US Army Corps
of Engineers
Los Angeles District

Little Colorado River at Winslow, Navajo County, Arizona

Flood Risk Management Feasibility Study

APPENDIX A

Hydrology (including Climate Change)

October 2018

US Army Corps of Engineers®
Los Angeles District
Hydrology and Hydraulics Branch

APPENDIX A
HYDROLOGY (Including Climate Change)

Little Colorado River at Winslow
Navajo County, Arizona

OCTOBER 2018

Errata Sheet: Little Colorado River at Winslow Feasibility Study Baseline and Future Without-Project Conditions Hydrology Revised Final Report, February 2012.

Section 1.3, "Study Purpose" is replaced as follows:

The purpose of this study is to formulate and evaluate cost effective, environmentally-sensitive, and technically feasible flood risk management (FRM) alternatives to address flood related damages and life-safety risk to the City of Winslow and vicinity.

Section 3, Existing and Future Without Project Conditions

This section is amended to include the following:

"A separate analysis was completed to analyze the potential impacts of climate change and is attached to this hydrology appendix."

Section 7.2 Climatologic Effect

This section is amended to include the following:

"Under the *USACE Climate Change Adaptation Policy Statement*, signed by Assistant Secretary of the Army Ms. Jo-Ellen Darcy on 3 June 2011, the US Army Corps of Engineers (USACE) is required to mainstream climate change adaptation in all activities as a means of enhancing the resilience of USACE's built and natural water-resource infrastructure and reducing its potential vulnerabilities to the effects of climate change and variability. USACE is charged with adaptation planning using the best available and actionable science to consider the impacts of climate change when planning for the future.

Engineering and Construction Bulletin 2014-10 outlines a two-step process for qualitative evaluation of climate change impacts to projects, studies and designs. The first step, Phase I, involves an initial screening-level qualitative analysis to assess whether climate change is relevant to the project goals or design. The second step, Phase II, provides a qualitative assessment of the hydrologic impacts of climate change in the project area. The qualitative approach includes evaluating the general effect of climate change on the important hydrologic variables and the underlying physical processes such as changes in processes governing rainfall runoff or snowmelt.

This climate change analysis has been completed and is attached to this hydrology appendix."

Section 4.2 Data Description

This section is amended to include the following additional background information for the Hydrologic Analysis to further explain the adopted methodology. The additional text is added as Section 4.2.1 and 4.2.2.

4.2.1 Evaluation of Available Data from the January 1993 Event

Although the USGS stream gage #09400350 Little Colorado River near Winslow, AZ was not installed until 2001 and detailed flow data in the Little Colorado River (LCR) was not captured until then, the Winslow Levee was overtopped by a high flow event in 1993. The 1993 peak flow estimate of 70,000 cfs at LCR Winslow is a preliminary estimate that was never accepted into the official period of record. Furthermore, Sabol (1993) reported "the Levee was overtopped and breached in January 1993. The discharge of the river at the time of the breach is unknown and it may have exceeded the design discharge; although other factors, such as naturally occurring aggradation and vegetation growth, may have produced a local backwater condition that was sufficient to cause levee overtopping." Therefore, this is not an accurate published flowrate that can be used in a discharge-frequency analysis. The January 8, 1993 high flow event that was observed along the LCR at Winslow was not captured in the upstream gaged flow at Joseph City because the event was more localized on Chevelon Creek, Clear Creek, and Jacks Canyon Creek which confluence with the LCR between Holbrook and Winslow.

Rainfall gages in the Chevelon Creek, Clear Creek, and Jacks Canyon Creek watersheds were compared to rainfall in the LCR watershed upstream of Holbrook and between Winslow and Grand Falls. The watershed localized around Winslow had much higher precipitation amounts, on January 6-8 1993, than experienced upstream and downstream in the watershed for the same time period. Therefore, it is evident that the January 8, 1993 event was a mostly localized event on the LCR near Winslow. For example, the Tonto Creek Fish Hatchery AZ precipitation gage recorded 12.21 inches of rainfall and Promontory AZ precipitation gage recorded 8.05 inches of rainfall over the three day period. Where Snowflake AZ only recorded 0.86 inches of rainfall, Greer AZ only recorded 0.44 inches of rainfall, Slaughter AZ only recorded 0.06 inches of rainfall, Flagstaff Airport AZ recorded 3.89 inches of rainfall, Walnut Canyon AZ only recorded 1.77 inches of rainfall, and Winslow Airport AZ only recorded 0.68 inches of rainfall over the same three day period.

USGS gage # 09397500 Chevelon Fork Below Wildcat Canyon reported a peak flow rate of 24,700 cfs on January 8, 1993 and USGS gage # 09398500 Clear Creek Below Willow Creek recorded a peak flow rate of 29,100 cfs on January 8, 1993. Both of these flow rates on January 8, 1993 are the historic peaks for those gages. This research confirms that the local peak flow rates were higher than the LCR flowrates upstream at Joseph City. On January 11, 1993 the USGS recorded a peak flow rate of 16,600 cfs at their Grand Falls gage which was much less than the unofficial estimated peak flow rate of 70,000 cfs in Winslow on January 8, 1993. Based on rainfall data in the watershed, it appears that the peak at Winslow was the result of a localized rainfall event on the local tributaries just upstream of Winslow. Rainfall amounts both upstream and downstream of the Winslow area were much lower than those recorded in the Chevelon and Clear Creek watersheds. Therefore, it is reasonable to assume that the high peak – short duration event on January 8, 1993 in the Winslow area, that did not have large runoff volume as compared to a watershed wide event, attenuated in the sinuous LCR reach between Winslow and Grand Falls which is approximately 77 miles long and has an additional 4,876 square miles of tributary area.

Runoff from the local watersheds surrounding Winslow was taken into account in the LCR Grand Falls gage and in the area ratioed discharge frequency curve at LCR Winslow. It is assumed that the localized high peak flows that were recorded on Chevelon Creek and Clear Creek and preliminarily estimated at Winslow attenuated between Winslow and Grand Falls. The locations of all of these stream and precipitation gages can be seen on Figure 1 (*attached at the end of this errata sheet*). Therefore, it is concluded that the isolated flow event on January 8, 1993 does not call into question the validity of the Agency Technically Reviewed (ATR) and certified hydrologic procedures, of interpolating the 1% ACE flows for the Winslow area based on computed 1% ACE flows for Joseph City and Grand Falls, which were used for this study.

Comparatively, the September 1923 event which had high flows recorded at both Joseph City upstream (60,000 cfs) and Grand Falls downstream (120,000 cfs) is assumed to be a watershed wide event with a large runoff volume and flows contributing all along the LCR, that would not have attenuated in the sinuous LCR reach between Winslow and Grand Falls.

Per USGS Bulletin 17B, high outliers are not excluded from the discharge-frequency analysis. However, if they are historical events, like 1923, they need to be weighted differently, as they were in this study, as mentioned in Section 4.3.1, Bulletin 17B Procedure, of the Hydrology Appendix. Therefore, the 1923 events at LCR Grand Falls and LCR Holbrook/Joseph City will be kept in the discharge-frequency analysis.

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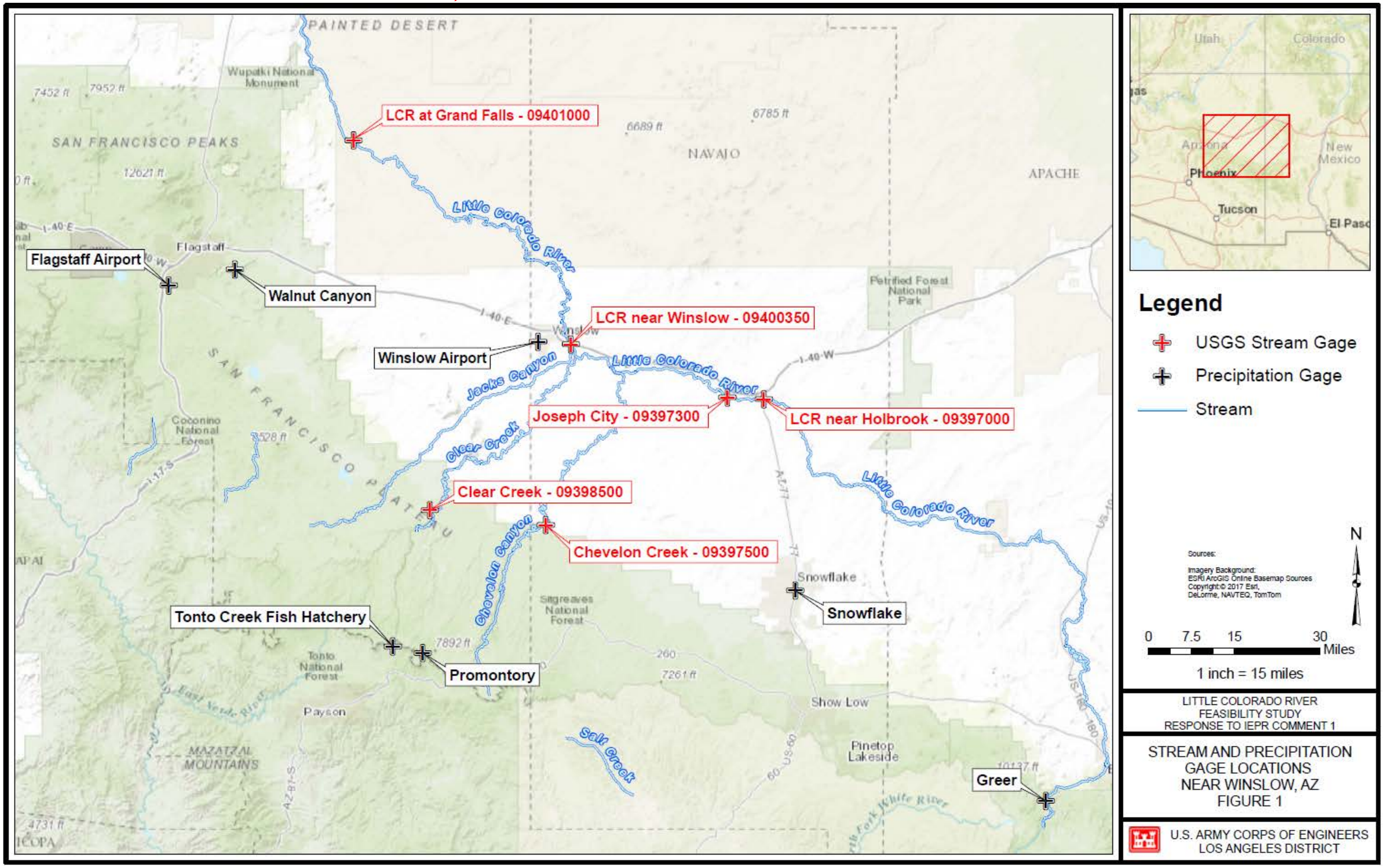

U.S. Army Corps
of Engineers
Los Angeles District

Little Colorado River at Winslow Feasibility Study
Baseline and Future Without-Project-Conditions Hydrology

Revised Final Report

Prepared For:
U.S. Army Corps of Engineers
Los Angeles District

February 2012

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Little Colorado River at Winslow Feasibility Study
Baseline and Future Without-Project-Conditions Hydrology
Revised Final Report

February 2012

Prepared For:

U.S. Army Corps of Engineers

Los Angeles District

Prepared by:

Tetra Tech, Inc.

