       *
* RETURN PERIOD ESTIMATES VIA PLOTTING POSITIONS,  *
*                                                  *
* AND COMPUTES MOMENTS, PARAMETERS, AND QUANTILES  *
*          ASSUMING A P-III DISTRIBUTION           *
*         FOR  HISTORICAL, PALEOHYDROLOGIC         *
*           AND SYSTEMATIC PEAK FLOW DATA          *
*                                                  *
*             USBR VERSION **BETA** 1.0            *
*             VERSION DATE: 07-06-1999             *
****************************************************
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  EMA Program Input File Name is:   redrock-em1.in
  EMA Program Output File Name is:    redrock-em1.out
  EMA Program Spreadsheet File Name is:    redrock-em1.ss

   EMA Run Date is   7/26/2002
   EMA Run Time is   2:52:18:99 pm

     Gila River near Redrock, NM run 1
     Historical Information to 1892, threshold based on 1941 flood 40,000


              INPUT AND CALCULATED CONSTANTS

  Number of User-Input Bounds is:     1

Bound     nh    neprim     tl          tu          nn      kk    kt     pe
  1        47     0          0.00   40000.00       109     2     0  0.018349

     Alpha       ns       ne       nqt    nfb_sum    kk_sum    n_qmax
      .400       62       2        62      63          2         109

   User has selected the Cunnane plotting position
   for estimating exceedance probabilities and relative goodness-of-fit

   User has selected log-Pearson Type III distribution
                   (Base 10 logarithms)

     rskew     rwgt      bias     tol    log
     0.000     0.000      1.0   0.1E-05    1

     run mode       conf lim type
        1                1

  Input no. of discharges to estimate exceed. prob  2
```

Input Discharge Values
40000.00
48800.00

INPUT YEAR AND DISCHARGE VALUES FOR PLOTTING

Year	Discharge	tl	tu
1906	15000.00	15000.00	15000.00
1911	18000.00	18000.00	18000.00
1929	6900.00	6900.00	6900.00
1930	5460.00	5460.00	5460.00
1931	7800.00	7800.00	7800.00
1932	4800.00	4800.00	4800.00
1933	2890.00	2890.00	2890.00
1934	7480.00	7480.00	7480.00
1935	4600.00	4600.00	4600.00
1936	6260.00	6260.00	6260.00
1937	11800.00	11800.00	11800.00
1938	7940.00	7940.00	7940.00
1939	4350.00	4350.00	4350.00
1940	15300.00	15300.00	15300.00
1941	40000.00	40000.00	40000.00
1942	3940.00	3940.00	3940.00
1943	2670.00	2670.00	2670.00
1944	4120.00	4120.00	4120.00
1945	1810.00	1810.00	1810.00
1946	5500.00	5500.00	5500.00
1947	6100.00	6100.00	6100.00
1948	4930.00	4930.00	4930.00
1949	18200.00	18200.00	18200.00
1950	4560.00	4560.00	4560.00
1951	454.00	454.00	454.00
1952	9100.00	9100.00	9100.00
1953	7700.00	7700.00	7700.00
1954	10400.00	10400.00	10400.00
1955	9500.00	9500.00	9500.00
1963	3500.00	3500.00	3500.00
1964	3360.00	3360.00	3360.00
1965	4130.00	4130.00	4130.00
1966	16800.00	16800.00	16800.00
1967	6860.00	6860.00	6860.00
1968	2970.00	2970.00	2970.00
1969	3050.00	3050.00	3050.00
1970	1330.00	1330.00	1330.00
1971	4600.00	4600.00	4600.00
1972	7640.00	7640.00	7640.00
1973	26200.00	26200.00	26200.00
1974	1520.00	1520.00	1520.00
1975	6740.00	6740.00	6740.00
1976	3810.00	3810.00	3810.00
1977	3270.00	3270.00	3270.00
1978	12700.00	12700.00	12700.00
1979	48800.00	48800.00	48800.00
1980	6180.00	6180.00	6180.00
1981	5470.00	5470.00	5470.00
1982	2990.00	2990.00	2990.00
1983	10800.00	10800.00	10800.00
1984	26300.00	26300.00	26300.00
1985	39100.00	39100.00	39100.00
1986	7210.00	7210.00	7210.00
1987	3610.00	3610.00	3610.00
1988	16600.00	16600.00	16600.00
1989	503.00	503.00	503.00
1990	1360.00	1360.00	1360.00
1991	11600.00	11600.00	11600.00
1992	5290.00	5290.00	5290.00
1993	25500.00	25500.00	25500.00
1994	827.00	827.00	827.00
1995	20400.00	20400.00	20400.00

SORTED DISCHARGE VALUES, CALCULATED EXCEEDANCE PROBABILITIES
AND RETURN PERIOD ESTIMATES

i	Year	Discharge	Exceed. Prob. P (%)	Rt. Per. T
1	1979	48800.00	0.5004	199.8333
2	1941	40000.00	1.3344	74.9375
3	1985	39100.00	2.8133	35.5460
4	1984	26300.00	4.4439	22.5027
5	1973	26200.00	6.0746	16.4621
6	1993	25500.00	7.7052	12.9782
7	1995	20400.00	9.3359	10.7114
8	1949	18200.00	10.9665	9.1187
9	1911	18000.00	12.5972	7.9383
10	1966	16800.00	14.2278	7.0285
11	1988	16600.00	15.8585	6.3058
12	1940	15300.00	17.4891	5.7178
13	1906	15000.00	19.1198	5.2302
14	1978	12700.00	20.7504	4.8192
15	1937	11800.00	22.3811	4.4681
16	1991	11600.00	24.0117	4.1646
17	1983	10800.00	25.6424	3.8998
18	1954	10400.00	27.2730	3.6666
19	1955	9500.00	28.9037	3.4598
20	1952	9100.00	30.5343	3.2750
21	1938	7940.00	32.1650	3.1090
22	1931	7800.00	33.7956	2.9590
23	1953	7700.00	35.4263	2.8228
24	1972	7640.00	37.0569	2.6986
25	1934	7480.00	38.6876	2.5848
26	1986	7210.00	40.3182	2.4803
27	1929	6900.00	41.9489	2.3839
28	1967	6860.00	43.5795	2.2947
29	1975	6740.00	45.2102	2.2119
30	1936	6260.00	46.8408	2.1349
31	1980	6180.00	48.4715	2.0631
32	1947	6100.00	50.1021	1.9959
33	1946	5500.00	51.7328	1.9330
34	1981	5470.00	53.3634	1.8739
35	1930	5460.00	54.9941	1.8184
36	1992	5290.00	56.6247	1.7660
37	1948	4930.00	58.2554	1.7166
38	1932	4800.00	59.8860	1.6698
39	1971	4600.00	61.5167	1.6256
40	1935	4600.00	63.1473	1.5836
41	1950	4560.00	64.7780	1.5437
42	1939	4350.00	66.4086	1.5058
43	1965	4130.00	68.0393	1.4697
44	1944	4120.00	69.6699	1.4353
45	1942	3940.00	71.3006	1.4025
46	1976	3810.00	72.9312	1.3712
47	1987	3610.00	74.5619	1.3412
48	1963	3500.00	76.1925	1.3125
49	1964	3360.00	77.8232	1.2850
50	1977	3270.00	79.4538	1.2586
51	1969	3050.00	81.0845	1.2333
52	1982	2990.00	82.7151	1.2090
53	1968	2970.00	84.3458	1.1856
54	1933	2890.00	85.9764	1.1631
55	1943	2670.00	87.6071	1.1415
56	1945	1810.00	89.2377	1.1206
57	1974	1520.00	90.8684	1.1005
58	1990	1360.00	92.4990	1.0811
59	1970	1330.00	94.1297	1.0624
60	1994	827.00	95.7603	1.0443
61	1989	503.00	97.3910	1.0268
62	1951	454.00	99.0216	1.0099

Initial EMA Calculated Moments

Mean	Variance	Skew
3.789275	0.179573	-0.304532

Number of Iterations for EMA Convergence is: 34

EMA CALCULATED MOMENTS
(Log-10 Moments)

Mean	Variance	Std. Dev	Skew
3.779984	0.172734	0.415613	-0.368146

The user chose rskew = 0.000 and rwgt = 0.0
The EMA Moments reflect this regional skew adjustment

FINAL PIII/LP-III PARAMETERS

Location (Tau)	Shape (Alpha)	Scale (Beta)
6.037858	29.513491	-0.076503

QUANTILES OF THE LOG-PEARSON TYPE III DISTRIBUTION

i	Q	EXCEED PROB P (%)	T
1	503.94	99.00000	1.010
2	610.47	98.50000	1.015
3	702.73	98.00000	1.020
4	786.18	97.50000	1.026
5	1005.80	96.00000	1.042
6	1136.85	95.00000	1.053
7	1712.66	90.00000	1.111
8	1977.83	87.50000	1.143
9	2237.30	85.00000	1.176
10	2494.60	82.50000	1.212
11	2752.17	80.00000	1.250
12	3011.89	77.50000	1.290
13	3275.27	75.00000	1.333
14	3543.64	72.50000	1.379
15	3818.22	70.00000	1.429
16	4100.21	67.50000	1.481
17	4196.05	66.66670	1.500
18	4390.77	65.00000	1.538
19	4691.13	62.50000	1.600
20	5002.56	60.00000	1.667
21	5326.45	57.50000	1.739
22	5664.33	55.00000	1.818
23	6017.88	52.50000	1.905
24	6389.00	50.00000	2.000
25	6779.89	47.50000	2.105
26	7193.06	45.00000	2.222
27	7631.43	42.50000	2.353
28	8098.48	40.00000	2.500
29	8598.36	37.50000	2.667
30	9136.09	35.00000	2.857
31	9717.83	32.50000	3.077
32	10351.27	30.00000	3.333
33	11046.18	27.50000	3.636
34	11815.22	25.00000	4.000
35	12675.21	22.50000	4.444
36	13649.17	20.00000	5.000
37	14769.72	17.50000	5.714
38	16085.22	15.00000	6.667
39	17671.76	12.50000	8.000
40	19658.89	10.00000	10.000
41	22294.29	7.50000	13.333
42	26147.99	5.00000	20.000
43	28337.34	4.00000	25.000
44	33104.33	2.50000	40.000
45	35439.87	2.00000	50.000
46	39799.61	1.33334	75.000
47	42981.55	1.00000	100.000

48	50938.63	0.50000	200.000
49	62053.79	0.20000	500.000
50	70882.48	0.10000	1000.000
51	80047.25	0.05000	2000.000
52	92639.33	0.02000	5000.000
53	102497.07	0.01000	10000.000

RELATIVE GOODNESS-OF-FIT

i	Exceed. Prob	Q Observed	Q Estimated	Relative Difference
1	0.0050042	48800.00	50928.82	0.0436
2	0.0133445	40000.00	39790.55	-0.0052
3	0.0281325	39100.00	31887.42	-0.1845
4	0.0444390	26300.00	27298.81	0.0380
5	0.0607455	26200.00	24277.58	-0.0734
6	0.0770520	25500.00	22043.51	-0.1355
7	0.0933585	20400.00	20280.93	-0.0058
8	0.1096650	18200.00	18831.24	0.0347
9	0.1259715	18000.00	17603.71	-0.0220
10	0.1422780	16800.00	16541.71	-0.0154
11	0.1585845	16600.00	15607.56	-0.0598
12	0.1748910	15300.00	14774.99	-0.0343
13	0.1911975	15000.00	14024.93	-0.0650
14	0.2075040	12700.00	13343.15	0.0506
15	0.2238105	11800.00	12718.76	0.0779
16	0.2401170	11600.00	12143.21	0.0468
17	0.2564235	10800.00	11609.70	0.0750
18	0.2727300	10400.00	11112.73	0.0685
19	0.2890365	9500.00	10647.78	0.1208
20	0.3053430	9100.00	10211.09	0.1221
21	0.3216495	7940.00	9799.53	0.2342
22	0.3379560	7800.00	9410.42	0.2065
23	0.3542625	7700.00	9041.48	0.1742
24	0.3705691	7640.00	8690.75	0.1375
25	0.3868756	7480.00	8356.52	0.1172
26	0.4031821	7210.00	8037.31	0.1147
27	0.4194886	6900.00	7731.80	0.1206
28	0.4357951	6860.00	7438.84	0.0844
29	0.4521016	6740.00	7157.40	0.0619
30	0.4684081	6260.00	6886.56	0.1001
31	0.4847146	6180.00	6625.50	0.0721
32	0.5010211	6100.00	6373.48	0.0448
33	0.5173276	5500.00	6129.81	0.1145
34	0.5336341	5470.00	5893.89	0.0775
35	0.5499406	5460.00	5665.15	0.0376
36	0.5662471	5290.00	5443.07	0.0289
37	0.5825536	4930.00	5227.19	0.0603
38	0.5988601	4800.00	5017.04	0.0452
39	0.6151666	4600.00	4812.23	0.0461
40	0.6314731	4600.00	4612.35	0.0027
41	0.6477796	4560.00	4417.03	-0.0314
42	0.6640861	4350.00	4225.93	-0.0285
43	0.6803926	4130.00	4038.70	-0.0221
44	0.6966991	4120.00	3855.01	-0.0643
45	0.7130056	3940.00	3674.53	-0.0674
46	0.7293121	3810.00	3496.94	-0.0822
47	0.7456186	3610.00	3321.90	-0.0798
48	0.7619251	3500.00	3149.09	-0.1003
49	0.7782316	3360.00	2978.14	-0.1136
50	0.7945381	3270.00	2808.68	-0.1411
51	0.8108446	3050.00	2640.28	-0.1343
52	0.8271511	2990.00	2472.48	-0.1731
53	0.8434576	2970.00	2304.73	-0.2240
54	0.8597641	2890.00	2136.38	-0.2608
55	0.8760706	2670.00	1966.63	-0.2634
56	0.8923771	1810.00	1794.40	-0.0086
57	0.9086836	1520.00	1618.27	0.0646
58	0.9249901	1360.00	1436.14	0.0560
59	0.9412966	1330.00	1244.70	-0.0641
60	0.9576031	827.00	1038.06	0.2552

61	0.9739096	503.00	803.50	0.5974
62	0.9902161	454.00	498.86	0.0988

GOODNESS-OF-FIT
Via Average Relative Deviations (ARD) and Mean Squared Deviations (MSD)

Number of observations: 62
Number of observations that exceed any threshold/bound: 2

All Observations

ARD	MSD
0.0982	0.0180

Maximum Observed

ARD_Q1	MSD_Q1
0.0436	0.0019

Above-Threshold Values

ARD_QK	MSD_QK
0.0244	0.0010

NON-EXCEEDANCE PROBABILITY TEST FOR LARGEST OBSERVATION

n_Qmax	Q_max	cdf	Ret. Per.	p*
109	48800.00	0.993997	166.570	0.519

p* is within acceptable range (0.05, 0.95)

Probability Plot Correlation Statistic
for Observations below all Thresholds/Bounds is 0.9882

ESTIMATED EXCEEDANCE PROBABILITIES FROM FITTED DISTRIBUTION

i	Input Q	Exceed Prob P (%)	T
1	40000.00	1.30914	76.386
2	48800.00	0.60035	166.570

Total EMA Program Run time: 0.010 seconds

Redrock CI

i,EXCEED PROB P (%),T,Q,STD_DEV (Q),CI_LOW,CI_HIGH

1,99.00000,	1.010,	503.95,	1.45,	184.20,	798.00
2,98.50000,	1.015,	610.48,	1.40,	253.89,	928.63
3,98.00000,	1.020,	702.74,	1.36,	319.33,	1039.89
4,97.50000,	1.026,	786.19,	1.34,	381.88,	1139.45
5,96.00000,	1.042,	1005.81,	1.28,	558.08,	1398.29
6,95.00000,	1.053,	1136.87,	1.26,	669.00,	1551.37
7,90.00000,	1.111,	1712.67,	1.20,	1180.06,	2220.07
8,87.50000,	1.143,	1977.85,	1.18,	1419.23,	2528.35
9,85.00000,	1.176,	2237.32,	1.17,	1652.34,	2831.15
10,82.50000,	1.212,	2494.62,	1.16,	1881.82,	3132.93
11,80.00000,	1.250,	2752.20,	1.15,	2109.65,	3436.77
12,77.50000,	1.290,	3011.92,	1.15,	2337.51,	3744.96
13,75.00000,	1.333,	3275.30,	1.15,	2566.89,	4059.36
14,72.50000,	1.379,	3543.67,	1.14,	2799.13,	4381.52
15,70.00000,	1.429,	3818.26,	1.14,	3035.46,	4712.84
16,67.50000,	1.481,	4100.24,	1.14,	3277.05,	5054.59
17,66.66670,	1.500,	4196.08,	1.14,	3358.94,	5171.03
18,65.00000,	1.538,	4390.81,	1.14,	3525.05,	5408.01
19,62.50000,	1.600,	4691.16,	1.13,	3780.62,	5774.35
20,60.00000,	1.667,	5002.60,	1.13,	4044.94,	6154.89
21,57.50000,	1.739,	5326.49,	1.13,	4319.25,	6551.03
22,55.00000,	1.818,	5664.37,	1.13,	4604.90,	6964.27
23,52.50000,	1.905,	6017.92,	1.13,	4903.34,	7396.30
24,50.00000,	2.000,	6389.05,	1.13,	5216.21,	7849.07
25,47.50000,	2.105,	6779.94,	1.13,	5545.36,	8324.78
26,45.00000,	2.222,	7193.11,	1.13,	5892.88,	8826.07
27,42.50000,	2.353,	7631.49,	1.13,	6261.20,	9356.04

28,40.00000,	2.500,	8098.54,	1.13,	6653.19,	9918.43
29,37.50000,	2.667,	8598.43,	1.13,	7072.23,	10517.83
30,35.00000,	2.857,	9136.16,	1.13,	7522.39,	11159.94
31,32.50000,	3.077,	9717.90,	1.13,	8008.64,	11851.95
32,30.00000,	3.333,	10351.34,	1.12,	8537.14,	12603.12
33,27.50000,	3.636,	11046.25,	1.12,	9115.66,	13425.62
34,25.00000,	4.000,	11815.30,	1.12,	9754.24,	14335.85
35,22.50000,	4.444,	12675.30,	1.12,	10466.11,	15356.54
36,20.00000,	5.000,	13649.26,	1.12,	11269.36,	16520.23
37,17.50000,	5.714,	14769.81,	1.12,	12189.50,	17875.39
38,15.00000,	6.667,	16085.32,	1.12,	13264.24,	19497.73
39,12.50000,	8.000,	17671.87,	1.12,	14552.45,	21512.66
40,10.00000,	10.000,	19659.00,	1.13,	16152.41,	24144.32
41, 7.50000,	13.333,	22294.42,	1.13,	18242.78,	27838.03
42, 5.00000,	20.000,	26148.14,	1.14,	21193.08,	33646.55
43, 4.00000,	25.000,	28337.49,	1.15,	22788.79,	37141.60
44, 2.50000,	40.000,	33104.49,	1.18,	26015.29,	45195.42
45, 2.00000,	50.000,	35440.05,	1.19,	27466.44,	49359.12
46, 1.33334,	75.000,	39799.80,	1.21,	29955.23,	57525.94
47, 1.00000,	100.000,	42981.75,	1.23,	31603.74,	63824.73
48, 0.50000,	200.000,	50938.85,	1.28,	35191.83,	80913.65
49, 0.20000,	500.000,	62054.04,	1.36,	39188.41,	108283.28
50, 0.10000,	1000.000,	70882.74,	1.42,	41731.66,	133249.78
51, 0.05000,	2000.000,	80047.49,	1.48,	43926.70,	162526.05
52, 0.02000,	5000.000,	92639.64,	1.57,	46385.22,	209031.12
53, 0.01000,	10000.000,	102497.39,	1.64,	47959.17,	251132.52

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***************************************************
*     EXPECTED MOMENTS ALGORITHM PROGRAM EMA      *
*       COMPUTES EXCEEDENCE PROBABILITIES AND     *
* RETURN PERIOD ESTIMATES VIA PLOTTING POSITIONS, *
*                                                 *
* AND COMPUTES MOMENTS, PARAMETERS, AND QUANTILES *
*           ASSUMING A P-III DISTRIBUTION         *
*          FOR  HISTORICAL, PALEOHYDROLOGIC       *
*            AND SYSTEMATIC PEAK FLOW DATA        *
*                                                 *
*              USBR VERSION **BETA** 1.0          *
*              VERSION DATE: 07-06-1999           *
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EMA Program Input File Name is:   virden-em1.in
EMA Program Output File Name is:    virden-em1.out
EMA Program Spreadsheet File Name is:    virden-em1.ss

 EMA Run Date is   7/26/2002
 EMA Run Time is   2:52:32:40 pm

   Gila River below Blue Creek near Virden, NM run 1
   Historical Information to 1892, threshold based on 1941 flood 41,700
```