4801 E. Broadway, Suite 521

Tucson, Arizona 85711

Registered Professional Engineer (Civil)
CERTIFICATE NO.
28850
DOUGLAS G.
LANTZ
Date Signed 2-25-12
ARIZONA U.S.A.
Exp. 3-31-2013

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EXECUTIVE SUMMARY

The Little Colorado River (LCR) at Winslow Feasibility Study is being conducted by the U.S. Army Corps of Engineers (Corps, or USACE) in cooperation with the Navajo County Flood Control District (the cost sharing Non-Federal Sponsor). The study area encompasses the main channel and floodplain of the LCR from Chevelon Canyon downstream (northwest) to Homolovi Ruins State Park, in and near the City of Winslow, in Navajo County, Arizona. The primary purpose of the Feasibility Study is to develop and evaluate potential non-structural and engineered solutions to address flooding issues affecting the Winslow area. In addition, the study will investigate opportunities for ecosystem restoration to support flood-risk management along the LCR and its tributaries, and recreational opportunities.

This *Baseline and Future Without-Project-Conditions Hydrology Report* documents hydrologic analyses for the LCR and major tributaries in the vicinity of Winslow. The hydrologic investigation encompasses the watershed of the LCR and major tributaries, including Chevelon Creek, Ruby Wash, Clear Creek, Cottonwood Wash, Salt Creek, and Jacks Canyon. Specific objects of the investigation include the following:

- Develop peak-discharge-frequency and volume-frequency relationships for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year return periods.
- Compare flood-frequency results with Regional Regression Equations (RREs) developed by the U.S. Geological Survey (USGS) that are applicable to the study area.
- Develop balanced hydrographs for the 25-, 50-, 100-, 200-, and 500-year return periods on the LCR at Winslow. The balanced hydrographs will serve as inputs to hydraulic and sediment-transport models that will be used to evaluate the existing conditions and project alternatives.
- Prepare low-flow analyses to determine the quantity and seasonal characteristics of daily flows for use in formulating ecosystem restoration measures.

Peak-Flow-Frequency Analysis

Annual peak-flow data were collected from 11 stream gages including four from the LCR, two from Chevelon Creek, two from Clear Creek, and three from Jack's Canyon Creek. However only seven of the data sets - three from the LCR, two from Chevelon Creek, two from Clear Creek - had record lengths suitable for frequency analysis. Two of the three gages on the LCR (Holbrook and Joseph City) are within 8 miles of each other and have drainage areas of 11,462 square miles and 12,384 square miles, respectively. The Joseph City gage has continuous data from 1950-1972, and the Holbrook gage has continuous data from 1971-2008. Given their proximity and the overlapping records, the two gages were combined into a single 61-year record at Holbrook, bringing the total to seven. The combination included adjusting the observed discharges at Joseph City record by the ratio of the drainage areas.

The data from seven stream gages along with the combined data set for the LCR at Holbrook were analyzed using procedures from *Guidelines for Determining Flood Flow Frequency, Bulletin 17B* (U. S. Department of the Interior, 1982). The analysis was conducted using the Corps' Statistical Software Package (HEC-SSP) that incorporates all of the Bulletin 17B procedures (USACE, 2009). Peak discharges on the LCR at Holbrook range 9,670 cfs for a 2-year event to 67,080 cfs for a 500-year. By comparison, the peak discharges for the combined record at Holbrook range from 7,680 cfs in the 2-year event to 69,300 cfs for the 500-year event. For the LCR at Grand Falls, the peak discharges range from 8,480 cfs in the 2-year event to 186,990 cfs for a 500-year event.

One of the discarded data sets included the 8-year record for the LCR at Winslow. Given the need for flow data at this point, a discharge-frequency relation for the LCR at Winslow was generated by linear interpolation between the discharge-frequency relations developed for the combined record at Holbrook and the record at Grand Falls. The interpolation was based on the ratios of the drainage areas at each concentration point. The interpolated peak discharges for the LCR at Winslow vary from 8,070 cfs in the 2-year event to 127,250 cfs to 500-year event. For 100-year event the interpolated peak discharge for the LCR near Winslow is 69,200 cfs.

USGS RREs were applied to estimate peak discharges at gaged and ungaged watersheds in the study area. Two sets of equations were applied. The first set of equations (referred to as "Region-11") were taken from USGS Water Supply Paper 2433 (Thomas, et. al., 1997), and the second set of equations (referred to as "Navajo-11") were taken from the USGS Scientific Investigation Report 2006-5306 (Waltemeyer, 2006). Both methods use the drainage area as an explanatory variable, and in both cases, the upper bound on drainage area excludes their use for the LCR. They were therefore applied to concentration points at Jacks Canyon, Chevelon Creek, and Clear Creek; and to a series of concentration points at the Ruby Wash Diversion Levee (RWDL). Comparisons with of the RRE results with the computed discharge-frequency relations on Chevelon Creek and Clear Creek show that the RRE values are less than half of the values for the frequency analysis. Results from the discharge frequency and RRE were compared results in previous and were found to be comparable.

Volume-Frequency Analysis

Average daily flow data for the flow volume-frequency analysis were collected from 12 stream gages near Winslow. Six of the stream gages did not have adequate record lengths for frequency analysis and were discarded. The remaining data sets, including two from the LCR, two from Chevelon Creek, and two from Clear Creek, were used in the flow volume-frequency analysis. HEC-SSP was again used as the analysis tool, but required preprocessing of the data to create continuous records. Tetra Tech coordinated with the Corps' Hydrologic Engineering Center (HEC) and developed the correct methodology for the preprocessing.

Theoretical volume-frequency curves based on the computed statistics and weighted skew coefficients have been inspected for their consistency (i.e., to see if the curves cross each other at any point). In the event that any crossing in the curves was found, engineering judgment was applied to adjust, using a new skew coefficient and standard deviations based on the computed statistics. For a 1-day flow duration, the computed flows on the LCR at Grand Falls range from 4,750 for the 2-year event to 40,430 cfs for a 500-year. As in the discharge-frequency analysis, a volume-frequency record for the LCR at Winslow was generated by interpolating between the records at Holbrook and Grand Falls. Results show 1-day discharges that range from 4,030 cfs in the 2-year event to 38,080 cfs in the 500-year event.

Balanced Hydrograph

A balanced hydrograph is one that considers equal severity (exceedance probability) for all possible durations of project design. These values are used to fit a single representative hydrograph for a particular location. The USACE had previously developed a 3.5-day Standard Project Flood hydrograph for the LCR at Holbrook, Arizona in the *Little Colorado River, Vicinity of Holbrook, Navajo County, Arizona,* Hydrology Report (USACE, 1977). The discharge-frequency and volume-frequency results developed in this study matched the 3.5-day duration of the Standard Project Flood hydrograph reasonably well, and the 3.5-day duration was adopted for the balanced hydrograph at Winslow. A new 3.5-day balanced hydrograph for the LCR at Winslow was developed to match the current data.

Low-Flow Analysis

Low-flow analysis provides an indication of the ability of a natural stream to meet a specified flow requirement at a particular location. Low-flow analyses were developed from the six data sets used for the volume-frequency, and the 8-year record (2001-2009) for the LCR near Winslow (09400350). Cumulative monthly flow volumes were calculated and plotted to observe both low-flow and high-flow years. A steep slope in the cumulative curve represents a wet season. On the other hand, a mild slope in the curve represents a dry season or low-flow years, and a totally flat portion of the curve represents a year with missing data. Low flow analyses included calculations to determine (1) the average number of days in a given month that the average daily flows exceed a given discharge, (2) the maximum number of days in a given month that the average daily flows exceed a given discharge, and (3) the maximum number of consecutive days in a month that the average daily flows exceed a given discharge. Generally, June was found to be the driest month of the year, and March was found as the wettest month of the year.

Peak-Flow-Frequency Analysis for Ruby Wash

Ruby Wash, Ice House Wash, and a number of un-named washes originate approximately 5 miles southwest of Winslow. They flow northeast until they are intercepted and diverted east towards the LCR by the RWDL. Previous studies by the Corps (USACE, 1961) estimated peak discharges for Ice House Wash and Ruby Wash using Regional Regression Equations (RREs) that were developed from limited data at three USGS gages. This report includes peak-discharge calculations for the concentration points at the RWDL based the aforementioned Region-11 and Navajo-11 RREs.

Since the Region-11 and Navajo-11 RREs were developed for a wide range of drainage areas, a site-specific regional regression analysis in the vicinity of Winslow was conducted as a supplement to the main study. The details are provided in Appendix D of this report. The additional study included a data search for applicable records, discharge-frequency analysis using the Bulletin 17B approach, and development of RREs to predict peak discharge on the basis of drainage area. The data search originally found 61 stream gage records for small watersheds within a 150-mile radius of Winslow. Based on an initial screening and preliminary discharge-frequency analyses, a total of 25 gage records were used to develop single-variable (drainage area) regression analyses for 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year events. The consistent relationship between drainage area and peak discharge for the range of return periods is confirmed. The new RREs have been applied to estimate peak discharges for the 2-, 5- 10-, 25-, 50-, 100-, 200-, and 500-year events for concentration points at the RWDL. A comparison of results shows that the peak discharges computed from the RREs developed during this study are roughly one-half the peak-discharge values obtained when using the USGS RREs.

1. INTRODUCTION

1.1. Study Authority

The Little Colorado River (LCR) at Winslow Feasibility Study is being conducted by the U.S. Army Corps of Engineers (Corps or USACE) under the authority provided by the Flood Control Act of 1937. This authority amends the Flood Control Act of 1936 to permit the Secretary of the Army, through the Chief of Engineers, to conduct preliminary examinations and surveys for flood control at the LCR upstream from the boundary of the Navajo Indian Reservation. Further authority is provided under House Committee on Public Works Resolution (Docket 2425), May 17, 1994, which states:

"… The Secretary of Army is hereby requested to review reports of the Chief of Engineers on the State of Arizona… in the interest of flood damage reduction, environmental protection and restoration, and related purposes."

1.2. Non-Federal Sponsor

The Navajo County Flood Control District is the Non-Federal sponsor for this study.

1.3. Study Purpose

The purpose of the LCR at Winslow Feasibility Study is to develop and evaluate potential non-structural and engineered solutions to address flooding issues affecting the Winslow Community, and to investigate opportunities for ecosystem restoration to support flood-risk management along the LCR and its tributaries in the vicinity of Winslow. There is also the prospect of providing recreational opportunities concurrent with flood-risk management and interrelated ecosystem restoration

1.4. Scope of This Report

The purpose of this *Baseline and Future Without-Project-Conditions Hydrology Report* is to provide documentation of the existing and future hydrologic conditions within the LCR at Winslow Feasibility Study area. This hydrologic report includes defining hydrologic baseline conditions by collecting, reviewing, analyzing, and summarizing existing data and information. The specific objectives of this study are summarized below:

- Develop peak-discharge and volume-frequency relations for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year return periods.
- Compare flood frequency results with applicable Regional Regression Equations (RREs) developed by the U.S. geological Survey (USGS).

- Develop balanced hydrographs for the 25-, 50-, 100-, 200-, and 500-year events for the LCR at Winslow. The balanced hydrographs will serve as inputs to hydraulic and sediment-transport modeling that will be used to evaluate the existing conditions and project alternatives.
- Prepare low-flow analyses to determine the quantity and seasonal characteristics of daily flows which will be used as a basis for ecosystem restoration measures.

This *Baseline and Future Without-Project-Conditions Hydrology Report* will be included as a technical appendix to the LCR at Winslow Feasibility Study.

1.5. Prior Studies and Reports

1.5.1. *Prior Studies by USACE*

The USACE has conducted the following studies in the Winslow area:

- *Flood Control, Little Colorado River and Its Tributaries Upstream from the Boundary of the Navajo Indian Reservation in Arizona*, Report on Survey. U.S. Army Corps of Engineers, Los Angeles District, December 1940.
- *Analysis of Design, Little Colorado River Levee, Holbrook, Arizona, Design Report.* U.S. Army Corps of Engineers, Los Angeles District, January 1948.
- *Review Report of the District Engineer on Survey for Flood Control, Winslow, Arizona and Vicinity, Little Colorado Arizona and Mexico,* Review Report. U.S. Army Corps of Engineers, Los Angeles District, December 1961.
- *Winslow Flood Control General Design Memorandum, Winslow, Arizona and Vicinity,* Design Report. U.S. Army Corps of Engineers, Los Angeles District, March 1969.
- *Operation and Maintenance Manual for Ruby Wash Diversion Levee Flood Control Project at Winslow, Arizona,* Operation and Maintenance Manual. U.S. Army Corps of Engineers, Los Angeles District, August 1972.
- *Little Colorado River, Vicinity of Holbrook, Navajo County, Arizona,* Hydrology Report. U.S. Army Corps of Engineers, Los Angeles District, September 1977.
- *Review Report for Flood Control and Recreational Development, Little Colorado River at Holbrook, Arizona, Volume I*, Review Report. U.S. Army Corps of Engineers, Los Angeles District, March 1979.
- *Technical Appendix of Review Report for Flood Control and Recreational Development, Little Colorado River at Holbrook, Arizona, Volume II*, Review Report. U.S. Army Corps of Engineers, Los Angeles District, March 1979.
- *Review Report for Flood Control and Recreational Development , Little Colorado River at Holbrook, Arizona, Volume I,* Review Report. U.S. Army Corps of Engineers, Los Angeles District, September 1980.
- *Technical Appendix of Review Report for Flood Control and Recreational Development, Little Colorado River at Holbrook, Arizona, Volume II,* Review Report. U.S. Army Corps of Engineers, Los Angeles District, September 1980.

- *Operation and Maintenance Manual for Ruby Wash Diversion Levee Flood Control Project at Winslow, Arizona*, Operation and Maintenance Manual. U.S. Army Corps of Engineers, Los Angeles District, November 1981.
- *Hydrology Appendix for General Design Memorandum, Little Colorado River Basin, vicinity of Holbrook, Navajo County, Arizona*, Hydrology Appendix. U.S. Army Corps of Engineers, Los Angeles District, January, 1985.
- *Hydrology Appendix for General Design Memorandum of Holbrook Flood Control Project, Holbrook, Arizona*, July 1988.
- *Holbrook Levees, General Design Memorandum, Project Design*, Design Report. U.S. Army Corps of Engineers, Los Angeles District, April 1991.
- *Holbrook Levees General Design Memorandum Project Construction Modification*, Design Report Addendum. U.S. Army Corps of Engineers, Los Angeles District, February, 1996.

1.5.2. *Prior Studies by Other Agencies*

Other agencies have conducted the following Studies in Winslow area:

- *Little Colorado River Flood Control Project, Winslow, Arizona*, Feasibility Report. Navajo County Flood Control District by the Arizona Department of Water Resources, November 1980.
- *Little Colorado River Geomorphology and River Stability Study*, Reconnaissance Level Engineering Report. Navajo County Department of Public Works by George V. Sabol Consulting Engineering, Inc., September 1993.
- *Analysis of Little Colorado River Stability Between Holbrook and Winslow, Arizona*, Little Colorado River Sediment Study. US Department of the Interior, Bureau of Reclamation May 2003.
- *Little Colorado River Near Winslow Floodplain Delineation Study*, Technical Data Notebook with Exhibits. Navajo County Flood Control District by Delph Engineering, Inc., November 2005.
- *Little Colorado River Near Winslow Floodplain Delineation Study*, Appendices for Technical Data Notebook. Navajo County Flood Control District by Delph Engineering, Inc., November 2005.
- *Little Colorado River Near Winslow Floodplain Delineation Study*, Technical Data Notebook. Navajo County Flood Control District by Delph Engineering, Inc., July 2009.

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2. GENERAL DESCRIPTION OF THE STUDY AREA

2.1. Little Colorado River and Tributaries

The hydrologic evaluation encompasses the watershed of the LCR and major tributaries, including Chevelon Creek, Ruby Wash, Clear Creek, Cottonwood Wash, Salt Creek, and Jacks Canyon (Figure 1). The LCR originates in the White Mountains, south of Springerville, Arizona. It flows in a north/northwesterly direction in a well-defined canyon until reaching the City of Holbrook, Arizona (Arizona Department of Water Resources, 1980). From there, it continues westerly and flows another 30 miles on a broad, open floodplain before it reaches the City of Winslow, Arizona. From there it continues northwesterly towards Grand Falls, Arizona, where the river creates a waterfall of around 190 ft in height. The total drainage area of the LCR varies from 11,462 square miles at Holbrook, to 16,192 square miles at Winslow, to 21,068 square miles at Grand Falls, Arizona.

The overall basin characteristics are summarized below (Delph Engineering, 2009):

- The basin is a portion of Colorado Plateau characterized by various rock formations and broad valleys with extensive flat, mesa-like highlands.
- Vegetation cover ranges from barren desert to mountain forest, including juniper, sagebrush, and grass. LCR and its tributaries support annual grass and shrubs.
- Elevation above mean sea level ranges from 11,500 feet in the upper watershed, to 4,800 feet at Winslow, to 4,650 feet at Grand Falls.
- The LCR basin is generally cool in the winter and warm in the summer. Temperatures extremes range from summertime highs of 110^0 F in the lower part of the basin to wintertime lows of -35^0F in the upper part of the basin.
- Two rainy seasons are observed. One extends from July to November and the other extends from December to April. Typically, late spring and June are dry throughout the basin.
- Mean-annual precipitation ranges from around 7 inches near Winslow to around 40 inches in the upper portion of the basin.
- Average streamflows in the LCR and its tributaries are minimal, and periods of no flow have been observed.

2.2. Ruby Wash Diversion Levee

Ruby Wash, Icehouse Wash, and four other small washes combine at the 5.3-mile-long Ruby Wash Diversion Levee (RWDL), which lies south of Winslow (Appendix D, Figure 1). These six washes originate approximately 5 miles southwest of the levee, at an elevation of about 5,000 feet, and northeast until they are diverted east by the RWDL to the LCR. For convenience, the concentration points for the six washes at points located upstream of the levee are designated as A, B, C, D, E (Ruby Wash), and F (Icehouse Wash). There are two other small drainage areas (designated as G and H) below the levee with concentrations points at the Santa Fe Railroad. The Ruby Wash area has a mean-annual precipitation of about 7 inches and is subject to the same rainy seasons as the overall watershed. Vegetative cover is high desert grass and shrubs. These small washes are ephemeral and typically have no flow. The subareas are undeveloped and are therefore assumed to be rural for this investigation.

3. EXISTING AND FUTURE WITHOUT PROJECT CONDITION

As used in this report, the future without-project condition refers to the expected future condition of the watershed over the 50-year planning horizon. It will be the basis for comparing and evaluating project alternatives and their impacts. Currently there are only a few small towns within the watershed, and their total surface area is not significant when compared to the 16,192 square mile drainage area upstream of Winslow. Future urbanization within the watershed, including the Ruby Wash area, is not expected to be significant enough to impact the discharge-frequency and volume-frequency relationships over the 50-year planning horizon. Therefore, it is assumed that the future without-project condition can be adequately characterized with existing baseline-conditions hydrology that is documented in this report.