INPUT AND CALCULATED CONSTANTS

Number of User-Input Bounds is: 1

Bound	nh	neprim	tl	tu	nn	kk	kt	pe
1	36	0	0.00	41700.00	109	2	0	0.018349

Alpha	ns	ne	nqt	nfb_sum	kk_sum	n_qmax
.400	73	2	73	74	2	109

User has selected the Cunnane plotting position
for estimating exceedance probabilities and relative goodness-of-fit

User has selected log-Pearson Type III distribution
(Base 10 logarithms)

rskew	rwgt	bias	tol	log
0.000	0.000	1.0	0.1E-05	1

run mode	conf lim type
1	1

Input no. of discharges to estimate exceed. prob 2

Input Discharge Values
41700.00
58700.00

INPUT YEAR AND DISCHARGE VALUES FOR PLOTTING

Year	Discharge	tl	tu
1927	1800.00	1800.00	1800.00
1928	1630.00	1630.00	1630.00
1929	5700.00	5700.00	5700.00
1930	7400.00	7400.00	7400.00
1931	8000.00	8000.00	8000.00
1932	6800.00	6800.00	6800.00
1933	5650.00	5650.00	5650.00
1934	8920.00	8920.00	8920.00
1935	8600.00	8600.00	8600.00
1936	3600.00	3600.00	3600.00
1937	9070.00	9070.00	9070.00
1938	6400.00	6400.00	6400.00
1939	1630.00	1630.00	1630.00
1940	11000.00	11000.00	11000.00
1941	41700.00	41700.00	41700.00
1942	3140.00	3140.00	3140.00
1943	1600.00	1600.00	1600.00
1944	4010.00	4010.00	4010.00
1945	5370.00	5370.00	5370.00
1946	10600.00	10600.00	10600.00
1947	3400.00	3400.00	3400.00
1948	2240.00	2240.00	2240.00
1949	15600.00	15600.00	15600.00
1950	2190.00	2190.00	2190.00
1951	440.00	440.00	440.00
1952	6100.00	6100.00	6100.00
1953	3330.00	3330.00	3330.00
1954	6670.00	6670.00	6670.00
1955	5280.00	5280.00	5280.00
1956	2660.00	2660.00	2660.00
1957	6710.00	6710.00	6710.00
1958	4550.00	4550.00	4550.00
1959	16400.00	16400.00	16400.00
1960	5220.00	5220.00	5220.00
1961	1920.00	1920.00	1920.00
1962	3920.00	3920.00	3920.00
1963	7320.00	7320.00	7320.00
1964	4480.00	4480.00	4480.00
1965	2540.00	2540.00	2540.00
1966	10900.00	10900.00	10900.00
1967	11500.00	11500.00	11500.00
1968	2920.00	2920.00	2920.00
1969	1790.00	1790.00	1790.00
1970	1130.00	1130.00	1130.00
1971	3730.00	3730.00	3730.00
1972	5700.00	5700.00	5700.00
1973	27200.00	27200.00	27200.00
1974	7560.00	7560.00	7560.00
1975	7720.00	7720.00	7720.00
1976	3700.00	3700.00	3700.00
1977	4450.00	4450.00	4450.00
1978	7800.00	7800.00	7800.00
1979	58700.00	58700.00	58700.00

1980	4300.00	4300.00	4300.00
1981	1890.00	1890.00	1890.00
1982	3680.00	3680.00	3680.00
1983	5870.00	5870.00	5870.00
1984	15500.00	15500.00	15500.00
1985	37000.00	37000.00	37000.00
1986	6670.00	6670.00	6670.00
1987	2680.00	2680.00	2680.00
1988	9000.00	9000.00	9000.00
1989	696.00	696.00	696.00
1990	710.00	710.00	710.00
1991	10200.00	10200.00	10200.00
1992	4430.00	4430.00	4430.00
1993	30000.00	30000.00	30000.00
1994	783.00	783.00	783.00
1995	22700.00	22700.00	22700.00
1996	11200.00	11200.00	11200.00
1997	19300.00	19300.00	19300.00
1999	3680.00	3680.00	3680.00
2000	266.00	266.00	266.00

SORTED DISCHARGE VALUES, CALCULATED EXCEEDANCE PROBABILITIES
AND RETURN PERIOD ESTIMATES

i	Year	Discharge	Exceed. Prob. P (%)	Rt. Per. T
1	1979	58700.00	0.5004	199.8333
2	1941	41700.00	1.3344	74.9375
3	1985	37000.00	2.6621	37.5644
4	1993	30000.00	4.0408	24.7474
5	1973	27200.00	5.4195	18.4517
6	1995	22700.00	6.7983	14.7096
7	1997	19300.00	8.1770	12.2294
8	1959	16400.00	9.5557	10.4649
9	1949	15600.00	10.9344	9.1454
10	1984	15500.00	12.3132	8.1214
11	1967	11500.00	13.6919	7.3036
12	1996	11200.00	15.0706	6.6354
13	1940	11000.00	16.4493	6.0793
14	1966	10900.00	17.8281	5.6091
15	1946	10600.00	19.2068	5.2065
16	1991	10200.00	20.5855	4.8578
17	1937	9070.00	21.9642	4.5529
18	1988	9000.00	23.3430	4.2839
19	1934	8920.00	24.7217	4.0450
20	1935	8600.00	26.1004	3.8314
21	1931	8000.00	27.4791	3.6391
22	1978	7800.00	28.8578	3.4653
23	1975	7720.00	30.2366	3.3073
24	1974	7560.00	31.6153	3.1630
25	1930	7400.00	32.9940	3.0309
26	1963	7320.00	34.3727	2.9093
27	1932	6800.00	35.7515	2.7971
28	1957	6710.00	37.1302	2.6932
29	1986	6670.00	38.5089	2.5968
30	1954	6670.00	39.8876	2.5070
31	1938	6400.00	41.2664	2.4233
32	1952	6100.00	42.6451	2.3449
33	1983	5870.00	44.0238	2.2715
34	1972	5700.00	45.4025	2.2025
35	1929	5700.00	46.7813	2.1376
36	1933	5650.00	48.1600	2.0764
37	1945	5370.00	49.5387	2.0186
38	1955	5280.00	50.9174	1.9640
39	1960	5220.00	52.2962	1.9122
40	1958	4550.00	53.6749	1.8631
41	1964	4480.00	55.0536	1.8164
42	1977	4450.00	56.4323	1.7720
43	1992	4430.00	57.8111	1.7298
44	1980	4300.00	59.1898	1.6895
45	1944	4010.00	60.5685	1.6510

46	1962	3920.00	61.9472	1.6143
47	1971	3730.00	63.3259	1.5791
48	1976	3700.00	64.7047	1.5455
49	1999	3680.00	66.0834	1.5132
50	1982	3680.00	67.4621	1.4823
51	1936	3600.00	68.8408	1.4526
52	1947	3400.00	70.2196	1.4241
53	1953	3330.00	71.5983	1.3967
54	1942	3140.00	72.9770	1.3703
55	1968	2920.00	74.3557	1.3449
56	1987	2680.00	75.7345	1.3204
57	1956	2660.00	77.1132	1.2968
58	1965	2540.00	78.4919	1.2740
59	1948	2240.00	79.8706	1.2520
60	1950	2190.00	81.2494	1.2308
61	1961	1920.00	82.6281	1.2102
62	1981	1890.00	84.0068	1.1904
63	1927	1800.00	85.3855	1.1712
64	1969	1790.00	86.7643	1.1525
65	1939	1630.00	88.1430	1.1345
66	1928	1630.00	89.5217	1.1170
67	1943	1600.00	90.9004	1.1001
68	1970	1130.00	92.2791	1.0837
69	1994	783.00	93.6579	1.0677
70	1990	710.00	95.0366	1.0522
71	1989	696.00	96.4153	1.0372
72	1951	440.00	97.7940	1.0226
73	2000	266.00	99.1728	1.0083

Initial EMA Calculated Moments

Mean	Variance	Skew
3.700777	0.196499	-0.243642

Number of Iterations for EMA Convergence is: 26

EMA CALCULATED MOMENTS
(Log-10 Moments)

Mean	Variance	Std. Dev	Skew
3.695521	0.191996	0.438173	-0.285068

The user chose rskew = 0.000 and rwgt = 0.0
The EMA Moments reflect this regional skew adjustment

FINAL PIII/LP-III PARAMETERS

Location (Tau)	Shape (Alpha)	Scale (Beta)
6.769693	49.222554	-0.062455

QUANTILES OF THE LOG-PEARSON TYPE III DISTRIBUTION

i	Q	EXCEED PROB P (%)	T
1	384.95	99.00000	1.010
2	466.42	98.50000	1.015
3	537.21	98.00000	1.020
4	601.42	97.50000	1.026
5	771.23	96.00000	1.042
6	873.11	95.00000	1.053
7	1325.29	90.00000	1.111
8	1535.86	87.50000	1.143
9	1743.21	85.00000	1.176
10	1950.06	82.50000	1.212
11	2158.31	80.00000	1.250
12	2369.42	77.50000	1.290
13	2584.63	75.00000	1.333

14	2805.05	72.50000	1.379
15	3031.71	70.00000	1.429
16	3265.63	67.50000	1.481
17	3345.39	66.66670	1.500
18	3507.85	65.00000	1.538
19	3759.47	62.50000	1.600
20	4021.65	60.00000	1.667
21	4295.66	57.50000	1.739
22	4582.91	55.00000	1.818
23	4885.00	52.50000	1.905
24	5203.73	50.00000	2.000
25	5541.16	47.50000	2.105
26	5899.70	45.00000	2.222
27	6282.19	42.50000	2.353
28	6691.97	40.00000	2.500
29	7133.08	37.50000	2.667
30	7610.43	35.00000	2.857
31	8130.06	32.50000	3.077
32	8699.58	30.00000	3.333
33	9328.68	27.50000	3.636
34	10029.99	25.00000	4.000
35	10820.40	22.50000	4.444
36	11723.15	20.00000	5.000
37	12771.43	17.50000	5.714
38	14014.81	15.00000	6.667
39	15531.95	12.50000	8.000
40	17458.15	10.00000	10.000
41	20055.27	7.50000	13.333
42	23935.44	5.00000	20.000
43	26181.30	4.00000	25.000
44	31169.81	2.50000	40.000
45	33661.20	2.00000	50.000
46	38391.54	1.33334	75.000
47	41907.36	1.00000	100.000
48	50923.30	0.50000	200.000
49	64025.72	0.20000	500.000
50	74832.93	0.10000	1000.000
51	86410.03	0.05000	2000.000
52	102891.03	0.02000	5000.000
53	116243.69	0.01000	10000.000

RELATIVE GOODNESS-OF-FIT

i	Exceed. Prob	Q Observed	Q Estimated	Relative Difference
1	0.0050042	58700.00	50912.00	-0.1327
2	0.0133445	41700.00	38381.61	-0.0796
3	0.0266210	37000.00	30482.69	-0.1761
4	0.0404082	30000.00	26077.40	-0.1308
5	0.0541954	27200.00	23143.81	-0.1491
6	0.0679827	22700.00	20971.67	-0.0761
7	0.0817699	19300.00	19261.54	-0.0020
8	0.0955572	16400.00	17859.87	0.0890
9	0.1093444	15600.00	16677.81	0.0691
10	0.1231316	15500.00	15659.54	0.0103
11	0.1369189	11500.00	14767.76	0.2842
12	0.1507061	11200.00	13976.40	0.2479
13	0.1644934	11000.00	13266.54	0.2060
14	0.1782806	10900.00	12624.03	0.1582
15	0.1920678	10600.00	12038.04	0.1357
16	0.2058551	10200.00	11500.10	0.1275
17	0.2196423	9070.00	11003.46	0.2132
18	0.2334295	9000.00	10542.65	0.1714
19	0.2472168	8920.00	10113.21	0.1338
20	0.2610040	8600.00	9711.44	0.1292
21	0.2747913	8000.00	9334.21	0.1668
22	0.2885785	7800.00	8978.92	0.1511
23	0.3023657	7720.00	8643.31	0.1196
24	0.3161530	7560.00	8325.45	0.1013
25	0.3299402	7400.00	8023.69	0.0843
26	0.3437275	7320.00	7736.56	0.0569