4. DISCHARGE-FREQUENCY ANALYSIS

4.1. Methodology

4.1.1. *Bulletin 17B Procedures*

Discharge-frequency analyses of stream gage data were conducted based on *Guidelines for Determining Flood Flow Frequency, Bulletin 17B,* of the Hydrology Subcommittee (U. S. Department of the Interior, 1982). Bulletin 17B describes data and procedures for computing flood-frequency curves where systematic stream gage records of sufficient length are available. The Pearson Type III distribution with log transformation of the flood data (Log-Pearson Type III) is recommended as the basic distribution for defining the annual flood series. This three-parameter, logarithmic distribution requires estimates of the mean, the standard deviation, and the skew for the logarithms of the annual maximum flows. The skew coefficient permits the fitting of otherwise non-normal samples to the distribution. If skew coefficient is zero, the Log-Pearson Type III distribution becomes a two-parameter log-normal distribution. The skew coefficient from stream gage data is sensitive to extreme events and was therefore weighted with a generalized skew coefficient of -0.1 and its mean squared error of 0.302, as shown in Plate I of Bulletin 17B.

Analytical frequency curves are computed using the calculated parameters. Bulletin 17B provides guidelines and techniques to deal with systematic records, historic data, broken records, incomplete records, zero-flood-years data, and low and high outliers. The Hydrologic Engineering Center (HEC) has developed a Statistical Software Package (HEC-SSP) that incorporates all of the Bulletin 17B procedures (USACE, 2009). HEC-SSP is used for the discharge-frequency and volume-frequency analyses in this report.

4.1.2. *Regional Regression Equations (RREs)*

USGS Water Supply Paper 2433, *Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States* (Thomas, et. al., 1997) subdivides the southwestern United States into 16 hydrologic flood regions on the basis of regional flood sources, elevation, analysis of flood yields, and analysis of residuals from preliminary regional flood-frequency relations. The study area for this analysis fits within Hydrologic Region-11 which covers northwestern Arizona. The Water Supply Paper developed RREs for peak discharges in Region-11 using drainage area and mean-annual evaporation as the explanatory variables. These equations are referred to herein as the “Region-11” RREs.

USGS Scientific Investigation Report 2006-5306, *Analysis of the Magnitude and Frequency of Peak Discharge for the Navajo Nation in Arizona, Utah, Colorado, and New Mexico* (Waltemeyer, 2006), modified and improved the Region-11 RREs by including average basin slope as a third explanatory variable. Equations based on Waltmeyer (2006) are referred to herein as the "Navajo-11" RREs.

In both cases, the explanatory variables are bounded by upper and lower limits. Therefore, the application of the RREs near the extreme range of the explanatory variables is reviewed for reasonableness and consistency. The RREs provide estimated flood magnitudes at different return periods, as well as standard error of estimate and equivalent years of record. The standard error of estimate is a measure of the accuracy of the RRE, and is the sum of average regression or model error and average sampling error. Equivalent years of record are the required number of years of actual peak-discharge record that would produce the same accuracy. The above-mentioned reports provide procedures on how to improve estimates by using information from gage data; or how to use the peak-discharge estimates from a gaged site to estimate peak discharge at an ungaged site; or how to estimate peak discharges for sites in transition zones.

The USGS has compiled RREs for estimating peak discharges in the National Streamflow Statistics (NSS) program (USGS, 2007). For this report, the NSS has been used to estimate flood discharges for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year return intervals at points of interest using the Region-11 and Navajo-11 RREs (Table 1). The computed peak discharges have units of cubic feet per second (cfs). Inputs for drainage area (AREA) are in square miles, inputs for mean-annual evaporation (EVAP) are in inches, and inputs for slope (S) are dimensionless (feet/feet).

4.2. Data Description

Figure 1 shows the locations of 13 USGS stream gages that were originally considered for this Study. The first 11 lines in Table 2 summarizes the location, drainage area, period of record, number of record years, and maximum observed peak discharge for the 11 gages that include peak discharge data on the LCR and significant tributaries. Table 3 shows annual peak-flow data for all of the 11 stream gages in chronological order.

Of these 11 gages, only seven were suitable for discharge-frequency analysis. The stream gage for the LCR near Winslow (09400350) has only 7 years of data, and stream gages for Jacks Canyon (09399300, 09399400, and 09399420) have record lengths of 6, 9, and 7 years respectively. Data from these gages are shown in tables and figures, but were not used in discharge-frequency analysis. Three of the seven records suitable for analysis are located on the LCR and include gages near Holbrook (09397000), Joseph City (09397300), and Grand Falls (09401000). The other four records suitable for peak discharge analysis include Chevelon Creek near Winslow (09397500), Chevelon Creek near Winslow (09398000), Clear Creek near Winslow (09398500), and Clear Creek near Winslow (09399000).

The stream gages near Holbrook and Joseph City are separated by a distance about 8 miles, and their drainage areas are 11,462 square miles and 12,384 square miles respectively. The Joseph City gage has continuous data from 1950-1972, and the Holbrook gage has continuous data from 1971-2008. Since the two records are so close together, they were combined to provide a continuous 61-year record for the LCR at Holbrook. In making the combination, the peak discharges from the Joseph City gage were multiplied by the ratio of the drainage areas (11,462/12,384 or 0.93). The data for this combined gage constitutes an 8th record suitable for analysis is included in the last line of Table 2.

Plots of the annual peak discharge by calendar year are provided for the LCR, Chevelon Creek, Clear Creek, and Jacks Canyon gages are shown in Figures 2a through 2d. The stream gage records indicate that the highest flood peaks on the LCR occurred in 1923 at Holbrook and at Grand Falls. Other stream gages on the LCR do not have record information for this year. In a floodplain study report by USACE in March 1976 it is found that historical events occurred on the LCR in 1923, 1957, 1968, and 1969. More recent data shows that event in year’s 1978 was higher than the events of 1957, 1968, and 1969. However, 1923 is still the highest historical event on the LCR. Chevelon and Clear Creeks are adjacent to each other. They often generate peak discharges at the same time and were responsible for flooding at Winslow in 1978. As seen from Table 2, Figures 2b and 2c, and previous studies, the maximum observed peak discharge occurred in 1978 at Chevelon Creek and in 1929 at Clear Creek. Two stream gages upstream of Chevelon and Clear Creeks show another historical event occurred in 1993.

4.3. Analysis

4.3.1. *Bulletin 17B Procedure*

Annual peak-flow data from the above mentioned records were reviewed for broken, incomplete, and zero flood records. Most of the stream gages do not show complete, systematic records (Figures 2a through 2d). Based on previous studies, it appears that none of these missing years had historical flood events or continuous zero-flood events. As described in Bulletin 17B, these records are categorized as “broken records” and are analyzed as a continuous record with the length equal to the sum of the segmented records.

The HEC-SSP program was used to compute analytical frequency curves, 5% and 95% confidence limits, and expected probability for the eight stream gages records suitable for analysis. Low- and high-outlier tests and historical event adjustments were made to improve the overall accuracy of the computations. Statistics and the computed peak discharges for different return periods are found in Table 4 and Table 5, respectively. Log-probability plots of the results are shown in Figures 3a through 3i. In addition to the analytical curves, the plots include observed events plotted using the Weibull plotting position. Input/output from HEC-SSP are included as Appendix A. The stream gage on the LCR near Winslow does not have enough record years to analyze the data using Bulletin 17B procedures, and the drainage area of 16,192 square miles is beyond the limits of the RREs (Section 4.3.2). A discharge-frequency curve for the LCR at Winslow (Figure 3d) was therefore estimated by linear interpolation, based on drainage area, of the results for the combined LCR record at Holbrook (Figure 3c) and the LCR record at Grand Falls (Figure 3e).

The means at the LCR gages (Table 4) vary from 3.85 at Joseph City to 3.99 at Holbrook, and do not vary significantly with the drainage area. The standard deviations vary from 0.24 at Joseph City to 0.39 at Grand Falls and also do not show a clear trend. Station skew coefficients for the LCR are 0.10 at Holbrook, 0.72 near Joseph City, and 0.54 at Grand Falls. For the combined gage at Holbrook, the station skew coefficient is 0.29. The highest skew coefficient is observed near Joseph City, and may be due to the limited period of record that does not include any events prior to 1971.

The means for Chevelon Creek and Clear Creek vary from 3.34 to 3.42 and are higher for increased drainage areas. The standard deviations vary from 0.47 to 0.60. Station skew coefficients for Chevelon Creek and Clear Creek have opposite signs even though the two watersheds are adjacent to each other. As noted previously, the station skew coefficient for each record was weighted using a generalized skew coefficient (-0.1) from Plate I in Bulletin 17B (U. S. Department of the Interior, 1982).

The resulting peak discharges on the LCR at Holbrook range from 9,670 cfs for the 2-year event to 67,080 cfs for the 500-year event. At Grand Falls, the peaks range from 8,480 cfs in the 2-year event to 186,990 cfs in the 500-year event. As seen in the tables, a 2-year return-period peak discharge is lower at Grand Falls than it is at Holbrook. This may be due to infiltration and percolation of surface runoff, which is relatively higher for infrequent events, between Holbrook and Grand Falls. As expected, the peak discharge for the less frequent events (for example, the 100-year return-period event) is higher at Grand Falls than it is at Holbrook. Joseph City is located downstream of Holbrook; however, peak discharges on the LCR near Joseph City are always found to be less than peak discharges at Holbrook. This is likely due to the fact that some of the significant historical flood events are not recorded at this location.

As previously discussed, the LCR stream gage records at Holbrook (1950-1972) and near Joseph City (1971-2008) were combined into a single 61-year-long record at Holbrook. As seen from Table 5, the computed peak discharge for the combined gage at Holbrook ranges from 7,680 cfs in the 2-year event to 69,300 cfs for the 500-year event. Computed peak discharges for the combined gage at Holbrook and the gage at Grand Falls have been used in interpolation to obtain peak discharges for the LCR near Winslow.