27	0.3575147	6800.00	7462.80	0.0975
28	0.3713019	6710.00	7201.27	0.0732
29	0.3850892	6670.00	6951.00	0.0421
30	0.3988764	6670.00	6711.09	0.0062
31	0.4126636	6400.00	6480.75	0.0126
32	0.4264509	6100.00	6259.28	0.0261
33	0.4402381	5870.00	6046.03	0.0300
34	0.4540254	5700.00	5840.43	0.0246
35	0.4678126	5700.00	5641.96	-0.0102
36	0.4815998	5650.00	5450.13	-0.0354
37	0.4953871	5370.00	5264.51	-0.0196
38	0.5091743	5280.00	5084.71	-0.0370
39	0.5229616	5220.00	4910.34	-0.0593
40	0.5367488	4550.00	4741.08	0.0420
41	0.5505360	4480.00	4576.60	0.0216
42	0.5643233	4450.00	4416.63	-0.0075
43	0.5781105	4430.00	4260.87	-0.0382
44	0.5918977	4300.00	4109.09	-0.0444
45	0.6056850	4010.00	3961.04	-0.0122
46	0.6194722	3920.00	3816.49	-0.0264
47	0.6332595	3730.00	3675.23	-0.0147
48	0.6470467	3700.00	3537.07	-0.0440
49	0.6608339	3680.00	3401.80	-0.0756
50	0.6746212	3680.00	3269.24	-0.1116
51	0.6884084	3600.00	3139.20	-0.1280
52	0.7021956	3400.00	3011.53	-0.1143
53	0.7159829	3330.00	2886.03	-0.1333
54	0.7297701	3140.00	2762.54	-0.1202
55	0.7435574	2920.00	2640.89	-0.0956
56	0.7573446	2680.00	2520.91	-0.0594
57	0.7711318	2660.00	2402.42	-0.0968
58	0.7849191	2540.00	2285.23	-0.1003
59	0.7987063	2240.00	2169.15	-0.0316
60	0.8124936	2190.00	2053.96	-0.0621
61	0.8262808	1920.00	1939.45	0.0101
62	0.8400680	1890.00	1825.33	-0.0342
63	0.8538553	1800.00	1711.33	-0.0493
64	0.8676425	1790.00	1597.07	-0.1078
65	0.8814297	1630.00	1482.14	-0.0907
66	0.8952170	1630.00	1365.99	-0.1620
67	0.9090042	1600.00	1247.90	-0.2201
68	0.9227915	1130.00	1126.89	-0.0028
69	0.9365787	783.00	1001.52	0.2791
70	0.9503659	710.00	869.49	0.2246
71	0.9641532	696.00	726.71	0.0441
72	0.9779404	440.00	564.31	0.2825
73	0.9917277	266.00	352.80	0.3263

GOODNESS-OF-FIT
Via Average Relative Deviations (ARD) and Mean Squared Deviations (MSD)

Number of observations: 73
Number of observations that exceed any threshold/bound: 2

All Observations

ARD	MSD
0.0971	0.0153

Maximum Observed

ARD_Q1	MSD_Q1
0.1327	0.0176

Above-Threshold Values

ARD_QK	MSD_QK
0.1061	0.0120

NON-EXCEEDANCE PROBABILITY TEST FOR LARGEST OBSERVATION

n_Qmax	Q_max	cdf	Ret. Per.	p*
109	58700.00	0.997130	348.426	0.731

p* is within acceptable range (0.05, 0.95)

Probability Plot Correlation Statistic
for Observations below all Thresholds/Bounds is 0.9820

ESTIMATED EXCEEDANCE PROBABILITIES FROM FITTED DISTRIBUTION

i	Input Q	Exceed Prob P (%)	T
1	41700.00	1.01681	98.347
2	58700.00	0.28700	348.426

Total EMA Program Run time: 0.010 seconds

Virden CI

i,EXCEED PROB P (%),T,Q,STD_DEV (Q),CI_LOW,CI_HIGH

1,	99.00000,	1.010,	384.55,	1.45,	145.55,	611.44
2,	98.50000,	1.015,	466.11,	1.40,	199.04,	712.13
3,	98.00000,	1.020,	536.98,	1.36,	249.14,	798.28
4,	97.50000,	1.026,	601.25,	1.34,	296.95,	875.66
5,	96.00000,	1.042,	771.24,	1.28,	431.70,	1078.05
6,	95.00000,	1.053,	873.21,	1.26,	516.71,	1198.54
7,	90.00000,	1.111,	1325.71,	1.20,	911.41,	1730.86
8,	87.50000,	1.143,	1536.38,	1.19,	1098.09,	1979.11
9,	85.00000,	1.176,	1743.80,	1.17,	1281.28,	2224.42
10,	82.50000,	1.212,	1950.69,	1.17,	1462.76,	2470.20
11,	80.00000,	1.250,	2158.96,	1.16,	1644.02,	2718.84
12,	77.50000,	1.290,	2370.07,	1.15,	1826.34,	2972.20
13,	75.00000,	1.333,	2585.27,	1.15,	2010.86,	3231.78
14,	72.50000,	1.379,	2805.65,	1.15,	2198.64,	3498.93
15,	70.00000,	1.429,	3032.26,	1.15,	2390.69,	3774.85
16,	67.50000,	1.481,	3266.11,	1.14,	2587.99,	4060.74
17,	66.66670,	1.500,	3345.84,	1.14,	2655.09,	4158.44
18,	65.00000,	1.538,	3508.24,	1.14,	2791.52,	4357.76
19,	62.50000,	1.600,	3759.75,	1.14,	3002.26,	4667.12
20,	60.00000,	1.667,	4021.81,	1.14,	3221.28,	4990.12
21,	57.50000,	1.739,	4295.67,	1.14,	3449.68,	5328.15
22,	55.00000,	1.818,	4582.76,	1.14,	3688.68,	5682.77
23,	52.50000,	1.905,	4884.67,	1.14,	3939.63,	6055.70
24,	50.00000,	2.000,	5203.19,	1.14,	4204.03,	6448.96
25,	47.50000,	2.105,	5540.40,	1.14,	4483.59,	6864.85
26,	45.00000,	2.222,	5898.70,	1.14,	4780.29,	7306.10
27,	42.50000,	2.353,	6280.91,	1.14,	5096.40,	7775.93
28,	40.00000,	2.500,	6690.40,	1.13,	5434.63,	8278.24
29,	37.50000,	2.667,	7131.19,	1.13,	5798.20,	8817.79
30,	35.00000,	2.857,	7608.20,	1.13,	6191.00,	9400.48
31,	32.50000,	3.077,	8127.47,	1.13,	6617.77,	10033.78
32,	30.00000,	3.333,	8696.59,	1.13,	7084.45,	10727.27
33,	27.50000,	3.636,	9325.27,	1.13,	7598.56,	11493.54
34,	25.00000,	4.000,	10026.15,	1.13,	8169.80,	12349.55
35,	22.50000,	4.444,	10816.11,	1.13,	8811.10,	13318.77
36,	20.00000,	5.000,	11718.42,	1.13,	9540.08,	14434.80
37,	17.50000,	5.714,	12766.29,	1.13,	10381.75,	15747.74
38,	15.00000,	6.667,	14009.33,	1.13,	11373.13,	17335.98
39,	12.50000,	8.000,	15526.30,	1.14,	12572.25,	19330.05
40,	10.00000,	10.000,	17452.72,	1.14,	14076.79,	21965.76
41,	7.50000,	13.333,	20050.93,	1.15,	16068.31,	25721.36
42,	5.00000,	20.000,	23934.57,	1.16,	18940.20,	31766.64
43,	4.00000,	25.000,	26183.47,	1.17,	20532.08,	35490.22
44,	2.50000,	40.000,	31181.54,	1.20,	23856.21,	44305.44
45,	2.00000,	50.000,	33679.18,	1.21,	25404.09,	48978.46
46,	1.33334,	75.000,	38424.07,	1.24,	28144.84,	58341.28
47,	1.00000,	100.000,	41953.00,	1.26,	30024.93,	65720.32
48,	0.50000,	200.000,	51011.42,	1.31,	34312.92,	86327.37
49,	0.20000,	500.000,	64197.91,	1.40,	39441.90,	120810.02
50,	0.10000,	1000.000,	75093.84,	1.46,	42922.90,	153554.64
51,	0.05000,	2000.000,	86784.79,	1.53,	46078.24,	193244.69
52,	0.02000,	5000.000,	103460.29,	1.64,	49782.76,	258609.01
53,	0.01000,	10000.000,	116997.49,	1.72,	52258.31,	319829.61

APPENDIX B
FLOOD VOLUME FREQUENCY INPUT/OUTPUT

Gila nr Gila 1 day vol

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.1346	0.5464	0.1926	0.0000	0.1926

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00831	1985	23400.0	0.99000	87	52	131
2	0.02216	1979	19600.0	0.98000	117	73	171
3	0.03601	1941	13000.0	0.97500	130	82	188
4	0.04986	1997	11200.0	0.96000	164	107	232
5	0.06371	1995	9910.0	0.95000	185	122	258
6	0.07756	1973	9030.0	0.90000	280	195	378
7	0.09141	1984	8390.0	0.80000	468	344	612
8	0.10526	1993	8210.0	0.70000	685	519	881
9	0.11911	1978	8000.0	0.60000	955	738	1219
10	0.13296	1949	6920.0	0.57040	1049	814	1339
11	0.14681	1988	6320.0	0.50000	1309	1023	1674
12	0.16066	1986	5300.0	0.42960	1638	1283	2106
13	0.17452	1972	4700.0	0.40000	1804	1414	2328
14	0.18837	1952	4220.0	0.30000	2558	1993	3364
15	0.20222	1966	4020.0	0.20000	3877	2970	5271
16	0.21607	1964	3790.0	0.10000	6999	5158	10122
17	0.22992	1991	3740.0	0.05000	11539	8155	17739
18	0.24377	1958	3520.0	0.04000	13375	9327	20960
19	0.25762	1937	3400.0	0.02500	17962	12180	29279
20	0.27147	1975	2850.0	0.02000	20524	13737	34071
21	0.28532	1980	2790.0	0.01000	30367	19536	53253
22	0.29917	1967	2490.0	0.00500	43705	27065	80756
23	0.31302	1942	2400.0	0.00200	68431	40379	135031
24	0.32687	1992	2310.0	0.00100	94163	53648	194840
25	0.34072	1999	2170.0	0.00050	127749	70353	276722
26	0.35457	1996	2160.0	0.00010	248227	126817	594758
27	0.36842	1962	1850.0				
28	0.38227	1932	1850.0				
29	0.39612	1940	1830.0				
30	0.40997	1998	1830.0				
31	0.42382	1976	1780.0				
32	0.43767	1954	1760.0				
33	0.45152	1983	1710.0				
34	0.46537	1960	1570.0				
35	0.47922	1957	1540.0				
36	0.49307	1929	1530.0				
37	0.50693	1930	1500.0				
38	0.52078	1968	1440.0				
39	0.53463	1987	1160.0				
40	0.54848	1944	1120.0				
41	0.56233	1938	1120.0				
42	0.57618	1982	882.0				
43	0.59003	1931	851.0				
44	0.60388	1963	806.0				
45	0.61773	1953	731.0				
46	0.63158	1939	669.0				
47	0.64543	1947	654.0				
48	0.65928	1943	622.0				
49	0.67313	1990	600.0				
50	0.68698	1977	565.0				
51	0.70083	1959	560.0				
52	0.71468	1956	551.0				
53	0.72853	1933	542.0				
54	0.74238	1934	518.0				
55	0.75623	1948	465.0				
56	0.77008	1935	458.0				
57	0.78393	1981	458.0				
58	0.79778	1974	431.0				
59	0.81163	1965	422.0				

60	0.82548	1945	405.0
61	0.83934	1955	398.0
62	0.85319	1994	344.0
63	0.86704	1969	326.0
64	0.88089	1989	325.0
65	0.89474	1936	291.0
66	0.90859	1946	280.0
67	0.92244	1971	268.0
68	0.93629	1970	266.0
69	0.95014	1950	260.0
70	0.96399	1961	254.0
71	0.97784	1951	98.0
72	0.99169	2000	93.0

Gila nr Gila 3 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.0139	0.4683	0.2003	0.0000	0.2003

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00843	1985	12120.0	0.99000	99	63	140
2	0.02247	1979	11570.0	0.98000	127	84	175
3	0.03652	1997	6480.0	0.97500	138	93	190
4	0.05056	1993	5800.0	0.96000	169	117	227
5	0.06461	1995	5390.0	0.95000	187	131	249
6	0.07865	1973	5273.3	0.90000	266	194	345
7	0.09270	1949	4883.3	0.80000	413	316	520
8	0.10674	1978	4666.7	0.70000	572	450	711
9	0.12079	1984	4386.7	0.60000	760	608	939
10	0.13483	1988	3793.3	0.57040	824	662	1017
11	0.14888	1972	3453.3	0.50000	996	805	1231
12	0.16292	1986	3230.0	0.42960	1207	978	1499
13	0.17697	1958	2786.7	0.40000	1311	1062	1634
14	0.19101	1975	2603.3	0.30000	1769	1426	2241
15	0.20506	1952	2576.7	0.20000	2528	2009	3296
16	0.21910	1991	2550.0	0.10000	4200	3227	5776
17	0.23315	1937	2533.3	0.05000	6456	4784	9364
18	0.24719	1966	2376.7	0.04000	7331	5370	10811
19	0.26124	1980	2210.0	0.02500	9449	6756	14420
20	0.27528	1964	2169.7	0.02000	10598	7493	16432
21	0.28933	1941	2166.7	0.01000	14853	10146	24152
22	0.30337	1962	1670.0	0.00500	20328	13434	34593
23	0.31742	1998	1636.7	0.00200	29923	18963	53919
24	0.33146	1983	1610.0	0.00100	39411	24227	74011
25	0.34551	1992	1593.3	0.00050	51282	30608	100221
26	0.35955	1999	1520.0	0.00010	91018	50892	194215
27	0.37360	1976	1483.3				
28	0.38764	1996	1450.3				
29	0.40169	1967	1365.7				
30	0.41573	1932	1350.0				
31	0.42978	1968	1300.0				
32	0.44382	1929	1263.0				
33	0.45787	1957	1217.0				
34	0.47191	1954	1138.7				
35	0.48596	1960	1087.3				
36	0.50000	1940	1028.0				
37	0.51404	1944	950.0				
38	0.52809	1987	884.0				
39	0.54213	1930	883.3				
40	0.55618	1942	866.7				
41	0.57022	1938	841.3				
42	0.58427	1982	758.7				
43	0.59831	1931	737.3				
44	0.61236	1963	659.7				
45	0.62640	1953	656.7				
46	0.64045	1939	567.7				
47	0.65449	1947	550.0				
48	0.66854	1943	521.0				
49	0.68258	1933	508.7				

50	0.69663	1990	490.3
51	0.71067	1977	477.0
52	0.72472	1959	463.3
53	0.73876	1934	446.7
54	0.75281	1948	431.0
55	0.76685	1935	384.0
56	0.78090	1945	381.7
57	0.79494	1955	378.3
58	0.80899	1974	371.0
59	0.82303	1965	356.7
60	0.83708	1981	328.7
61	0.85112	1994	314.3
62	0.86517	1989	291.0
63	0.87921	1969	270.3
64	0.89326	1956	263.7
65	0.90730	1936	261.3
66	0.92135	1950	244.3
67	0.93539	1970	243.0
68	0.94944	1946	222.3
69	0.96348	1961	209.3
70	0.97753	1971	202.3
71	0.99157	1951	92.0

Gila nr Gila 5 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
2.8787	0.4419	0.1990	0.0000	0.1990