The interpolated peak discharges range from 8,070 cfs in the 2-year event, to 69,200 cfs in the 100-year event, to 127,250 cfs for the 500-year event.

4.3.2. *Regional Regression Equations (RREs)*

4.3.2.1. Chevelon Creek, Clear Creek and Jacks Canyon

The explanatory variables for drainage area (AREA), annual evaporation (EVAP), and slope (S) used in the RREs are shown in Table 1. The variables are bounded by upper and lower limits and limit the application of the RRE to watersheds that fit within the limitations. Chevelon Creek, Clear Creek, and Jacks Canyon (Figure 4) have drainage areas, annual evaporation, and average basin slopes that fit the limitations of the RREs. The values of the explanatory variables that were used in the equations are listed in Table 6. The drainage areas for the LCR at Holbrook, Joseph City, Winslow, and Grand Falls, exceed the upper limits for AREA by an order of magnitude or more so regional analysis was not considered at these locations.

Calculations for the peak discharges using the Region-11 and Navajo-11 RREs were performed using the NSS program. Drainage areas for each watershed were obtained from the USGS gage record. Mean-annual evaporation information was obtained from Figure 1 of the USGS Fact Sheet 111-98 (U.S. Geological Survey, 1999). For the three stream gage locations (Chevelon Creek 09397500, Chevelon Creek 09398000, and Clear Creek 09398500) average basin slopes were obtained from Appendix 1 of the USGS Scientific Investigation Report 2006-5306 (Waltemeyer, 2006), and for the other two stream gage locations (i.e., for Clear Creek 09399000 and Jacks Canyon Creek 09399400) the average basin slopes were first estimated from USGS quads and were then adjusted for consistency with the first three basins. The peak discharges for the 2-year through 500-year events using the Region-11 and Navajo-11 RREs are shown in Table 7. The input and output data from the NSS program can be found in Appendix B.

For the 5-year through 500-year events, the peak discharges computed from the Region-11 RREs are generally higher than the peak discharges estimated by the Navajo-11 RREs. In the 2-year event, the Region-11 peak discharges are generally lower. Region-11 RREs are functions of drainage area and mean-annual evaporation. Since the mean annual evaporation rates are practically the same for all five adjacent drainage basins, the peak discharges are primarily a function of drainage area. Therefore, the highest peak discharges estimated by the Region-11 RREs are found in the largest watershed (Chevelon Creek, near Winslow - 09398000), and range from 1,620 cfs for the 2-year event to 77,600 cfs for 500-year event. The USGS Region-11 equations do not include the 500-year return interval. Therefore, peak discharges for the 500-year event were extrapolated using the NSS program. The extrapolation procedure consisted of fitting a Log-Pearson Type III curve for the 2- to 100-year flood discharges, given by NSS software, and then extrapolating the curve for 500-year flood discharge (U.S. Geological Survey, 2007).

As a result of the extrapolation, 500-year peak discharges for the Region-11 approach are relatively higher when comparing with the peak discharges for other return intervals (Table 7).

Using the Navajo-11 RREs, the highest peak discharges are predicted to occur on Clear Creek. However, for Clear Creek some of the estimated peak discharges are predicted to be highest at the upstream location and some are predicted to be highest at the downstream location of this creek. Navajo-11 RREs are function of drainage area and average slope of the basin. Although at the upstream stream gage location the basin area is smaller than the basin area at the downstream location, the average basin slope is just the opposite, which is to be expected. In addition, at higher return-periods the exponent of the average basin slope is relatively higher, which makes this variable more important, especially for the higher return-period events. This causes some of the events to be higher at the upstream location.

4.3.2.2. Ruby Wash

The Region-11 and Navajo-11 RREs were applied to the ungaged concentration points defined at the RWDL. The drainage areas were obtained from the 1969 GDM (USACE, 1969) and mean-annual evaporation information was obtained from Figure 1 of the USGS Fact Sheet 111-98 (U.S. Geological Survey, 1999). Average basin slopes were first estimated from USGS. Table 8 and Table 9 list the input parameters and estimated peak discharges, respectively.

4.4. Comparison of Results

4.4.1. *Comparison of Discharge-Frequency and Regional Regression Equations Results*

Table 10 compares the peak discharges computed using the Region-11 and Navajo-11 RREs with the Bulletin 17B results for the four stream gage locations on Chevelon Creek and Clear Creek. In general, the Bulletin 17B results are significantly higher than the results using the RREs. Bulletin 17B procedures predict that the highest peak discharges will occur at the downstream location of Clear Creek for all return-interval events, except for the 500-year flood. For a 500-year return-period event, the highest peak discharge is computed at the upstream location of Chevelon Creek. On the other hand, the RREs predict that highest peak discharges will occur at the downstream location of Chevelon Creek. At this location, the results from both of the approaches are comparable.

4.4.2. *Comparison of Discharge-Frequency Results with Previous Studies*

Table 11 compares the Bulletin 17B and RRE results with results that were published in Appendix 1 of the Scientific Investigation Report 2006-5306 (Waltemeyer 2006). The published data include predictive results from Navajo-11 RREs; station value used in the regression analysis; and weighted values (from station and predicted values). These results are available only for three stream gage locations: Chevelon

Creek 09397500, Chevelon Creek 09398000, and Clear Creek 09398500. The results for the Navajo-11 RREs in this study are consistent with the predicted values the Scientific Investigation Report. The Bulletin 17B results from this study are roughly comparable with the station values and weighted values. Table 11 also compares the Bulletin 17B and RRE results with station values that were published in Water Supply Paper 2433 (Thomas et. al., 1997). The published station values are general higher than the results from the Region-11 and Navajo-11 RREs but are somewhat lower than the results of the Bulletin 17B analysis.

A July 2009 floodplain-delineation study prepared for Navajo County by Delph Engineering includes 100-year peak discharge results for some of the location considered in this analysis. As shown in Table 12, the 100-year peak discharges computed by Delph on the LCR at Grand Falls, LCR at Holbrook, Chevelon Creek near Winslow (09398000), and Clear Creek near Winslow (09399000) are very close to the 100-year peaks found using the Bulletin 17B method in this analysis. Table 12 also compares the 100-year peak discharges on Chevelon and Clear Creek with peak discharges found in the USACE 1961 report. The USACE 100-year peak discharges are approximately 1.4 times higher than the Bulletin 17B results in this study.

The interpolated results for the LCR near Winslow (Table 5 and Figure 3d) yield a 100-year peak discharge of 69,200 cfs, which compares favorably with the 100-year peak discharge of 65,000 published in the Corps Flood Plain Information Study[1] (USACE, 1976). Later, ADWR (Arizona Department of Water Resources, 1980), Delph Engineering (Delph Engineering, 2005 and 2009) and the Federal Emergency Management Agency (FEMA) reported a 100-year peak discharge of 65,000 cfs on the LCR near Winslow. The 500-year peak discharge interpolated for this study (127,250) is 17 percent higher than the 500-year peak (109,000 cfs) in the Corps study.

4.4.3. Comparison of Estimated Flows for Ruby Wash

It was reported that the September 1928 flood was the largest flood on Ruby Wash before 1961. However, the discharge was not recorded or estimated (USACE, 1961). According to railroad records, substantial damage to the railroad was observed from flood events in July 1905, August 1910, July 1911, August 1929, and July 1930. For the flood of August 1957, a discharge of 1,800 cfs was estimated on Ruby Wash at the railroad bridge. This estimate was based on high water marks (USACE, 1961).

The estimated peak discharges for the original Ice House Wash at the Santa Fe Railroad Bridge contained in the 1969 GDM are compared with the results estimated in this investigation in Table 13. For less frequent events, the estimated peak discharges computed by RREs are approximately one-half of the

[1] The Corps results were was based statistical analysis of existing streamflow and runoff characteristics.

estimated peak discharges found in the 1969 GDM. The peak discharges in the 1969 GDM were developed from by correlation with discharge frequency curves developed from the available data for Show Low Creek, Chevelon Creek, and Clear Creek (USACE, 1969). The 1969 GDM included peak discharges for uncontrolled drainage from Ruby Wash at the Santa Fe Railroad. The results are not comparable with the results in this study since the drainage areas upstream of the RWDL are not the same.

The 2003 Flood Insurance Study (Federal Emergency Management Agency, 2003) reported a peak discharge of 1,293 cfs for the original Ruby Wash watershed at the Santa Fe Railroad. This is comparable to the 100-year peak discharge of 1,600 cfs using Navajo-11 regression equation (Table 9) from this investigation.

The Standard Project Floods for the three other locations—at the upstream end of the diversion levee, at the diversion levee where the Ruby Wash gets diverted, and at the downstream end of the diversion levee—were estimated in the 1969 GDM to be 8,500 cfs, 13,000 cfs, and 23,000 cfs, respectively. This investigation estimated 500-year peak discharges to 2-year peak discharges for these three locations. As seen from Table 9, the estimated peak discharges the 500-year event for both RREs are less than the Standard Project Flood at these locations.

4.5. Conclusions

Annual peak-flow data were collected from 11 stream gages on the LCR and major tributaries near Winslow Arizona. Three of the records on the Jacks Canyon Creek and the record for the LCR at Winslow were discarded because the record lengths were too short. The seven remaining records were analyzed using methods in Bulletin 17B to develop discharge-frequency relations. An additional record (combined record at Holbrook) was created by combining the data for the LCR at Holbrook and the LCR at Joseph City, which are only about 8 miles apart. The result was a continuous record from 1950 through 2008. In addition, a discharge-frequency relation for the LCR at Winslow was estimated by linear interpolation (based on drainage area) of the frequency results for the LCR at Grand Falls and the LCR at Holbrook (combined record). The drainage areas for the LCR exceed the limits for RREs from two different studies (Region-11 and Navajo-11) that apply to the study area. Therefore, RRE results were not computed for comparison.

The Region-11 and Navajo-11 RREs were used for estimating peak discharges on Chevelon Creek, Clear Creek, and Jacks Canyon Creek. The results from the RRE analyses on Chevelon Creek and Clear Creek were compared with the peak discharges predicted from Bulletin 17B procedures, and show that peak discharges estimated using the RREs are less than one-half the peak-flow values computed using the Bulletin 17B approach.