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00843	1979	8054.0	0.99000	82	54	114
2	0.02247	1985	7980.0	0.98000	104	71	142
3	0.03652	1993	4108.0	0.97500	113	78	153
4	0.05056	1973	3830.0	0.96000	137	97	181
5	0.06461	1995	3569.2	0.95000	151	108	198
6	0.07865	1949	3403.0	0.90000	210	156	269
7	0.09270	1978	3280.0	0.80000	319	248	396
8	0.10674	1984	2934.8	0.70000	433	345	532
9	0.12079	1972	2482.4	0.60000	567	459	691
10	0.13483	1958	2312.0	0.57040	611	497	746
11	0.14888	1991	2242.0	0.50000	731	598	893
12	0.16292	1986	2200.2	0.42960	876	718	1075
13	0.17697	1988	2012.0	0.40000	948	777	1166
14	0.19101	1966	1958.0	0.30000	1257	1026	1571
15	0.20506	1937	1872.0	0.20000	1761	1417	2261
16	0.21910	1952	1868.0	0.10000	2841	2216	3838
17	0.23315	1980	1786.0	0.05000	4262	3213	6053
18	0.24719	1941	1752.0	0.04000	4805	3582	6932
19	0.26124	1962	1540.0	0.02500	6104	4448	9095
20	0.27528	1983	1506.0	0.02000	6802	4904	10287
21	0.28933	1998	1436.0	0.01000	9350	6526	14790
22	0.30337	1992	1332.8	0.00500	12568	8504	20752
23	0.31742	1976	1320.0	0.00200	18095	11769	31532
24	0.33146	1968	1218.0	0.00100	23458	14825	42501
25	0.34551	1999	1152.8	0.00050	30065	18480	56558
26	0.35955	1929	1117.2	0.00010	51626	29839	105501
27	0.37360	1957	1095.6				
28	0.38764	1932	1069.8				
29	0.40169	1960	1018.2				
30	0.41573	1967	1009.8				
31	0.42978	1954	858.4				
32	0.44382	1975	808.6				
33	0.45787	1940	769.4				
34	0.47191	1942	720.0				
35	0.48596	1944	715.4				
36	0.50000	1997	711.4				
37	0.51404	1982	704.8				
38	0.52809	1931	682.4				
39	0.54213	1930	670.2				
40	0.55618	1938	669.0				

41	0.57022	1987	643.2
42	0.58427	1953	576.0
43	0.59831	1963	574.6
44	0.61236	1939	524.4
45	0.62640	1933	481.6
46	0.64045	1977	462.0
47	0.65449	1943	451.6
48	0.66854	1947	434.2
49	0.68258	1959	426.0
50	0.69663	1948	420.6
51	0.71067	1934	388.8
52	0.72472	1945	359.8
53	0.73876	1955	355.6
54	0.75281	1974	326.4
55	0.76685	1965	321.4
56	0.78090	1996	321.4
57	0.79494	1994	274.4
58	0.80899	1981	266.4
59	0.82303	1936	249.8
60	0.83708	1935	242.6
61	0.85112	1950	230.6
62	0.86517	1970	221.8
63	0.87921	1989	207.4
64	0.89326	1946	204.8
65	0.90730	1971	194.0
66	0.92135	1956	186.6
67	0.93539	1969	185.2
68	0.94944	1961	173.6
69	0.96348	1964	159.0
70	0.97753	1990	156.4
71	0.99157	1951	88.4

Gila nr Redrock 1 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.3360	0.5754	0.1001	0.0000	0.1001

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00949	1979	34000.0	0.99000	110	60	174
2	0.02532	1941	25000.0	0.98000	153	89	235
3	0.04114	1985	23000.0	0.97500	172	101	261
4	0.05696	1973	19500.0	0.96000	223	136	330
5	0.07278	1993	16000.0	0.95000	255	159	372
6	0.08861	1995	15300.0	0.90000	403	266	565
7	0.10443	1997	12700.0	0.80000	706	498	954
8	0.12025	1984	12600.0	0.70000	1065	778	1412
9	0.13608	1966	12400.0	0.60000	1518	1135	1998
10	0.15190	1949	12200.0	0.57040	1678	1260	2208
11	0.16772	1978	10300.0	0.50000	2120	1605	2797
12	0.18354	1991	6980.0	0.42960	2683	2039	3565
13	0.19937	1937	6660.0	0.40000	2970	2256	3963
14	0.21519	1952	6210.0	0.30000	4272	3226	5831
15	0.23101	1940	6190.0	0.20000	6565	4866	9306
16	0.24684	1988	5920.0	0.10000	12003	8534	18223
17	0.26266	1972	5670.0	0.05000	19886	13526	32277
18	0.27848	1983	4890.0	0.04000	23062	15466	38218
19	0.29430	1975	4670.0	0.02500	30961	20162	53531
20	0.31013	1986	4530.0	0.02000	35351	22710	62330
21	0.32595	1992	4450.0	0.01000	52097	32117	97389
22	0.34177	1967	4270.0	0.00500	74511	44159	147218
23	0.35759	1954	3700.0	0.00200	115400	65085	244315
24	0.37342	1980	3240.0	0.00100	157234	85564	349803
25	0.38924	1942	3000.0	0.00050	210987	110926	492260
26	0.40506	1964	2870.0	0.00010	398248	194128	1030968
27	0.42089	1976	2730.0				
28	0.43671	1999	2720.0				
29	0.45253	1934	2610.0				
30	0.46835	1932	2540.0				

31	0.48418	1944	2440.0
32	0.50000	1968	2360.0
33	0.51582	1996	2260.0
34	0.53165	1998	1840.0
35	0.54747	1938	1730.0
36	0.56329	1955	1170.0
37	0.57911	1982	1160.0
38	0.59494	1931	1070.0
39	0.61076	1933	1030.0
40	0.62658	1953	1020.0
41	0.64241	1943	1000.0
42	0.65823	1987	984.0
43	0.67405	1939	970.0
44	0.68987	1947	961.0
45	0.70570	1963	950.0
46	0.72152	1935	827.0
47	0.73734	1977	783.0
48	0.75316	1965	782.0
49	0.76899	1936	768.0
50	0.78481	1948	665.0
51	0.80063	1971	645.0
52	0.81646	1946	633.0
53	0.83228	1994	619.0
54	0.84810	1981	612.0
55	0.86392	1950	586.0
56	0.87975	1945	515.0
57	0.89557	1990	503.0
58	0.91139	1969	500.0
59	0.92722	1989	407.0
60	0.94304	1974	338.0
61	0.95886	1970	302.0
62	0.97468	1951	144.0
63	0.99051	2000	105.0

Gila near Redrock 3 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.1631	0.5086	0.0063	0.0000	0.0063

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00949	1979	16333.3	0.99000	96	56	146
2	0.02532	1985	13333.3	0.98000	132	81	194
3	0.04114	1973	11533.3	0.97500	147	91	214
4	0.05696	1993	9083.3	0.96000	188	121	266
5	0.07278	1995	8253.3	0.95000	213	139	298
6	0.08861	1978	7776.7	0.90000	325	225	439
7	0.10443	1997	6656.7	0.80000	543	399	708
8	0.12025	1949	6410.0	0.70000	787	597	1009
9	0.13608	1966	6266.7	0.60000	1081	837	1378
10	0.15190	1984	6103.3	0.57040	1181	918	1506
11	0.16772	1937	4723.3	0.50000	1454	1138	1858
12	0.18354	1975	4150.0	0.42960	1790	1404	2303
13	0.19937	1988	3870.0	0.40000	1956	1535	2527
14	0.21519	1991	3740.0	0.30000	2688	2096	3542
15	0.23101	1972	3623.3	0.20000	3899	2992	5311
16	0.24684	1952	3606.7	0.10000	6535	4838	9439
17	0.26266	1992	3223.3	0.05000	10014	7143	15301
18	0.27848	1967	3106.7	0.04000	11341	7995	17630
19	0.29430	1983	3033.3	0.02500	14505	9980	23358
20	0.31013	1941	2950.0	0.02000	16196	11019	26507
21	0.32595	1940	2923.3	0.01000	22321	14682	38329
22	0.34177	1986	2643.3	0.00500	29941	19073	53790
23	0.35759	1980	2523.3	0.00200	42749	26164	81215
24	0.37342	1954	2048.7	0.00100	54888	32644	108513
25	0.38924	1968	2046.7	0.00050	69510	40221	142742
26	0.40506	1999	1983.3	0.00010	115245	62819	256960
27	0.42089	1964	1850.0				
28	0.43671	1942	1800.0				
29	0.45253	1976	1766.7				

30	0.46835	1944	1746.7
31	0.48418	1998	1743.3
32	0.50000	1932	1713.3
33	0.51582	1996	1453.3
34	0.53165	1934	1296.7
35	0.54747	1938	1184.7
36	0.56329	1982	1116.7
37	0.57911	1931	983.3
38	0.59494	1955	904.7
39	0.61076	1953	880.0
40	0.62658	1963	840.0
41	0.64241	1933	805.0
42	0.65823	1943	780.0
43	0.67405	1939	773.3
44	0.68987	1947	715.7
45	0.70570	1987	680.0
46	0.72152	1977	660.7
47	0.73734	1935	645.3
48	0.75316	1981	553.0
49	0.76899	1945	503.7
50	0.78481	1994	491.7
51	0.80063	1965	487.7
52	0.81646	1948	480.7
53	0.83228	1936	443.0
54	0.84810	1950	414.3
55	0.86392	1969	381.0
56	0.87975	1946	351.7
57	0.89557	1990	343.0
58	0.91139	1974	320.0
59	0.92722	1971	317.7
60	0.94304	1989	309.0
61	0.95886	1970	279.7
62	0.97468	1951	119.3
63	0.99051	2000	101.7

Gila near Redrock 5 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.0876	0.4584	0.0379	0.0000	0.0379

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00965	1979	11040.0	0.99000	108	66	158
2	0.02572	1985	8900.0	0.98000	143	92	202
3	0.04180	1973	7968.0	0.97500	158	102	221
4	0.05788	1993	6770.0	0.96000	195	131	268
5	0.07395	1978	5556.0	0.95000	218	149	296
6	0.09003	1995	5452.0	0.90000	318	228	417
7	0.10611	1997	4676.0	0.80000	502	379	639
8	0.12219	1949	4586.0	0.70000	700	545	878
9	0.13826	1966	4320.0	0.60000	931	737	1160
10	0.15434	1984	4182.0	0.57040	1008	802	1257
11	0.17042	1975	3648.0	0.50000	1215	972	1519
12	0.18650	1937	3350.0	0.42960	1466	1176	1843
13	0.20257	1991	3252.0	0.40000	1589	1274	2004
14	0.21865	1972	2700.0	0.30000	2118	1690	2721
15	0.23473	1988	2688.8	0.20000	2969	2334	3931
16	0.25080	1992	2576.0	0.10000	4753	3616	6643
17	0.26688	1967	2504.0	0.05000	7024	5164	10342
18	0.28296	1952	2491.0	0.04000	7873	5725	11780
19	0.29904	1941	2480.0	0.02500	9870	7018	15260
20	0.31511	1983	2418.0	0.02000	10925	7687	17148
21	0.33119	1980	2100.0	0.01000	14685	10013	24107
22	0.34727	1940	1978.8	0.00500	19267	12750	32995
23	0.36334	1968	1898.0	0.00200	26807	17087	48379
24	0.37942	1986	1895.8	0.00100	33821	20985	63368
25	0.39550	1954	1647.2	0.00050	42148	25484	81848
26	0.41158	1998	1622.0	0.00010	67618	38643	141937
27	0.42765	1999	1525.6				
28	0.44373	1976	1470.0				

29	0.45981	1942	1460.0
30	0.47588	1932	1387.6
31	0.49196	1944	1276.2
32	0.50804	1964	1169.0
33	0.52412	1996	1080.2
34	0.54019	1982	1041.6
35	0.55627	1931	946.0
36	0.57235	1934	924.2
37	0.58842	1938	907.8
38	0.60450	1955	782.2
39	0.62058	1963	765.8
40	0.63666	1953	752.6
41	0.65273	1939	706.4
42	0.66881	1943	676.4
43	0.68489	1933	660.0
44	0.70096	1987	638.8
45	0.71704	1977	638.2
46	0.73312	1935	571.6
47	0.74920	1947	571.6
48	0.76527	1945	475.4
49	0.78135	1948	463.8
50	0.79743	1981	462.6
51	0.81350	1965	446.6
52	0.82958	1994	428.0
53	0.84566	1936	399.6
54	0.86174	1950	350.4
55	0.87781	1969	337.0
56	0.89389	1974	304.4
57	0.90997	1989	296.6
58	0.92604	1946	274.0
59	0.94212	1970	266.4
60	0.95820	1990	242.0
61	0.97428	1971	224.8
62	0.99035	1951	103.8

Gila near Virden 1 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.3321	0.5312	0.0451	0.0000	0.0451

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00820	1979	33100.0	0.99000	130	78	195
2	0.02186	1941	21700.0	0.98000	179	112	261
3	0.03552	1985	20100.0	0.97500	201	128	288
4	0.04918	1995	18200.0	0.96000	257	169	361
5	0.06284	1993	17200.0	0.95000	292	195	405
6	0.07650	1997	15300.0	0.90000	451	317	604
7	0.09016	1973	14500.0	0.80000	766	568	991
8	0.10383	1984	11000.0	0.70000	1124	861	1432
9	0.11749	1949	10400.0	0.60000	1563	1219	1978
10	0.13115	1966	8180.0	0.57040	1714	1343	2170
11	0.14481	1991	7540.0	0.50000	2129	1678	2700
12	0.15847	1978	7340.0	0.42960	2645	2090	3375
13	0.17213	1937	6850.0	0.40000	2904	2294	3718
14	0.18579	1975	6180.0	0.30000	4053	3183	5288
15	0.19945	1986	5520.0	0.20000	5998	4634	8075
16	0.21311	1934	4980.0	0.10000	10361	7725	14761
17	0.22678	1967	4800.0	0.05000	16317	11720	24554
18	0.24044	1983	4690.0	0.04000	18634	13226	28519
19	0.25410	1988	4620.0	0.02500	24244	16791	38408
20	0.26776	1972	4460.0	0.02000	27286	18685	43920
21	0.28142	1960	4280.0	0.01000	38508	25484	64989
22	0.29508	1940	4170.0	0.00500	52846	33853	93260
23	0.30874	1980	4020.0	0.00200	77675	47774	144895
24	0.32240	1958	3870.0	0.00100	101873	60850	197721
25	0.33607	1952	3870.0	0.00050	131718	76497	265528
26	0.34973	1996	3650.0	0.00010	228808	124976	500918
27	0.36339	1992	3570.0				
28	0.37705	1942	3370.0				

29	0.39071	1957	3310.0
30	0.40437	1944	3020.0
31	0.41803	1929	2890.0
32	0.43169	1999	2670.0
33	0.44536	1954	2660.0
34	0.45902	1976	2620.0
35	0.47268	1964	2530.0
36	0.48634	1932	2470.0
37	0.50000	1930	2410.0
38	0.51366	1968	2350.0
39	0.52732	1962	2320.0
40	0.54098	1935	2100.0
41	0.55464	1933	2030.0
42	0.56831	1998	1970.0
43	0.58197	1959	1690.0
44	0.59563	1963	1650.0
45	0.60929	1987	1530.0
46	0.62295	1931	1430.0
47	0.63661	1977	1360.0
48	0.65027	1938	1350.0
49	0.66393	1955	1190.0
50	0.67760	1953	935.0
51	0.69126	1982	920.0
52	0.70492	1946	871.0
53	0.71858	1943	853.0
54	0.73224	1947	765.0
55	0.74590	1971	754.0
56	0.75956	1974	752.0
57	0.77322	1945	724.0
58	0.78689	1939	720.0
59	0.80055	1928	694.0
60	0.81421	1956	613.0
61	0.82787	1961	608.0
62	0.84153	1981	597.0
63	0.85519	1950	586.0
64	0.86885	1936	559.0
65	0.88251	1969	535.0
66	0.89617	1965	482.0
67	0.90984	1970	442.0
68	0.92350	1948	440.0
69	0.93716	1989	329.0
70	0.95082	1994	303.0
71	0.96448	1990	296.0
72	0.97814	1951	203.0
73	0.99180	2000	123.0

Gila near Virden 3 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.1735	0.4884	-0.0303	0.0000	-0.0303

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00820	1979	17973.3	0.99000	106	66	155
2	0.02186	1985	11923.3	0.98000	145	94	206
3	0.03552	1995	10856.7	0.97500	162	106	227
4	0.04918	1993	10606.7	0.96000	206	139	282
5	0.06284	1973	9903.3	0.95000	232	160	315
6	0.07650	1997	8503.3	0.90000	352	254	460
7	0.09016	1949	6230.0	0.80000	580	441	735
8	0.10383	1984	6193.3	0.70000	830	650	1037
9	0.11749	1978	5643.3	0.60000	1127	898	1400
10	0.13115	1966	5323.3	0.57040	1228	982	1525
11	0.14481	1975	4843.3	0.50000	1499	1205	1866
12	0.15847	1991	4650.0	0.42960	1830	1474	2290
13	0.17213	1986	4286.7	0.40000	1993	1605	2503
14	0.18579	1967	3950.0	0.30000	2700	2161	3450
15	0.19945	1937	3810.0	0.20000	3848	3034	5059
16	0.21311	1988	3340.0	0.10000	6277	4795	8682
17	0.22678	1980	3313.3	0.05000	9388	6939	13628

18	0.24044	1992	3123.3	0.04000	10553	7720	15548
19	0.25410	1958	3073.3	0.02500	13295	9521	20188
20	0.26776	1972	3016.7	0.02000	14742	10454	22697
21	0.28142	1952	3013.3	0.01000	19897	13699	31915
22	0.29508	1983	3000.0	0.00500	26160	17515	43604
23	0.30874	1941	2876.7	0.00200	36416	23550	63643
24	0.32240	1960	2730.0	0.00100	45897	28954	82960
25	0.33607	1996	2690.0	0.00050	57084	35168	106539
26	0.34973	1934	2595.7	0.00010	90890	53193	181782
27	0.36339	1940	2323.3				
28	0.37705	1962	2163.3				
29	0.39071	1929	2143.3				
30	0.40437	1968	2130.0				
31	0.41803	1957	2076.7				
32	0.43169	1964	2063.3				
33	0.44536	1944	1983.3				
34	0.45902	1998	1883.3				
35	0.47268	1976	1833.3				
36	0.48634	1999	1823.3				
37	0.50000	1954	1816.7				
38	0.51366	1932	1766.7				
39	0.52732	1942	1746.7				
40	0.54098	1930	1720.0				
41	0.55464	1959	1366.7				
42	0.56831	1933	1325.0				
43	0.58197	1931	1106.7				
44	0.59563	1987	958.0				
45	0.60929	1935	948.3				
46	0.62295	1977	916.0				
47	0.63661	1963	881.7				
48	0.65027	1938	873.3				
49	0.66393	1982	825.0				
50	0.67760	1955	787.3				
51	0.69126	1953	739.0				
52	0.70492	1943	712.7				
53	0.71858	1939	694.0				
54	0.73224	1946	652.7				
55	0.74590	1947	646.0				
56	0.75956	1974	592.0				
57	0.77322	1928	544.0				
58	0.78689	1969	488.3				
59	0.80055	1945	485.3				
60	0.81421	1950	473.3				
61	0.82787	1971	459.3				
62	0.84153	1936	446.7				
63	0.85519	1965	424.0				
64	0.86885	1948	423.3				
65	0.88251	1981	406.7				
66	0.89617	1961	388.3				
67	0.90984	1956	359.7				
68	0.92350	1994	290.7				
69	0.93716	1989	248.0				
70	0.95082	1970	246.7				
71	0.96448	1990	219.0				
72	0.97814	1951	158.3				
73	0.99180	2000	116.7				

Gila near Virden 5 day

Mean of Logs	Std.Dev	Data Skew	Reg.Skew	Final Skew
3.0727	0.4423	0.0079	0.0000	0.0079

RANK	m-.4/N+.2	YEAR	Q	EXCEED.	FREQ.Q	LOW	HIGH
1	0.00855	1993	10508.0	0.99000	111	72	157
2	0.02279	1985	8326.0	0.98000	147	98	202
3	0.03704	1995	7290.0	0.97500	161	109	220
4	0.05128	1973	6790.0	0.96000	199	139	266
5	0.06553	1997	5980.0	0.95000	222	157	294
6	0.07977	1949	4472.0	0.90000	321	237	411

7	0.09402	1978	4352.0	0.80000	502	389	625
8	0.10826	1984	4316.0	0.70000	692	552	850
9	0.12251	1975	4212.0	0.60000	912	739	1115
10	0.13675	1966	3854.0	0.57040	986	801	1204
11	0.15100	1991	3692.0	0.50000	1181	964	1445
12	0.16524	1986	3118.0	0.42960	1414	1158	1740
13	0.17949	1967	3048.0	0.40000	1528	1251	1887
14	0.19373	1937	2826.0	0.30000	2015	1641	2528
15	0.20798	1958	2666.0	0.20000	2785	2236	3588
16	0.22222	1988	2636.0	0.10000	4364	3402	5898
17	0.23647	1992	2550.0	0.05000	6327	4782	8952
18	0.25071	1972	2316.0	0.04000	7050	5277	10118
19	0.26496	1983	2314.0	0.02500	8734	6406	12900
20	0.27920	1952	2245.0	0.02000	9614	6986	14389
21	0.29345	1941	2194.0	0.01000	12711	8980	19785
22	0.30769	1960	2092.4	0.00500	16415	11292	26511
23	0.32194	1962	2070.0	0.00200	22384	14894	37839
24	0.33618	1996	1994.2	0.00100	27827	18080	48598
25	0.35043	1968	1920.0	0.00050	34183	21708	61582
26	0.36467	1934	1796.4	0.00010	53100	32086	102323
27	0.37892	1998	1774.0				
28	0.39316	1929	1694.0				
29	0.40741	1940	1594.0				
30	0.42165	1930	1581.0				
31	0.43590	1976	1530.0				
32	0.45014	1957	1523.2				
33	0.46439	1954	1447.4				
34	0.47863	1942	1444.0				
35	0.49288	1999	1434.4				
36	0.50712	1944	1413.0				
37	0.52137	1932	1403.0				
38	0.53561	1964	1286.6				
39	0.54986	1959	1206.2				
40	0.56410	1931	940.4				
41	0.57835	1933	863.0				
42	0.59259	1963	797.0				
43	0.60684	1982	774.2				
44	0.62108	1977	735.0				
45	0.63533	1987	728.2				
46	0.64957	1938	709.2				
47	0.66382	1955	667.2				
48	0.67806	1939	632.6				
49	0.69231	1953	613.6				
50	0.70655	1943	612.2				
51	0.72080	1935	608.2				
52	0.73504	1947	525.8				
53	0.74929	1974	513.4				
54	0.76353	1945	466.2				
55	0.77778	1946	457.6				
56	0.79202	1928	435.6				
57	0.80627	1948	414.2				
58	0.82051	1969	412.2				
59	0.83476	1936	408.8				
60	0.84900	1965	397.2				
61	0.86325	1950	387.0				
62	0.87749	1981	362.6				
63	0.89174	1961	300.6				
64	0.90598	1971	299.4				
65	0.92023	1994	272.8				
66	0.93447	1956	265.6				
67	0.94872	1970	239.8				
68	0.96296	1989	229.2				
69	0.97721	1990	184.6				
70	0.99145	1951	129.4				

APPENDIX C
FLOW DURATION ESTIMATES

STATFLUV Program Input File Name is: gila_pors.in
STATFLUV Program Output File Name is: gila_pors.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	26603
SAMPLE MEAN	=	157.311
SAMPLE MEDIAN	=	74.000
STANDARD DEVIATION	=	384.956
COEFFICIENT OF VARIATION	=	2.4471
SKEWNESS COEFFICIENT	=	22.5996
KURTOSIS COEFFICIENT	=	936.6386
LAG-1 SERIAL CORR. COEFF.	=	0.9233

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	15.0000
p .0001	16.0000
p .0006	18.0000
p .0030	20.0000
p .0100	23.0000
p .0325	28.0000
p .1000	40.0000
p .2000	53.0000
p .2500	57.0000
p .3000	60.0000
p .4000	66.0000
p .5000	74.0000
p .6000	89.0000
p .7000	115.0000
p .7500	135.0000
p .8000	166.0000
p .9000	313.0000
p .9675	669.0000
p .9900	1240.0000
p .9970	2480.0000
p .9994	7171.5040
p .9999	15241.3600
p max	23400.0000

STATFLUV Program Input File Name is: gila_wins.in
STATFLUV Program Output File Name is: gila_wins.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	13202
SAMPLE MEAN	=	202.190
SAMPLE MEDIAN	=	86.000
STANDARD DEVIATION	=	459.142
COEFFICIENT OF VARIATION	=	2.2708
SKEWNESS COEFFICIENT	=	21.2147
KURTOSIS COEFFICIENT	=	816.1627
LAG-1 SERIAL CORR. COEFF.	=	0.8835

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	38.0000
p .0001	38.3203

p .0006	42.9218
p .0030	45.0000
p .0100	48.0000
p .0325	53.0000
p .1000	57.0000
p .2000	62.0000
p .2500	64.0000
p .3000	66.0000
p .4000	72.0000
p .5000	86.0000
p .6000	109.0000
p .7000	149.0000
p .7500	183.0000
p .8000	237.0000
p .9000	447.0000
p .9675	850.9025
p .9900	1470.0000
p .9970	2993.9100
p .9994	7640.4980
p .9999	22182.8600
p max	23400.0000

STATFLUV Program Input File Name is: gila_sums.in
STATFLUV Program Output File Name is: gila_sums.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	8948
SAMPLE MEAN	=	119.102
SAMPLE MEDIAN	=	66.000
STANDARD DEVIATION	=	341.432
COEFFICIENT OF VARIATION	=	2.8667
SKEWNESS COEFFICIENT	=	19.4063
KURTOSIS COEFFICIENT	=	531.2126
LAG-1 SERIAL CORR. COEFF.	=	0.9152

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	15.0000
p .0001	13.4235
p .0006	16.0000
p .0030	19.0000
p .0100	21.0000
p .0325	26.0000
p .1000	34.0000
p .2000	42.0000
p .2500	47.0000
p .3000	50.0000
p .4000	57.0000
p .5000	66.0000
p .6000	76.0000
p .7000	90.0000
p .7500	102.0000
p .8000	118.0000
p .9000	185.0000
p .9675	407.1575
p .9900	1025.1000
p .9970	2357.6500
p .9994	7361.3440
p .9999	11648.2038
p max	13000.0000

STATFLUV Program Input File Name is: mog_pors.in
STATFLUV Program Output File Name is: mog_pors.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	12276
SAMPLE MEAN	=	30.873
SAMPLE MEDIAN	=	6.400
STANDARD DEVIATION	=	108.796
COEFFICIENT OF VARIATION	=	3.5240
SKEWNESS COEFFICIENT	=	25.2458
KURTOSIS COEFFICIENT	=	1044.0787
LAG-1 SERIAL CORR. COEFF.	=	0.8591

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	0.0000
p .0001	0.0000
p .0006	0.0000
p .0030	0.0000
p .0100	0.0000
p .0325	0.0000
p .1000	0.3400
p .2000	1.4000
p .2500	1.7000
p .3000	2.2000
p .4000	3.7800
p .5000	6.4000
p .6000	10.0000
p .7000	18.0000
p .7500	25.0000
p .8000	36.0000
p .9000	83.0000
p .9675	167.0000
p .9900	291.1500
p .9970	551.5070
p .9994	1901.1260
p .9999	5544.6000
p max	6000.0000

STATFLUV Program Input File Name is: mog_wins.in
STATFLUV Program Output File Name is: mog_wins.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	6051
SAMPLE MEAN	=	46.689
SAMPLE MEDIAN	=	13.000
STANDARD DEVIATION	=	141.630
COEFFICIENT OF VARIATION	=	3.0335
SKEWNESS COEFFICIENT	=	21.5366
KURTOSIS COEFFICIENT	=	709.4329
LAG-1 SERIAL CORR. COEFF.	=	0.8310

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	0.3300
p .0001	0.1997
p .0006	0.4779
p .0030	0.6400
p .0100	0.8656
p .0325	1.1000
p .1000	1.6000
p .2000	2.6000
p .2500	3.5000
p .3000	4.5000

p .4000	7.8000
p .5000	13.0000
p .6000	21.0000
p .7000	39.0000
p .7500	53.0000
p .8000	71.0000
p .9000	120.0000
p .9675	207.3100
p .9900	341.4800
p .9970	818.6040
p .9994	2751.4240
p .9999	3633.6083
p max	6000.0000

STATFLUV Program Input File Name is: mog_sums.in
STATFLUV Program Output File Name is: mog_sums.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	4151
SAMPLE MEAN	=	15.477
SAMPLE MEDIAN	=	3.400
STANDARD DEVIATION	=	66.713
COEFFICIENT OF VARIATION	=	4.3104
SKEWNESS COEFFICIENT	=	19.2253
KURTOSIS COEFFICIENT	=	572.3926
LAG-1 SERIAL CORR. COEFF.	=	0.7697

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	0.0000
p .0001	0.0000E+00
p .0006	0.0000
p .0030	0.0000
p .0100	0.0000
p .0325	0.0000
p .1000	0.0000
p .2000	0.5800
p .2500	0.9700
p .3000	1.3000
p .4000	2.1000
p .5000	3.4000
p .6000	5.3200
p .7000	8.3000
p .7500	10.0000
p .8000	13.0000
p .9000	29.0000
p .9675	83.0000
p .9900	199.4800
p .9970	515.0880
p .9994	1085.0880
p .9999	1074.4912
p max	2540.0000

STATFLUV Program Input File Name is: red_pors.in
STATFLUV Program Output File Name is: red_pors.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	23011
SAMPLE MEAN	=	217.002
SAMPLE MEDIAN	=	92.000
STANDARD DEVIATION	=	603.052
COEFFICIENT OF VARIATION	=	2.7790

```
SKEWNESS COEFFICIENT      =     21.6705
KURTOSIS COEFFICIENT      =    808.5523
LAG-1 SERIAL CORR. COEFF.=       0.9247
```

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	3.0000
p .0001	3.0000
p .0006	4.1000
p .0030	6.3036
p .0100	9.2000
p .0325	16.0000
p .1000	31.0000
p .2000	51.0000
p .2500	60.0000
p .3000	67.0000
p .4000	80.0000
p .5000	92.0000
p .6000	112.0000
p .7000	150.0000
p .7500	186.0000
p .8000	235.0000
p .9000	454.0000
p .9675	1010.0000
p .9900	1778.8000
p .9970	3778.2000
p .9994	10515.6800
p .9999	24397.6000
p max	34000.0000

STATFLUV Program Input File Name is: red_wins.in
STATFLUV Program Output File Name is: red_wins.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

```
SAMPLE SIZE               =        11419

SAMPLE MEAN            =      287.681
SAMPLE MEDIAN             =      110.000
STANDARD DEVIATION        =      705.897
COEFFICIENT OF VARIATION  =       2.4538
SKEWNESS COEFFICIENT      =      18.8618
KURTOSIS COEFFICIENT      =     642.4462
LAG-1 SERIAL CORR. COEFF.=        0.8842
```

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	16.0000
p .0001	16.4260
p .0006	23.8520
p .0030	32.0000
p .0100	39.0000
p .0325	48.0000
p .1000	63.0000
p .2000	75.0000
p .2500	80.0000
p .3000	85.0000
p .4000	94.0000
p .5000	110.0000
p .6000	140.0000
p .7000	208.0000
p .7500	264.0000
p .8000	340.0000
p .9000	650.0000
p .9675	1240.0000
p .9900	2248.0000

p .9970	5151.8000
p .9994	10666.4000
p .9999	32438.0000
p max	34000.0000

STATFLUV Program Input File Name is: red_sums.in
STATFLUV Program Output File Name is: red_sums.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	7749
SAMPLE MEAN	=	163.045
SAMPLE MEDIAN	=	78.000
STANDARD DEVIATION	=	559.413
COEFFICIENT OF VARIATION	=	3.4310
SKEWNESS COEFFICIENT	=	24.0938
KURTOSIS COEFFICIENT	=	823.7664
LAG-1 SERIAL CORR. COEFF.	=	0.8522

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	3.0000
p .0001	2.3250
p .0006	3.0000
p .0030	4.7000
p .0100	6.8000
p .0325	12.0000
p .1000	22.0000
p .2000	35.0000
p .2500	42.0000
p .3000	49.0000
p .4000	63.0000
p .5000	78.0000
p .6000	94.0000
p .7000	120.0000
p .7500	140.0000
p .8000	170.0000
p .9000	296.0000
p .9675	649.1250
p .9900	1500.0000
p .9970	3325.0000
p .9994	12275.0000
p .9999	19375.0000
p max	25000.0000

STATFLUV Program Input File Name is: vird_pors.in
STATFLUV Program Output File Name is: vird_pors.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	26603
SAMPLE MEAN	=	212.114
SAMPLE MEDIAN	=	93.000
STANDARD DEVIATION	=	581.923
COEFFICIENT OF VARIATION	=	2.7434
SKEWNESS COEFFICIENT	=	19.8470
KURTOSIS COEFFICIENT	=	699.5143
LAG-1 SERIAL CORR. COEFF.	=	0.9319