Results from the discharge-frequency analyses and RREs were compared with the results from previous reports for the study area. A good amount of observed data has been used for the peak-flow frequency analysis using Bulletin 17B procedures, and the results from this analysis were found to be close to published results. Therefore, peak-flow frequency analysis results using Bulletin 17B procedures were adopted for purposes of developing balanced hydrographs.

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5. VOLUME-FREQUENCY ANALYSIS

5.1. Method Description

Volume-frequency analysis involves construction of volume-duration curves for specified frequencies (i.e., frequency analysis of maximum runoff within a specified duration). Runoff volumes are expressed as average flows within the duration. Volume-duration analysis results can be used for solving reservoir planning, design, and operation problems as part of flood-control studies.

Maximum average-annual runoffs are extracted from the daily average flows, and the annual series are constructed for specified durations. Statistics are then calculated for each of the series based on Bulletin 17B procedures. Computed statistics are inspected for consistency. For example, for a particular return period, average daily flow from a 1-day duration curve should not be less than the average daily flow from a 10-day duration curve. Therefore, to prevent the duration curves from crossing each other skew coefficients and standard deviations can be adjusted based on the computed statistics and engineering judgment. For comparison purposes, observed series are plotted according to the Weibull Plotting Position on the same sheet with the analytical curves. Software package HEC-SSP was used for the volume-frequency analyses.

5.2. Data Description

Average daily-flow data flow data were collected from 12 stream gages on the LCR and major tributaries near Winslow. Table 14 describes the number of record years, maximum annual peaks, drainage areas, and other important information regarding the stream gages from which average daily-flow data was collected. Locations are shown in Figure 1. There are two daily flow stream gages for the LCR near Winslow (09400000 and 09400350) that have only 4 and 8 years of records respectively. Likewise, the daily flow stream gage for the LCR near Joseph City has only 6 years of data. Since Bulletin 17B procedures do not recommend analyzing any series with less than 10 years of recorded data, the data at these locations were not used in this analysis. Stream gage data for the LCR at Holbrook and at Grand Falls had daily flow records for periods of 35 and 41 years respectively and were used for volume-frequency analysis. Stream gage data were also collected from Jacks Canyon, Chevelon Creek, Clear Creek, and Salt Creek. The records lengths at Jacks Canyon, Salt Creek, and one of the gages on Clear Creek had record lengths between 2 and 7 years and were not used. The remaining tributary gages, two on clear Creek and two on Chevelon Creek had records lengths that varied between and 39 and 57 years and were used in the analysis.

In summary, six data sets - two from the LCR, two from Chevelon Creek, and two from Clear Creek - were used for volume-frequency analyses. A scatter plot of the annual maximum daily flows for these 6 stream gage data sets are summarized in Table 14 and are shown in Figures 5a through 5c. The highest maximum daily flow (27,100 cfs) on the LCR was observed in 1929 at Grand Falls. At Holbrook, the highest maximum daily flow was 20,200 cfs, observed in 1905. These values were considered as historical events, and historical adjustments were made to account for them. Both stream gages on Clear Creek show that the highest maximum daily average flow occurred in 1978. However, highest maximum daily average flows in the Chevelon Creek were observed in two different years (i.e., 1957 and 1952), and at two separate stream gage locations.

5.3. Analysis

5.3.1. *Data Preprocessing*

The HEC-SSP data importer can directly download USGS online data for use in the frequency analysis. However, if the record length is broken for various periods of time, it considers the missing years as zero-flow years, which impacts the results. From old study reports it is found that none of these missing years apparently had historical flood events or continuous zero-flood events. Therefore, as recommended by the SSP team at the Hydrologic Engineering center (HEC), data were manually adjusted outside the SSP using an Excel spreadsheet. Per Bulletin 17B and the USACE manual (USACE, 1993), broken records of different segments can be analyzed as a continuous record with the length equal to the sum of the segmented records. Therefore, the broken record was converted into a continuous record by adjusting actual record years but keeping the seasonality unchanged. The adjusted continuous systematic record was then imported into HEC-SSP for analysis. Table 15 shows the relationship between the adjusted and actual dates.

5.3.2. *Extracting Annual Maximums for Specified Durations*

When extracting annual maximums it is important to minimize the possibility that the same flood event is used for consecutive years. Therefore, choosing a start date of the year is important. The start date of the year should be chosen in a way that it should capture all of the flood events from a certain flood regime. Monthly variations in average daily streamflows for all stream gages are plotted in Figures 6a through 6f. Two distinct rainy seasons are observed from the plots. The season that extends from July to November includes “monsoons” and dissipating tropical cyclones; and the other season, extending from December to April, includes frontal storms (USACE, 2001). Therefore, June 1st was considered as the start of a year to capture all of the events in these two time ranges of the rainy seasons. As an aid in the selection of durations for the volume-frequency analyses, some historic hydrographs from each of the data sets were plotted (see Figures 7a through 7f). Maximum durations were chosen as 10 days for the LCR, and as 7 days for its tributaries. Volume-duration data is then extracted using HEC-SSP.

5.3.3. *Results*

Similar to the peak-flow frequency analysis, a generalized skew coefficient of -0.1 and its mean squared error of 0.302 have been used to improve the station skew coefficient. Historical adjustment of the data has also been made. Theoretical volume-frequency curves for a data set, based on the computed statistics and weighted skew coefficients, have been inspected for their consistency (i.e., to see if the curves cross each other anywhere). If any crossing of the curves were found, engineering judgment was applied to adjust skew coefficients and standard deviations, based on the computed statistics and the adjusted new skew coefficient, and standard deviations were adopted to obtain the curves. Computed statistics, with adjusted skew coefficients and standard deviations, are tabulated in Table 16, Table 17, and Table 18. The computed volume-frequency curves for the LCR at Grand Falls do not cross each other. Therefore, the computed statistics have not been adjusted for this data set. Computed volume-duration flow magnitudes for different return periods are shown in Table 19, Table 20, and Table 21.

Frequency curves and observed flows based on the Weibull plotting position are shown in Figures 8a through 8g. For the 1-day duration, the computed flows for the LCR at Grand Falls range 4,750 cfs in a 2-year event to 40,430 cfs for a 500-year event. For the LCR at Holbrook, the 1-day flows vary from 3,330 cfs in a 2-year event to 35,800 in a 500-year event. Due to a lack of adequate streamflow data for the LCR near Winslow, the volume-frequency relations were interpolated (based on drainage areas) from the LCR at Holbrook and LCR and Grand Falls results. For a 1-day duration, the interpolated flows range from 4,030 cfs for 2-year event to 38,080 cfs, for 500-year event. Input and output results from HEC-SSP are provided in Appendix C.

5.3.4. *Comparison of Volume-Frequency and Peak-Discharge-Frequency Results*

HEC-SSP does not plot volume-frequency curves on the same sheet as the peak-flow frequency analysis plot. Therefore, in order to compare the curves from these two analyses, data was exported into an Excel spreadsheet, and the curves were plotted on the same sheet. These plots are shown in Figure 9a through 9g. In general, the peak-discharge curves are positively skewed while volume frequency curves are negatively skewed. A negative skew for volume-frequency relations is consistent with the climatology of the southwest. Large flow events that peak for more than a day or two are extremely rare and flow volumes for the infrequent events are relatively lower than those in more frequent events.

5.4. Conclusions

Volume-frequency analyses were performed for six stream gage records on the LCR and major tributaries near Winslow. Most of the data sets were broken (i.e., there were missing years of data) and required preprocessing to develop continuous, systematic records suitable for analysis. Outliers and historic adjustments were considered in the analysis process. Based on the computed statistics, engineering judgment was applied when necessary for purposes of adjusting standard deviations and skew coefficients of the analytical frequency curves so that, for a specific set of data, different duration curves would not cross each other. Finally, frequency curves from the volume-duration analysis were compared with the peak-flow frequency analysis curves. The volume-frequency analysis results were used to develop balanced hydrographs.

6. DEVELOPMENT OF BALANCED HYDROGRAPHS

6.1. Method Description

A balanced hydrograph is the one that considers equal severity (i.e., exceedance probability) for the peak discharge and the average flows over the range of durations in the event (Beard, 1975 & USACE, 1994). These values are used to fit a single representative hydrograph for a particular location. This approach is known as the balanced hydrograph technique (Cudworth, 1989).

The method requires a representative hydrograph for the given location. Once a representative hydrograph (or shape of the hydrograph) is chosen for a location, the peak discharge, average daily flow, and progressively longer average flows (e.g. 1-day, 2-day, etc.) are fit to create the balanced hydrograph. The method is applied using a spreadsheet approach.

6.2. Representative Hydrograph

Representative or pattern hydrographs were developed for each of the locations for which discharge and volume-frequency analyses were performed. Hydrographs for significant events were selected from the daily flow data and were plotted with the peak discharges on a common ordinate so that the rising limbs and recession limbs could be compared. Based on the plotted hydrographs from recorded data, a representative or pattern hydrograph was chosen. Figures 10a and 10c through 10g show the representative hydrographs for six locations where peak discharge and flow volume-frequency analyses have been conducted. Figure 10b shows a representative hydrograph for the LCR near Winslow, a location where the peak discharge and volume-duration results were obtained from interpolated results. The representative hydrographs for the LCR at Holbrook, near Winslow, and at Grand Falls show that the ratio of the recession time to the rise time is around 4, 2, and 2, respectively. For the upstream and downstream locations of Chevelon Creek (09397500 and 09398000, respectively) these ratios are nearer to 5 and 4, and for the upstream and downstream locations of Clear Creek (09398500 and 09399000, respectively) these ratios are around 4 and 3, respectively. As expected, the ratio of time to recede to time to rise is higher at the upstream locations within the contributing watersheds than that at the downstream locations.

6.3. Balanced Hydrographs

The representative hydrographs show rise times between 1 and 5 days, and recession times as long as 15 days, however, the hydrographs for the mainstem LCR show that the majority of the flows occur within 3-5 days. The USACE had previously developed a Standard Project Flood hydrograph for the LCR at Holbrook, Arizona in the *Little Colorado River, Vicinity of Holbrook, Navajo County, Arizona*, Hydrology Report (USACE, 1977). The hydrograph, shown in Table 22 and Figure 11, is 3.5 days long.