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	1.7000
p .0001	1.7000

p .0006	1.9000
p .0030	2.6000
p .0100	3.5000
p .0325	7.2000
p .1000	23.0000
p .2000	45.0000
p .2500	55.0000
p .3000	64.0000
p .4000	79.0000
p .5000	93.0000
p .6000	111.0000
p .7000	147.0000
p .7500	178.0000
p .8000	224.0000
p .9000	447.6000
p .9675	992.3700
p .9900	1900.0000
p .9970	3870.0000
p .9994	10400.0000
p .9999	20643.3600
p max	33100.0000

STATFLUV Program Input File Name is: vird_wins.in
STATFLUV Program Output File Name is: vird_wins.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	13140
SAMPLE MEAN	=	282.460
SAMPLE MEDIAN	=	110.000
STANDARD DEVIATION	=	696.341
COEFFICIENT OF VARIATION	=	2.4653
SKEWNESS COEFFICIENT	=	17.7317
KURTOSIS COEFFICIENT	=	562.2435
LAG-1 SERIAL CORR. COEFF.	=	0.9010

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	15.0000
p .0001	15.0000
p .0006	17.0000
p .0030	23.4230
p .0100	31.0000
p .0325	44.0000
p .1000	61.0000
p .2000	75.0000
p .2500	80.0000
p .3000	85.0000
p .4000	96.0000
p .5000	110.0000
p .6000	138.0000
p .7000	194.0000
p .7500	240.0000
p .8000	316.0000
p .9000	635.0000
p .9675	1290.0000
p .9900	2230.0000
p .9970	4500.0000
p .9994	11319.2600
p .9999	29016.7000
p max	33100.0000

STATFLUV Program Input File Name is: vird_sums.in
STATFLUV Program Output File Name is: vird_sums.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

```
SAMPLE SIZE                  =        9071

SAMPLE MEAN             =      163.569
SAMPLE MEDIAN                =       74.000
STANDARD DEVIATION           =      512.154
COEFFICIENT OF VARIATION =          3.1311
SKEWNESS COEFFICIENT         =      19.9633
KURTOSIS COEFFICIENT         =     608.4824
LAG-1 SERIAL CORR. COEFF.=          0.8898
```

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	1.7000
p .0001	1.5422
p .0006	1.8000
p .0030	2.0216
p .0100	2.6000
p .0325	3.9000
p .1000	13.0000
p .2000	29.0000
p .2500	36.0000
p .3000	44.0000
p .4000	58.0000
p .5000	74.0000
p .6000	94.0000
p .7000	122.0000
p .7500	143.0000
p .8000	171.0000
p .9000	302.6000
p .9675	701.2800
p .9900	1682.8000
p .9970	3665.6800
p .9994	11111.3600
p .9999	19703.6864
p. max	21700.0000

STATFLUV Program Input File Name is: sanf_pors.in
STATFLUV Program Output File Name is: sanf_pors.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

```
SAMPLE SIZE                  =       15190

SAMPLE MEAN             =       27.069
SAMPLE MEDIAN                =        8.350
STANDARD DEVIATION           =      101.707
COEFFICIENT OF VARIATION =          3.7573
SKEWNESS COEFFICIENT         =      27.9167
KURTOSIS COEFFICIENT         =    1149.7427
LAG-1 SERIAL CORR. COEFF.=          0.9116
```

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	0.2400
p .0001	0.2660
p .0006	0.4023
p .0030	0.8200
p .0100	1.4000
p .0325	2.1000
p .1000	3.4000
p .2000	4.8000
p .2500	5.4000
p .3000	6.0000
p .4000	7.0000
p .5000	8.3500

p .6000	10.0000
p .7000	14.0000
p .7500	17.0000
p .8000	22.0000
p .9000	53.0000
p .9675	163.0000
p .9900	301.0900
p .9970	479.2810
p .9994	1492.8100
p .9999	4958.4720
p max	5000.0000

STATFLUV Program Input File Name is: sanf_wins.in
STATFLUV Program Output File Name is: sanf_wins.out

ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

SAMPLE SIZE	=	7493
SAMPLE MEAN	=	37.904
SAMPLE MEDIAN	=	11.000
STANDARD DEVIATION	=	90.781
COEFFICIENT OF VARIATION	=	2.3950
SKEWNESS COEFFICIENT	=	12.2882
KURTOSIS COEFFICIENT	=	321.8651
LAG-1 SERIAL CORR. COEFF.	=	0.8900

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

PERCENTILE	QUARTILE
p min	0.9600
p .0001	0.7194
p .0006	1.2496
p .0030	2.7000
p .0100	3.3000
p .0325	4.0000
p .1000	5.0000
p .2000	6.1000
p .2500	6.7000
p .3000	7.2000
p .4000	8.5000
p .5000	11.0000
p .6000	14.0000
p .7000	21.0000
p .7500	26.0000
p .8000	39.0000
p .9000	97.0000
p .9675	232.0000
p .9900	372.0600
p .9970	519.6980
p .9994	1435.5400
p .9999	2550.0149
p max	3400.0000

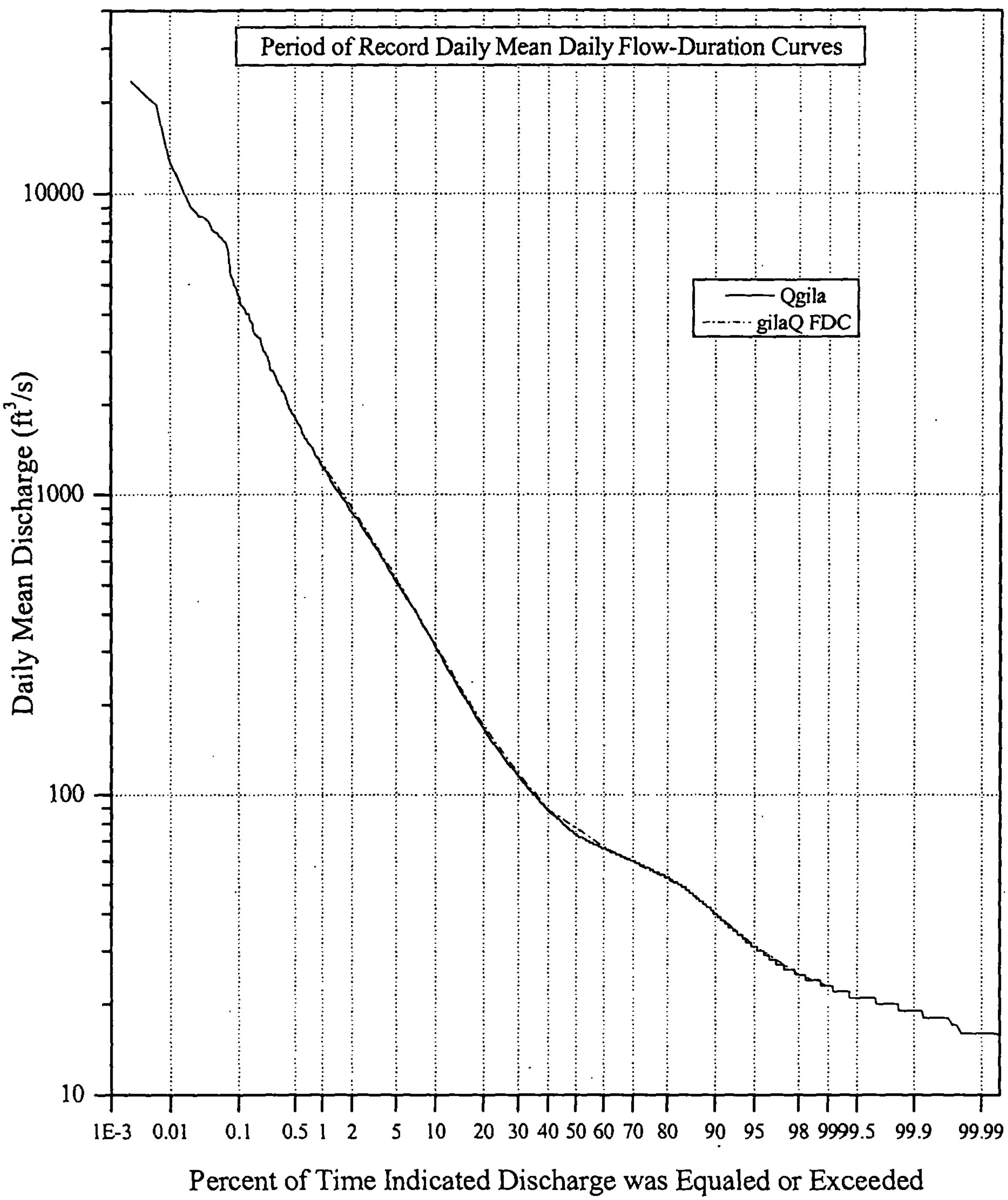
STATFLUV Program Input File Name is: sanf_sums.in
STATFLUV Program Output File Name is: sanf_sums.out

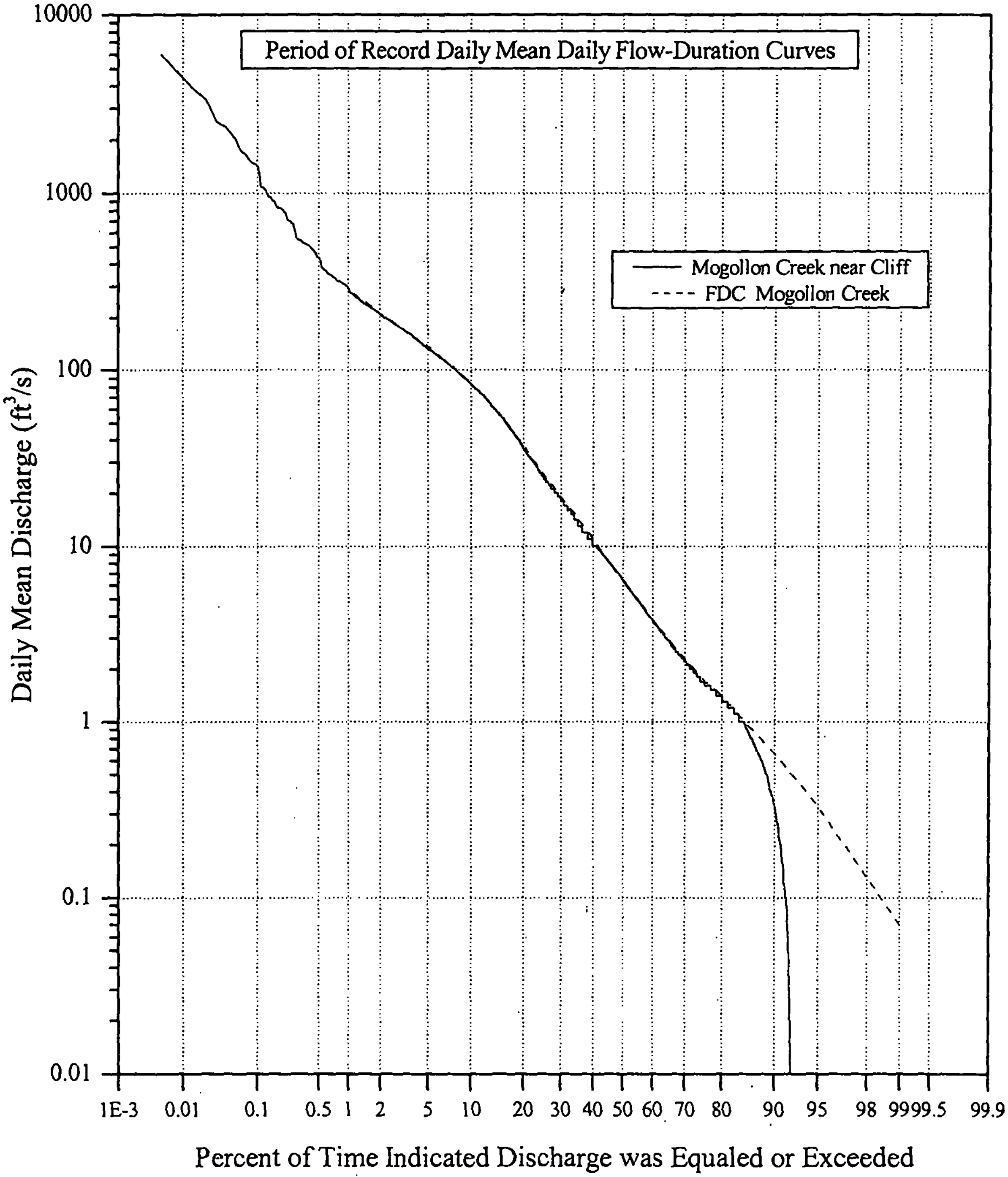
ESTIMATED SAMPLE STATISTICS (UNBIASED ESTIMATES)

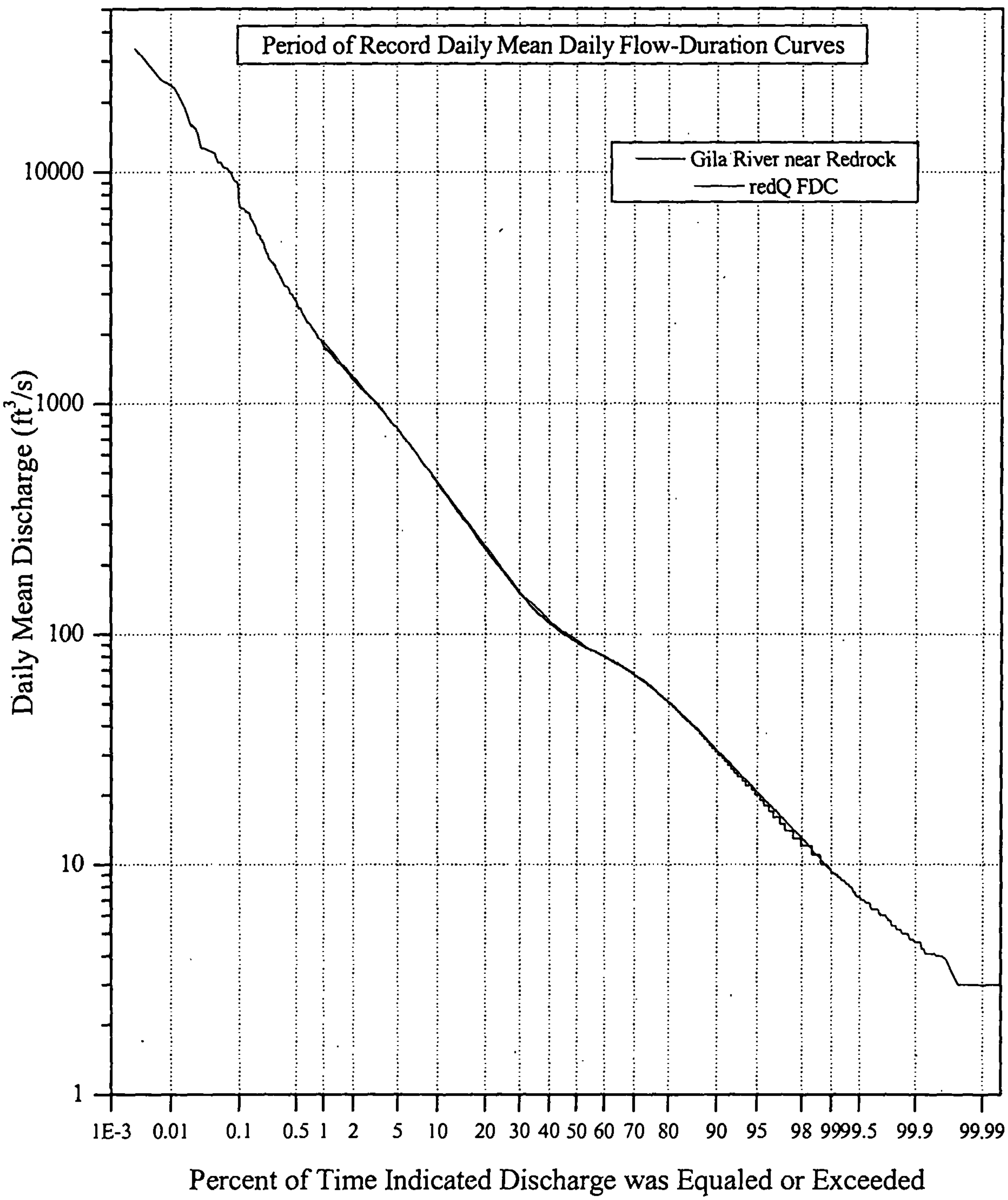
SAMPLE SIZE	=	5135
SAMPLE MEAN	=	18.319
SAMPLE MEDIAN	=	7.200
STANDARD DEVIATION	=	133.131
COEFFICIENT OF VARIATION	=	7.2675
SKEWNESS COEFFICIENT	=	31.1266
KURTOSIS COEFFICIENT	=	1063.9345
LAG-1 SERIAL CORR. COEFF.	=	0.8381

SELECTED QUARTILES FOR BOXPLOT CONSTRUCTION

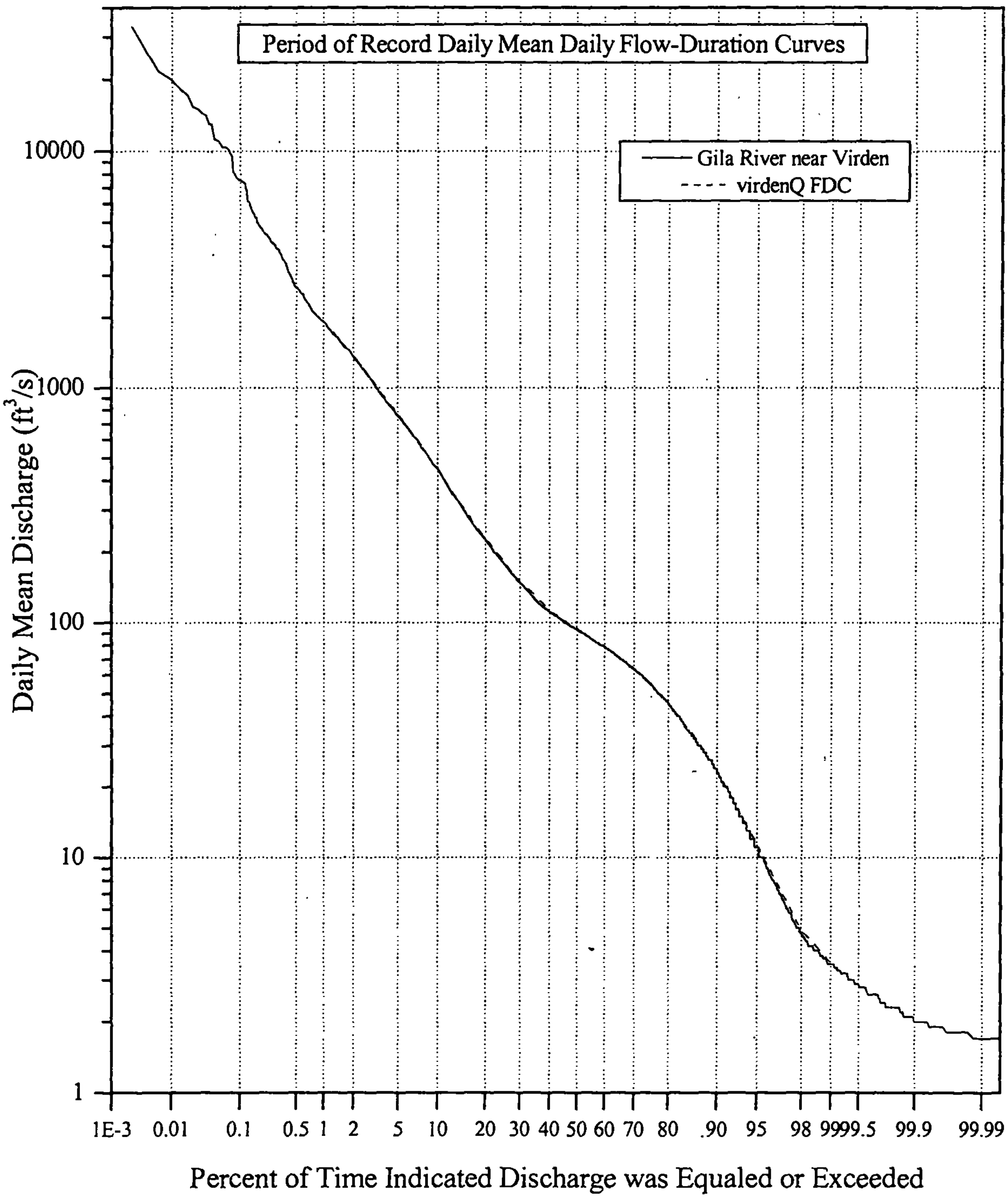
PERCENTILE	QUARTILE
p min	0.2400
p .0001	0.1233
p .0006	0.3341
p .0030	0.4863
p .0100	0.8700
p .0325	1.7920
p .1000	2.9000
p .2000	4.1000
p .2500	4.6000
p .3000	5.1000
p .4000	6.1000
p .5000	7.2000
p .6000	8.7000
p .7000	11.0000
p .7500	13.0000
p .8000	15.0000
p .9000	25.0000
p .9675	61.0000
p .9900	149.2800
p .9970	389.3920
p .9994	4246.1440
p .9999	2577.7280
p max	5000.0000


Period of Record Daily Mean Daily Flow-Duration Curves
Qgila
gilaQ FDC
Daily Mean Discharge (ft^3/s)
10000
1000
100
10
1E-3
0.01
0.1
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.5
99.9
99.99
Percent of Time Indicated Discharge was Equaled or Exceeded

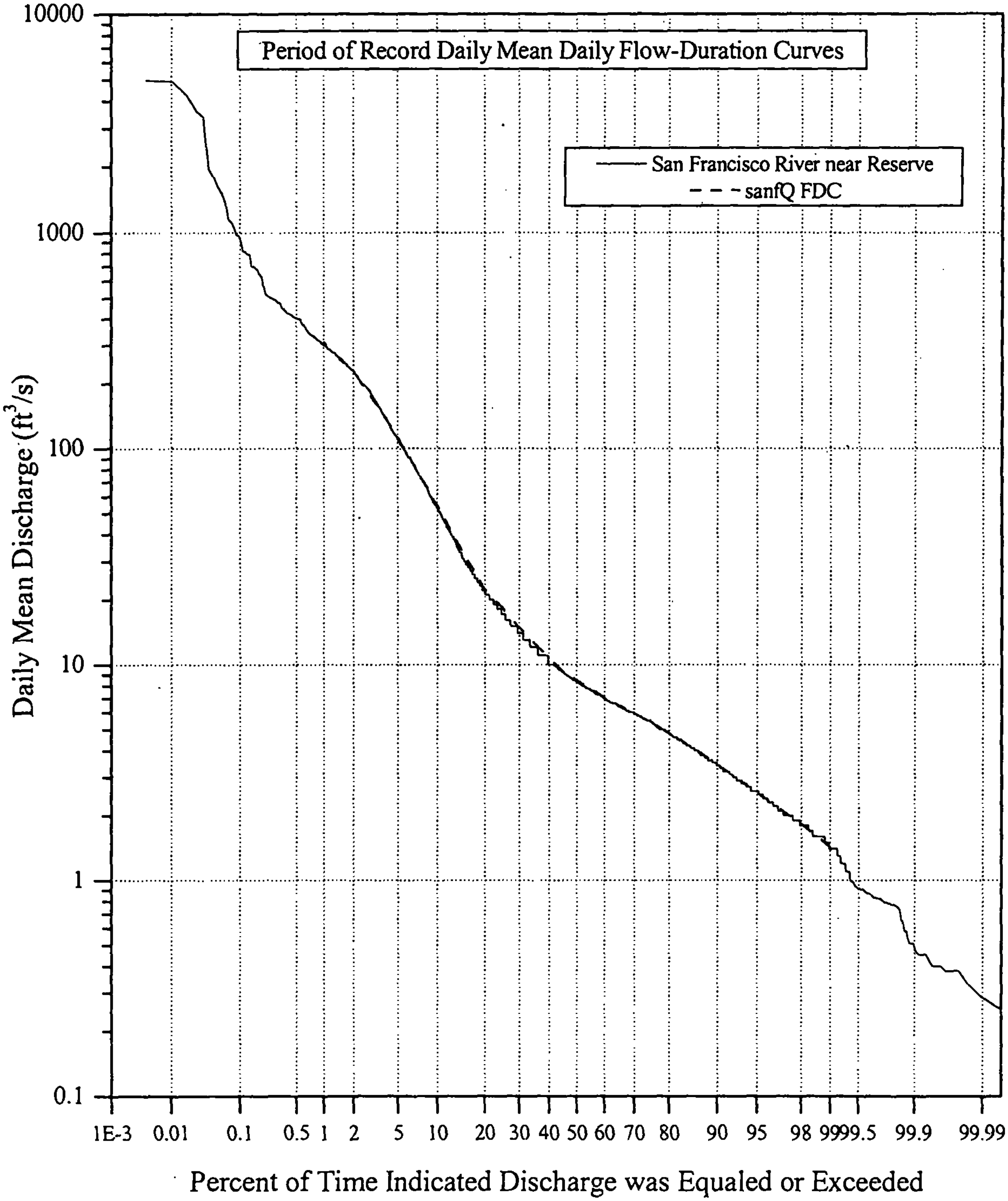

Period of Record Daily Mean Daily Flow-Duration Curves
Mogollon Creek near Cliff
FDC Mogollon Creek
10000
1000
100
10
1
0.1
0.01
Daily Mean Discharge (ft³/s)
1E-3
0.01
0.1
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.5
99.9
Percent of Time Indicated Discharge was Equaled or Exceeded



Period of Record Daily Mean Daily Flow-Duration Curves
Gila River near Redrock
redQ FDC
Daily Mean Discharge (ft³/s)
10000
1000
100
10
1
1E-3
0.01
0.1
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.5
99.9
99.99
Percent of Time Indicated Discharge was Equaled or Exceeded



Period of Record Daily Mean Daily Flow-Duration Curves
Gila River near Virden
virdenQ FDC
10000
1000
100
10
1
Daily Mean Discharge (ft³/s)
1E-3 0.01 0.1 0.5 1 2 5 10 20 30 40 50 60 70 80 .90 95 98 9999.5 99.9 99.99
Percent of Time Indicated Discharge was Equaled or Exceeded


Period of Record Daily Mean Daily Flow-Duration Curves
San Francisco River near Reserve
sanfQ FDC
Daily Mean Discharge (ft3/s)
10000
1000
100
10
1
0.1
1E-3
0.01
0.1
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.5
99.9
99.99
Percent of Time Indicated Discharge was Equaled or Exceeded

APPENDIX D
PRECIPITATION TREND ANALYSIS RESULTS - SWSTAT

FORT BAYARD

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.022	0.776	-0.006	1923	2000	78	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	-0.012	0.883	-0.001	1923	2000	78	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	-0.005	0.948	0.000	1923	2000	78	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	-0.059	0.445	-0.015	1923	2000	78	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	-0.031	0.695	-0.001	1923	2000	78	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.111	0.177	0.029	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	0.006	0.943	0.002	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	0.022	0.792	0.001	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	0.070	0.397	0.016	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	0.012	0.887	0.001	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.210	0.018	0.066	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	0.110	0.216	0.024	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	0.127	0.153	0.009	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	0.087	0.329	0.027	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	0.046	0.605	0.002	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.252	0.010	0.086	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	0.168	0.086	0.046	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	0.123	0.210	0.012	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	0.069	0.482	0.024	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	0.072	0.467	0.004	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.169	0.127	0.059	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	0.127	0.254	0.049	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	0.073	0.514	0.011	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	-0.003	0.991	0.000	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	-0.062	0.584	-0.004	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.067	0.617	0.033	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	FortB ann
2	0.156	0.232	0.103	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	FortB win
3	0.074	0.580	0.013	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	FortB spr
4	-0.094	0.475	-0.050	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	FortB sum
5	-0.168	0.199	-0.012	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	FortB max

GILA HOT SPRINGS

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.126	0.237	0.051	1958	2000	43	0	0	0	0.000000	1000000.	30/34678	prcp	Gila ann
2	0.044	0.683	0.014	1958	2000	43	0	0	0	0.000000	1000000.	30/34678	prcp	Gila win
3	0.164	0.124	0.014	1958	2000	43	0	0	0	0.000000	1000000.	30/34678	prcp	Gila spr
4	0.071	0.510	0.015	1958	2000	43	0	0	0	0.000000	1000000.	30/34678	prcp	Gila sum
5	0.207	0.052	0.011	1958	2000	43	0	0	0	0.000000	1000000.	30/34678	prcp	Gila max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.135	0.226	0.061	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Gila ann
2	0.076	0.499	0.028	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Gila win
3	0.183	0.098	0.019	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Gila spr
4	0.027	0.816	0.007	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Gila sum
5	0.121	0.279	0.008	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Gila max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.083	0.532	-0.054	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Gila ann
2	0.018	0.901	0.006	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Gila win
3	0.060	0.656	0.006	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Gila spr
4	-0.097	0.464	-0.034	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Gila sum
5	0.062	0.643	0.007	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Gila max

HOOD/RESERVE RANGER STATION

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.113	0.129	0.025	1917	2000	84	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	-0.002	0.985	0.000	1917	2000	84	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.029	0.696	0.001	1917	2000	84	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	0.118	0.112	0.019	1917	2000	84	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.085	0.254	0.002	1917	2000	84	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.132	0.085	0.030	1921	2000	80	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.037	0.627	0.007	1921	2000	80	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.043	0.575	0.002	1921	2000	80	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	0.106	0.165	0.018	1921	2000	80	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.099	0.196	0.003	1921	2000	80	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.102	0.212	0.028	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.057	0.491	0.013	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.017	0.835	0.001	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	0.085	0.299	0.016	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.147	0.073	0.004	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.113	0.204	0.043	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.114	0.202	0.027	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.119	0.183	0.006	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	0.040	0.660	0.007	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.177	0.047	0.007	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.086	0.384	0.036	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.087	0.380	0.024	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.106	0.281	0.007	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	0.034	0.732	0.008	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.157	0.110	0.008	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.015	0.898	0.010	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.105	0.345	0.046	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	0.190	0.087	0.016	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	-0.071	0.529	-0.031	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	0.154	0.166	0.009	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.241	0.064	-0.132	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	0.053	0.695	0.032	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	-0.078	0.556	-0.016	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	-0.163	0.212	-0.092	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	-0.039	0.775	-0.003	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.087	0.451	-0.054	1917	1954	38	0	0	0	0.000000	1000000.	30/34678	prcp	Hood ann
2	-0.104	0.365	-0.033	1917	1954	38	0	0	0	0.000000	1000000.	30/34678	prcp	Hood win
3	-0.047	0.687	-0.006	1917	1954	38	0	0	0	0.000000	1000000.	30/34678	prcp	Hood spr
4	-0.125	0.274	-0.035	1917	1954	38	0	0	0	0.000000	1000000.	30/34678	prcp	Hood sum
5	-0.087	0.450	-0.004	1917	1954	38	0	0	0	0.000000	1000000.	30/34678	prcp	Hood max

CLIFF

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.286	0.002	0.120	1945	2000	56	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff ann
2	0.234	0.011	0.058	1945	2000	56	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff win
3	0.038	0.687	0.002	1945	2000	56	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff spr
4	0.152	0.100	0.037	1945	2000	56	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff sum
5	0.214	0.024	0.009	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.223	0.023	0.107	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff ann
2	0.190	0.052	0.053	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff win
3	0.148	0.132	0.008	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff spr
4	0.112	0.255	0.031	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff sum
5	0.251	0.010	0.011	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.144	0.196	0.097	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff ann
2	0.147	0.184	0.054	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff win
3	0.192	0.083	0.018	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff spr
4	0.036	0.753	0.010	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff sum
5	0.246	0.026	0.012	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.067	0.617	0.076	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff ann
2	0.143	0.276	0.073	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff win
3	0.182	0.164	0.027	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff spr
4	-0.053	0.695	-0.041	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff sum
5	0.154	0.239	0.011	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Cliff max