The 3.5-day duration reasonably matches the pattern hydrographs for the LCR Mainstem and was adopted as the base time for the balanced hydrograph. However, the double peak shown in the Standard Project Flood hydrograph was not observed in the gage data for the hydrographs shown in Figure 10a (LCR at Holbrook). The balanced hydrograph was therefore developed using a single peak that corresponds to the time-of-peak Standard Project Flood hydrograph. The balanced hydrographs for the 25-, 50-, 100-, 200-, and 500-year events on the LCR at Winslow are listed in Table 23. Plots are shown in Figure 12.

6.4. Conclusion

Balanced hydrographs were developed for the LCR at Winslow based on peak-discharge and volume-frequency analyses of data that was interpolated from the gage records for the LCR at Holbrook and Grand Falls. The duration of the balanced hydrograph was based on the Standard Project Flood hydrograph previously developed by the USACE, and the pattern (location of the peak) was based on engineering judgment and observed gage data

7. RISK AND UNCERTAINY ANALYSIS AND CLIMATOLOGICAL EFFECT

7.1. Risk and Uncertainty Analysis

Risk and uncertainty are involved in frequency analyses due to lack of adequate technical knowledge of the complex hydrologic process and parameter interactions in the predicting function. Uncertainty involved in computed discharges impacts flood-damage-reduction analysis. Therefore, risk-based analysis for flood-damage-reduction analysis is required. A flood-damage-reduction analysis can be done by developing a damage-probability function which can be derived from stage-discharge and discharge-probability functions, provided the probability of exceeding the stage corresponding to discharge equals the probability of exceeding that discharge. A set of experiments needs to be conducted to compute the expected annual damage via sampling the functions mentioned above (USACE, 1996).

Expected probability and confidence limits calculations are the function of record length. Therefore record length is required in order to calculate/estimate the uncertainty involved with the estimated discharges. As noted in the sections on data description (Sections 4.2 and 5.2) annual peak-flow and average daily-flow data are not necessarily collected from the same stream gage locations. Even if they were collected from the same stream gage location, the period of record may be different for the two sets of data. Table 24 lists the equivalent record length for the stream gages near Winslow for which different analyses have been performed for this hydrologic investigation. The equivalent record length is obtained based on the “Equivalent Record Length Guidelines” table on Page 4-5 in “Risk Based Analysis for Flood Damage Reduction Studies” (USACE, 1996). For the gaged watershed for which analytical frequency analysis is performed, the historical period is considered as the longest equivalent record length. For the watershed for which regional regression analysis has been conducted, the average length of record used in the regional study has been used as the equivalent record length.

Due to lack of perfect knowledge of the distribution and the parameters of the distribution uncertainly involves in the flood-frequency analysis, the Pearson Type III distribution with log transformation of the flood data (Log-Pearson Type III) is used to define the flood series. Log-Pearson Type III has three parameters: location, scale, and shape that are estimated with statistical moments: the mean, the standard deviation and the coefficient of skewness of a sample. It is assumed that sample moments are good estimates of the population moments. As time goes by, new observations are added to the sample and the distribution parameters tend to the true values. Since the sample moments are just the estimates of the true parameter values, the process involves uncertainty with regard to the computed discharges. Uncertainty can be delineated with considerable accuracy by calculating expected probability of the exceedance probability as outlined in Appendix 11 of the Bulletin 17B of the Hydrology Subcommittee (U. S.

Department of the Interior, 1982). Following Bulletin 17B procedures, the expected peak discharges for different return periods are calculated. These discharges are listed in Table 25, Table 26, and Table 27 for different stream gages near Winslow, Arizona.

The probabilistic description of the discharge-probability uncertainty can be shown by calculating confidence limits for a confidence level (USACE, 1996). For this study the confidence limits for the peak discharges are calculated for a confidence level of 5%. Table 25, Table 26, and Table 27 list confidence limits along with expected and computed peak discharges for stream gages near Winslow.

7.2. Climatologic Effect

Two distinct rainy seasons are observed from the streamflow data plotted in Figure 6. The season that extends from July to November includes “monsoons” and dissipating tropical cyclones; and the other season, extending from December to April, includes frontal storms (USACE, 2001). The rest of the months in any given year can be considered as more or less “dry.” Historically the extreme streamflow events for the LCR at Holbrook and near Joseph City were found to occur during the months of September through December. The extreme events for the LCR at Grand Falls were found to occur during the months of December through April. The difference in seasonality at Grand Falls may be due to the period of record for that gage. Most of the data was collected between 1923 and 1959, and covers a period that had wet years as well as drought years. Most of the data for the LCR at Holbrook was collected between 1950 and 1972, and represents a period that was influenced by drought.

The character of the streamflow in the LCR and its tributaries is a function of regional climate. As a result, streamflow in the LCR and its tributaries is ephemeral (i.e., flow directly results either from precipitation or from snow melt). If at some locations flooding is found as a result of two different meteorological events, the records for that location may not be homogeneous. For such a non-homogeneous record, a mixed-population treatment can be applied. In that case, events should be segregated and analyzed separately for each type of event and then combined together. Otherwise, the data would produce abnormally large skew coefficients reflected by abnormal slope changes in the discharge-frequency curve when plotted on probability paper (U. S. Department of the Interior, 1982). However, Page 16 of Bulletin 17B states that if the two events cannot be “identified and separated by an objective and hierologically meaningful criterion, the record shall be treated as coming from one population”. For this hydrologic investigation, it is assumed that the record is coming from one population.

As mentioned in Bulletin 17B on Page 6, “there is much speculation about climatic changes. Available evidence indicates that major changes occur in time scales involving thousands of year.” However, per Bulletin 17B it is conventional to assume flood flows are not affected by the climatic trends. The guidelines in Bulletin 17B, which were developed assuming climatic time invariance, is used for this investigation for the flood-frequency analysis.

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8. LOW-FLOW ANALYSIS

8.1. Method Description

Low-flow analysis provides an indication of the ability of a natural stream to meet a specified flow requirement at a particular location. This low-flow analysis in this report will be used to determine if there are sufficient flows for water quality, fish and wildlife, wetland, and recreation purposes. Since analytical techniques are usually not applicable to low-flow data (USACE, 1993), a spreadsheet approach was employed to determine (1) the average number of days in a given month that the average daily flows exceed a given discharge, (2) the maximum number of days in a given month that the average daily flows exceed a given discharge, and (3) the maximum number of consecutive days in a month that the average daily flows exceed a given discharge.

8.2. Data Description

Low-flow analyses were developed from the six data sets used for the volume-frequency and the 8-year record (2001-2009) for the LCR near Winslow (09400350). Annual maximum daily flows are plotted in Figure 5. Six of the stream gages had broken data sets (the exception being the stream gage on the LCR near Winslow). As a result, some of the years in the plots do not show any streamflows. For the LCR, most of the data sets are concentrated between the late 1920s to the early 1970s; and on average the annual maximum daily flows are observed to lie somewhere between 5,000 and 6,000 cfs. For some of the calendar years, the annual maximum daily flows were found to be zero for the LCR at Grand Falls. This is due to the partial records of the data for those years. However, it is also possible that this is due to the loss of flow by attenuation on the broad floodplain, especially if those zero-flow years are dry or nearly dry. For Chevelon Creek, most of the available data falls between the years 1930 and 1970, and on average the annual maximum daily flows are observed to lie below 2,000 cfs. Due to partial-year data, some of the calendar years show zero as the annual maximum daily flows. Similarly, most of the annual maximum daily flows for Clear Creek are observed to lie somewhere between the years 1930 and 1990; and on average the annual maximum daily flows are observed to be around 2,500 cfs. Similar to the LCR and Chevelon Creek, some of the calendar years show zero flows for Clear Creek.

The seasonal variation in runoff shown in Figure 6 corresponds to the aforementioned rainy seasons that extend from July to November (monsoons and dissipating tropical cyclones) and December to April (frontal storms). The rest of the months in any given year can be considered as more or less “dry.” Cumulative monthly flows were calculated and were plotted in Figures 13a through 13c. Steeper slopes in the cumulative curve represent a wet period and milder slopes represent a low-flow period. A totally flat portion of the curve indicates missing data. As seen by observing Figure 13a, for the LCR at Holbrook

(09397000) there are two completely flat portions of the curve, from 1908 to 1949 and from 1974 to 2003. Data were not recorded for these periods. Similarly, data were not recorded for the LCR at Grand Falls from 1961 to 1989. The wet years for the LCR at Grand Falls are found in the late 1920s, the early 1930s, the early 1940s, and the mid-1990s. The pattern of the curves for both downstream and upstream locations of Chevelon Creek and Clear Creek is more or less equivalent (see Figure 13b and Figure 13c).

8.3. Analysis

Three types of analyses were performed to calculate the frequency of various low-flows on a monthly basis. They are described in the following sections.

8.3.1. *Average Daily Exceedance*

Average number of days in a given month that the average daily flows exceed a given discharge was calculated for all of the stream gage locations considered. These locations are listed in Table 28, Table 29, and Table 30, and are plotted in Figures 14a through 14g. The "No Flow" rows in the tables represent the average number days in a month that there is no flow in the stream. For the LCR, the month of June contained the maximum average number of days with no flow for both stream gages. The maximum number of days with no flow for the LCR at Grand Falls is 28, and for the LCR at Holbrook the maximum number of days with no flow is 5. The average number of days that flows exceeded a given threshold was calculated for flows between 0.00 (second row in the table) and 500 (last row in the table) cfs. For the LCR at Grand Falls, March is the wettest month and has an average period of exceedance that varies from 27 days to 12 days for discharges of 0.00 to 500 cfs, respectively. June is the driest month at this location. For the LCR at Holbrook, August is the wettest month, in which the period of exceedance varies from 31 days to 7 days for discharges of 0.00 to 500 cfs, respectively. June is the driest month at this location as well. Based on the 8 years of record (2001-2009), the LCR near Winslow does not have any zero records for any months. Similar to the stream gage at Grand Falls, the wettest and driest months are March and June, respectively. Similarly, March is the wettest month and June is the driest month for both locations on Chevelon Creek. Upstream of Clear Creek, the wettest month is March and downstream of Clear Creek the wettest month is April. However, for both of these locations July is the driest month of the year.