REDROCK

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.231	0.016	0.084	1949	2000	52	0	0	0	0.000000	1000000.	30/34678	prcp	Red an
2	0.207	0.031	0.049	1949	2000	52	0	0	0	0.000000	1000000.	30/34678	prcp	Red win
3	0.093	0.336	0.004	1949	2000	52	0	0	0	0.000000	1000000.	30/34678	prcp	Red spr
4	0.051	0.597	0.008	1949	2000	52	0	0	0	0.000000	1000000.	30/34678	prcp	Red sum
5	0.078	0.416	0.004	1949	2000	52	0	0	0	0.000000	1000000.	30/34678	prcp	Red max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.197	0.045	0.075	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Red an
2	0.199	0.042	0.048	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Red win
3	0.094	0.340	0.005	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Red spr
4	0.007	0.947	0.002	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Red sum
5	0.028	0.782	0.002	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Red max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.097	0.382	0.045	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Red an
2	0.137	0.217	0.042	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Red win
3	0.108	0.333	0.007	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Red spr
4	-0.088	0.428	-0.028	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Red sum
5	-0.109	0.327	-0.004	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Red max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.011	0.943	-0.018	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Red an
2	0.163	0.212	0.072	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Red win
3	0.007	0.972	0.000	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Red spr
4	-0.205	0.116	-0.101	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Red sum
5	-0.166	0.205	-0.011	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Red max

LORDSBURG

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.133	0.087	0.029	1924	2000	77	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.121	0.121	0.020	1924	2000	77	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	-0.262	0.001	-0.015	1924	2000	77	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	0.051	0.515	0.009	1924	2000	77	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	-0.030	0.759	-0.001	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.147	0.072	0.033	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.073	0.372	0.015	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	-0.160	0.050	-0.008	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	0.090	0.271	0.016	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	-0.030	0.759	-0.001	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.159	0.073	0.043	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.150	0.091	0.033	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	-0.020	0.828	0.000	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	0.014	0.883	0.003	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	-0.030	0.759	-0.001	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.180	0.066	0.054	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.207	0.034	0.056	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	0.140	0.154	0.007	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	0.011	0.913	0.005	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	-0.133	0.175	-0.006	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.113	0.311	0.043	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.249	0.025	0.077	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	0.082	0.462	0.004	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	-0.082	0.463	-0.025	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	-0.099	0.376	-0.006	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.067	0.617	0.037	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Lord ann
2	0.145	0.269	0.063	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Lord win
3	0.000	1.000	0.000	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Lord spr
4	-0.057	0.669	-0.024	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Lord sum
5	0.009	0.957	0.001	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Lord max

MIMBRES RANGER STATION

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.097	0.269	0.035	1939	2000	62	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb ann
2	-0.006	0.947	-0.002	1939	2000	62	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb win
3	-0.215	0.014	-0.020	1939	2000	62	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb spr
4	0.116	0.185	0.032	1939	2000	62	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb sum
5	0.323	0.001	0.013	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.125	0.159	0.048	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb ann
2	0.027	0.769	0.006	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb win
3	-0.173	0.052	-0.015	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb spr
4	0.112	0.207	0.033	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb sum
5	0.323	0.001	0.013	1948	2000	53	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.068	0.493	0.034	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb ann
2	0.041	0.682	0.009	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb win
3	-0.014	0.894	-0.001	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb spr
4	0.071	0.472	0.027	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb sum
5	0.362	0.000	0.014	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.090	0.421	-0.052	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb ann
2	-0.005	0.972	-0.003	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb win
3	0.018	0.880	0.002	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb spr
4	-0.085	0.449	-0.037	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb sum
5	0.196	0.076	0.009	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.195	0.134	-0.149	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb ann
2	-0.021	0.887	-0.010	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb win
3	-0.028	0.844	-0.004	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb spr
4	-0.172	0.187	-0.100	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb sum
5	-0.014	0.929	-0.001	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	prcp	Mimb max

GLENWOOD

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.266	0.006	0.138	1949	1999	51	0	0	0	0.000000	1000000.	30/34678	prcp	Glen ann
2	0.195	0.044	0.063	1949	1999	51	0	0	0	0.000000	1000000.	30/34678	prcp	Glen win
3	0.170	0.079	0.012	1949	1999	51	0	0	0	0.000000	1000000.	30/34678	prcp	Glen spr
4	0.161	0.098	0.046	1949	1999	51	0	0	0	0.000000	1000000.	30/34678	prcp	Glen sum
5	0.129	0.183	0.006	1949	1999	51	0	0	0	0.000000	1000000.	30/34678	prcp	Glen max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.273	0.005	0.144	1950	1999	50	0	0	0	0.000000	1000000.	30/34678	prcp	Glen ann
2	0.213	0.030	0.075	1950	1999	50	0	0	0	0.000000	1000000.	30/34678	prcp	Glen win
3	0.178	0.069	0.014	1950	1999	50	0	0	0	0.000000	1000000.	30/34678	prcp	Glen spr
4	0.148	0.132	0.044	1950	1999	50	0	0	0	0.000000	1000000.	30/34678	prcp	Glen sum
5	0.120	0.222	0.006	1950	1999	50	0	0	0	0.000000	1000000.	30/34678	prcp	Glen max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.246	0.026	0.164	1960	1999	40	0	0	0	0.000000	1000000.	30/34678	prcp	Glen ann
2	0.218	0.049	0.101	1960	1999	40	0	0	0	0.000000	1000000.	30/34678	prcp	Glen win
3	0.176	0.113	0.019	1960	1999	40	0	0	0	0.000000	1000000.	30/34678	prcp	Glen spr
4	0.100	0.370	0.038	1960	1999	40	0	0	0	0.000000	1000000.	30/34678	prcp	Glen sum
5	0.147	0.184	0.010	1960	1999	40	0	0	0	0.000000	1000000.	30/34678	prcp	Glen max

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.177	0.175	0.192	1970	1999	30	0	0	0	0.000000	1000000.	30/34678	prcp	Glen ann
2	0.189	0.148	0.125	1970	1999	30	0	0	0	0.000000	1000000.	30/34678	prcp	Glen win
3	0.053	0.695	0.007	1970	1999	30	0	0	0	0.000000	1000000.	30/34678	prcp	Glen spr
4	0.140	0.284	0.088	1970	1999	30	0	0	0	0.000000	1000000.	30/34678	prcp	Glen sum
5	0.191	0.143	0.016	1970	1999	30	0	0	0	0.000000	1000000.	30/34678	prcp	Glen max

APPENDIX E
STREAMFLOW TREND ANALYSIS RESULTS - SWSTAT

GILA RIVER NEAR GILA

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.165	0.052	24.808	1929	2000	65	7	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.138	0.088	0.717	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.172	0.033	17.411	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	-0.031	0.708	0.000	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.071	0.379	0.068	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.125	0.122	0.154	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.138	0.088	0.283	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.125	0.122	0.514	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.123	0.128	1.238	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	0.192	0.017	14.558	1929	2000	72	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.195	0.024	29.630	1931	2000	63	7	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.144	0.079	0.755	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.183	0.026	20.000	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	-0.015	0.859	0.000	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.105	0.199	0.100	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.130	0.111	0.161	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.135	0.098	0.289	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.120	0.143	0.500	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.129	0.116	1.273	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	0.205	0.012	16.188	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.195	0.038	36.872	1941	2000	54	6	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.192	0.031	1.106	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.175	0.049	23.134	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	0.107	0.230	0.063	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.206	0.021	0.229	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.221	0.013	0.353	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.199	0.025	0.421	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.183	0.039	0.824	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.183	0.039	1.737	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	0.206	0.021	19.127	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.178	0.091	44.667	1951	2000	44	6	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.237	0.016	1.750	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.189	0.054	34.615	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	0.198	0.043	0.143	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.294	0.003	0.432	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.367	0.000	0.640	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.318	0.001	0.778	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.269	0.006	1.429	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.200	0.041	2.461	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	0.197	0.045	24.017	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.096	0.426	36.714	1961	2000	35	5	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.112	0.316	1.104	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.144	0.196	35.548	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	0.078	0.484	0.067	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.113	0.310	0.220	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.177	0.110	0.413	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.126	0.258	0.405	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.100	0.370	0.785	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.079	0.477	1.280	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	0.144	0.196	23.929	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.034	0.825	-17.400	1971	2000	26	4	0	0	0.000000	1000000.	30/34678	peak	Gila pk
2	0.025	0.858	0.625	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila mean
3	0.011	0.943	3.167	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila max
4	0.034	0.802	0.045	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila min
5	0.074	0.580	0.267	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila p10
6	0.115	0.382	0.488	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila 30p
7	0.126	0.335	0.625	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila 50p
8	0.051	0.708	0.750	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila 70p
9	0.007	0.972	0.413	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila 90p
10	-0.011	0.943	-1.852	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Gila 3d

MOGOLLON CREEK NEAR CLIFF

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.066	0.594	-6.000	1967	2000	34	0	0	0	0.000000	1000000.	30/34678	flow	Mog pk
2	0.030	0.816	0.122	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog mean
3	0.011	0.938	1.017	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog max
4	0.087	0.485	0.073	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog 50p
5	0.027	0.840	0.053	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog 70p
6	0.019	0.889	0.242	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog 90p
7	0.027	0.840	1.000	1968	2000	33	0	0	0	0.000000	1000000.	30/34678	flow	Mog 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.113	0.392	-17.778	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog pk
2	0.030	0.830	0.154	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog mean
3	-0.067	0.617	-4.526	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog max
4	0.106	0.421	0.083	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog 50p
5	0.051	0.708	0.192	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog 70p
6	0.039	0.775	0.333	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog 90p
7	-0.044	0.748	-2.278	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Mog 3d

GILA RIVER NEAR REDROCK

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.054	0.707	61.905	1929	1955	27	0	0	0	0.000000	1000000.	30/34678	flow	Redrock pk
2	-0.287	0.047	-3.440	1931	1959	25	4	0	0	0.000000	1000000.	30/34678	flow	Redrock mean
3	-0.093	0.528	-12.750	1931	1955	25	0	0	0	-0.3402823E+39	1000000.	30/34678	flow	Redrock max
4	0.116	0.180	0.077	1931	2000	63	7	0	0	0.000000	1000000.	30/34678	flow	Redrock min
5	-0.533	0.000	-2.068	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 10p
6	-0.440	0.002	-2.278	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 30p
7	-0.373	0.009	-2.000	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 50p
8	-0.413	0.004	-3.016	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 70p
9	-0.233	0.107	-8.172	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 90p
10	-0.080	0.591	-15.742	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.054	0.707	61.905	1929	1955	27	0	0	0	0.000000	1000000.	30/34678	flow	Redrock pk
2	-0.287	0.047	-3.440	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock mean
3	-0.093	0.528	-12.750	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock max
4	-0.437	0.002	-0.756	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock min
5	-0.533	0.000	-2.068	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 10p
6	-0.440	0.002	-2.278	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 30p
7	-0.373	0.009	-2.000	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 50p
8	-0.413	0.004	-3.016	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 70p
9	-0.233	0.107	-8.172	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 90p
10	-0.080	0.591	-15.742	1931	1955	25	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.041	0.725	23.333	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock pk
2	0.105	0.359	1.725	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock mean
3	0.064	0.580	20.100	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock max
4	0.181	0.113	0.250	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock min
5	0.178	0.119	0.421	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 10p
6	0.134	0.242	0.548	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 30p
7	0.139	0.222	0.783	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 50p
8	0.098	0.393	1.333	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 70p
9	0.121	0.291	3.442	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 90p
10	0.058	0.615	14.417	1963	2000	38	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 3d

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.094	0.475	-85.294	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock pk
2	0.057	0.669	1.700	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock mean
3	-0.044	0.748	-13.222	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock max
4	0.182	0.164	0.275	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock min
5	0.221	0.090	0.680	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 10p
6	0.163	0.212	1.022	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 30p
7	0.156	0.232	1.308	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 50p
8	0.071	0.592	1.000	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 70p
9	0.099	0.454	4.009	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 90p
10	-0.039	0.775	-18.848	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Redrock 3d

GILA RIVER NEAR VIRDEN

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.036	0.658	13.213	1927	2000	73	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.136	0.089	1.058	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	0.110	0.170	18.441	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.326	0.000	0.150	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.183	0.022	0.281	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.132	0.100	0.333	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.103	0.200	0.333	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.112	0.163	0.583	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.116	0.148	1.806	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	0.144	0.073	17.092	1928	2000	73	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.004	0.963	1.610	1931	2000	69	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.141	0.085	1.141	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	0.106	0.196	19.190	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.309	0.000	0.153	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.207	0.012	0.330	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.158	0.054	0.433	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.111	0.176	0.381	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.109	0.184	0.578	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.121	0.140	1.893	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	0.144	0.079	18.121	1931	2000	70	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.074	0.410	32.000	1941	2000	59	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.200	0.024	1.918	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	0.128	0.149	29.274	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.395	0.000	0.218	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.352	0.000	0.643	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.287	0.001	0.792	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.193	0.030	0.735	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.186	0.036	1.085	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.178	0.045	2.973	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	0.165	0.063	24.214	1941	2000	60	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.077	0.443	46.875	1951	2000	49	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.233	0.018	2.764	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	0.137	0.162	41.667	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.503	0.000	0.365	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.455	0.000	0.962	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.407	0.000	1.205	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.313	0.001	1.353	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.277	0.005	2.010	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.195	0.046	4.229	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	0.153	0.120	27.451	1951	2000	50	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.067	0.553	62.917	1961	2000	39	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.131	0.239	1.948	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	0.090	0.421	38.506	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.305	0.006	0.345	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.255	0.021	0.823	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.229	0.038	0.720	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.132	0.234	0.732	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.123	0.268	1.242	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.117	0.294	2.797	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	0.082	0.463	25.995	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	-0.052	0.707	-47.200	1971	2000	29	1	0	0	0.000000	1000000.	30/34678	flow	Virden pk
2	0.076	0.568	1.930	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden mean
3	-0.048	0.721	-22.615	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden max
4	0.299	0.021	0.500	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden min
5	0.239	0.066	1.057	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 10p
6	0.184	0.159	0.933	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 30p
7	0.205	0.116	1.625	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 50p
8	0.140	0.284	2.050	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 70p
9	0.099	0.454	3.684	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 90p
10	-0.053	0.695	-13.611	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	Virden 3day

SAN FRANCISCO RIVER NEAR RESERVE

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.159	0.141	12.600	1959	2000	42	0	0	0	0.000000	1000000.	30/34678	flow	SanF pk
2	0.007	0.955	0.009	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF mean
3	0.022	0.849	0.899	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF max
4	-0.271	0.013	-0.032	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF min
5	-0.001	1.000	0.000	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 10p
6	0.149	0.174	0.038	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 30p
7	0.116	0.290	0.042	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 50p
8	0.013	0.911	0.007	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 70p
9	-0.034	0.762	-0.099	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 90p
10	0.029	0.796	0.569	1960	2000	41	0	0	0	0.000000	1000000.	30/34678	flow	SanF 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	PERIOD OF RECORD TO	NUMBER OF VALUES USED	NUMBER OF VALUES NOT	NON-ZERO RETURNS CODE	NON-ZERO RETURNS CNT	RANGE OF DATA MINIMUM	RANGE OF DATA MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.136	0.221	12.036	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF pk
2	0.015	0.898	0.019	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF mean
3	0.033	0.771	1.442	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF max
4	-0.273	0.013	-0.036	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF min
5	-0.019	0.870	-0.007	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 10p
6	0.126	0.258	0.034	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 30p
7	0.104	0.351	0.039	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 50p
8	0.019	0.870	0.015	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 70p
9	-0.026	0.825	-0.069	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 90p
10	0.044	0.701	0.846	1961	2000	40	0	0	0	0.000000	1000000.	30/34678	flow	SanF 3day

DATA-SET NUMBER	KENDALL'S TAU	P-LEVEL	MEDIAN SLOPE OF TREND	PERIOD OF RECORD FROM	TO	NUMBER OF VALUES USED	NOT	NON-ZERO RETURNS CODE	CNT	RANGE OF DATA MINIMUM	MAXIMUM	QUALIFIERS	DATA TYPE	STATION NUMBER
1	0.021	0.887	1.818	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF pk
2	-0.014	0.929	-0.012	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF mean
3	-0.044	0.748	-1.174	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF max
4	-0.308	0.017	-0.045	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF min
5	-0.115	0.382	-0.042	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 10p
6	0.016	0.915	0.004	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 30p
7	0.074	0.580	0.041	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 50p
8	0.007	0.972	0.002	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 70p
9	-0.009	0.957	-0.009	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 90p
10	-0.011	0.943	-0.231	1971	2000	30	0	0	0	0.000000	1000000.	30/34678	flow	SanF 3day