8.3.2. *Total Daily Exceedance*

Historically, the total number of days in a month that the average daily flows exceed a given discharge on the LCR, Chevelon Creek, and Clear Creek are summarized in Table 31, Table 32, and Table 33. The row titled "No Flow" represents the maximum number of days that the stream had zero flows (dry). Therefore, the number "zero" in this row for a particular month means that there are no zero flows in the record for that month. The LCR at Grand Falls has the highest number of total exceedances compared to the LCR at Holbrook. While, historically, the LCR at Holbrook does not have any zero records in the months of January, February, March, September, October, and November, the LCR at Grand Falls gets dry even in these months. Historically, the maximum consecutive exceedance frequencies that the average daily flows exceed a given flow for the LCR at Grand Falls and at Holbrook are highest during the month of March. As seen from Table 31, the LCR near Winslow (09400350) does not have any zero record for any months. The maximum number of consecutive days that the average daily flows exceed a given flow for this location is found for the month of March. Similarly, maximum periods of flow exceedance have been summarized for Chevelon Creek and for Clear Creek. March has the highest maximum periods of flow exceedance for both Chevelon Creek and Clear Creek.

8.3.3. *Average Consecutive Daily Exceedance*

The average number of consecutive days in a month that the average daily discharges exceed a given discharge are listed in Table 34, Table 35, and Table 36. For the LCR and Chevelon Creek, the average maximum periods of exceedance in a month are found to be higher at the downstream stream gage locations. However, for Clear Creek the maximum number period of exceedance is higher at the upstream stream gage location.

8.4. Conclusion

Low-flow analyses were performed for seven stream gages near Winslow. Cumulative monthly flow was calculated in order to observe the wet and dry periods of the year at each of the stream gage locations. Average number of days, maximum number of days, and average maximum number of consecutive days in a month that average daily flows exceed a given discharge were calculated. Maximum number of consecutive days that a stream at a location is dry was also calculated. Generally, for the seven stream gage data sets evaluated, March is the wettest month of the year and June is the driest month of the year.

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9. SUMMARY AND CONCLUSIONS

This report documents the baseline conditions and future without-project conditions for the LCR near Winslow, Arizona, in terms of flood hydrology (frequency analysis), a balanced hydrograph, and a low-flow analysis. The resultant peak discharges and balanced hydrographs can be used for additional analysis in terms of hydraulics and as a basis to evaluate the existing conditions and project alternatives. Low-flows are the significant vehicle for conveyance of nutrients and contaminants, and therefore the analysis results can be used as a basis for ecosystem restoration measures that support flood-risk management.

Annual peak-flow data were collected from 11 stream gages near Winslow, Arizona. However, some of the stream gages that have shorter periods of record data have been discarded from the peak-flow frequency analysis. The stream gage data sets that were used in the analysis include three data sets from stream gages on the LCR, two from stream gages on Chevelon Creek, and two from stream gages on Clear Creek. Analyses were performed using the software package HEC-SSP, following Bulletin 17B procedures. Because the stream gage on the LCR near Winslow did not have a sufficient number of years of data to be analyzed properly, an interpolation technique, based on drainage areas, was adopted to derive results from the computed results for the LCR at Grand Falls and LCR at Holbrook.

Two sets of RREs (Region-11 and Navajo-11) were used to predict peak discharges for different return periods on gaged and ungaged watersheds. For the gaged watersheds, RRE results were compared with results computed following Bulletin 17B procedures. Results show that computed peak discharges using Bulletin 17B procedures were generally more than two times higher than results computed using the RREs. Results from the Bulletin 17B and RREs approaches were compared with previous Flood Insurance Studies (FIS) and hydrologic studies prepared by the Corps. The discharge frequency results from the Bulletin 17B approach for the LCR at Holbrook, at Grand Falls, and near Winslow (interpolated), were found to be in close agreement with the published results.

Daily average streamflow data was collected from 12 stream gages near Winslow. Six of the gages (two from the LCR, two from Chevelon Creek, and two from Clear Creek) had sufficient record lengths for conducting volume-frequency analyses using HEC-SSP. As in the peak-discharge frequency analyses, a volume-frequency relation was generated for the LCR near Winslow by interpolating between the results for the LCR at Holbrook and Grand Falls. Balanced hydrographs were developed for the LCR at Winslow based on peak discharges and flow volumes from the interpolated data, using a previously developed Standard Project Flood hydrograph to establish the duration.

Low-flow analyses were performed using the six records from the volume frequency analysis and the 8-year record of daily flows for the LCR at Winslow. Analyses were performed in order to compute the average number of days in a given month that the average daily flows exceed a given discharge. The maximum number of consecutive days and the average maximum number of consecutive days in the month that the average daily discharges exceed a given discharge were also calculated. Generally, June is the driest month of the year and March is the wettest month of the year. The maximum number of consecutive days during any given month that a stream was dry was also calculated.

A regional regression analysis was performed for a limited set of discharge-frequency records in the vicinity of Winslow for use in estimating peak discharges on ungaged watersheds near the RWDL. Methods and results are summarized in Appendix D.

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Tables

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Table 1: USGS Flood-Peak Discharge Equations for Northeastern Arizona

Return Period (years)	USGS Water Supply Paper 2433 (Region-11)	USGS Scientific Investigation Report 2006-5306 (Navajo-11)
2	$Q_2 = 26\ AREA^{0.62}$	$Q_2 = 3.05x10^2\ AREA^{0.476}\ S^{0.608}$
5	$Q_5 = 130\ AREA^{0.56}$	$Q_5 = 8.44x10^2\ AREA^{0.471}\ S^{0.653}$
10	$Q_{10} = 0.10\ AREA^{0.52} EVAP^{2.0}$	$Q_{10} = 1.49x10^3\ AREA^{0.466}\ S^{0.688}$
25	$Q_{25} = 0.17\ AREA^{0.52} EVAP^{2.0}$	$Q_{25} = 2.79x10^3\ AREA^{0.460}\ S^{0.730}$
50	$Q_{50} = 0.24\ AREA^{0.54} EVAP^{2.0}$	$Q_{50} = 4.19x10^3\ AREA^{0.455}\ S^{0.759}$
100	$Q_{100} = 0.27\ AREA^{0.58} EVAP^{2.0}$	$Q_{100} = 6.03x10^3\ AREA^{0.450}\ S^{0.784}$
500	N/A	$Q_{500} = 1.25x10^4\ AREA^{0.439}\ S^{0.836}$
Q_t = Peak streamflow in cfs		
AREA = Drainage area in square miles; for Region-11 , 0.2 ≤ AREA ≤ 890; for Navajo-11, 0.11 ≤ AREA ≤ 2,150		
EVAP = Mean annual evaporation in inch; 44.1 ≤ EVAP ≤ 55.7		
S = Average basin slope in percent; 0.0177 ≤ S ≤ 0.1545		

Table 2: Pertinent Stream Gage Records for Annual Peaks

Watershed Name	USGS Gage Number	Coordinates Latitude Longitude	Location	DA (sm)	Period of Record	Number of Record Years	Max Observed Discharge	
							Q (cfs)	Date
Little Colorado River at Holbrook, AZ	09397000	34°53'52", 110°09'45"	At Holbrook	11,462	1905, 1923, 1950-1972, 2004-2008	31	60,000	9/19/23
Little Colorado River Near Joseph City, AZ	09397300	34°54'04" 110°15'17"	Near Joseph City	12,384	1971 - 2008	36	25,400	12/19/78
Little Colorado River near Winslow, AZ	09400350	35°00'42" 110°39'02"	Near Winslow North of I-40	16,192	2002-2008	7	20,000	12/30/04
Little Colo. River at Grand Falls, AZ	09401000	35°26'00" 111°12'00"	At Grand Falls	21,068	1923-1959, 1970, 1971, 1990-1994	43	120,000	9/19/23
Chevelon Creek Below Wildcat Canyon, near Winslow, AZ	09397500	34°38'11" 110°42'49"	Around 32 miles south from I-40	271	1948-1970, 1978, 1982-2007	48	24,700	1/8/93
Chevelon Creek near Winslow, AZ	09398000	34°55'35" 110°31'51"	Near Winslow & south of I-40	785	1916-1919, 1929-1978, 2006	50	33,600	12/18/78
Clear Creek Below Willow Creek, near Winslow, AZ	09398500	34°40'03" 111°00'25"	Near Red Hill area below Willow Creek	317	1948-1993	45	29,100	1/8/93
Clear Creek near Winslow, AZ	09399000	34°58'10" 110°38'40"	Near Chevelon Butte Road	621	1929-1982, 2005-2006	54	50,000	4/4/29
Jacks Canyon Trib near Winslow, AZ	09399300	34°49'27" 110°57'26"	Jacks Canyon tributary on Route 87	0.29	1963-1968	6	192	2/1/68
Jacks Canyon Creek near Winslow, AZ	09399400	34°55'17" 110°47'49"	East of Route 87 on Creek	295	1970-1978, 2007-2008	9	4,600	12/18/78
Jacks Canyon Trib No. 3 near Winslow, AZ	09399420	34°56'08" 110°47'18"	Jacks Canyon tributary on Route 87	0.25	1970-1976	7	285	7/16/72
Little Colorado River at Holbrook, AZ	Combined 09397000 & 09397300	34°53'52", 110°09'45"	At Holbrook	11,462	1905, 1923, 1950-2008, 2004-2008	61	60,000	9/19/23

Table 3: Annual Peak-Discharge Data

LCR at Holbrook-09397000		LCR near Joseph City-09397300		LCR at Grand Falls- 09401000		Chevelon Creek near Winslow-09397500		Chevelon Creek near Winslow-09398000		Clear Creek near Winslow-09398500		Clear Creek near Winslow-09399000	
DA = 11,462 (sm)		DA = 12,384 (sm)		DA = 21,068 (sm)		DA = 271 (sm)		DA = 785 (sm)		DA = 317 (sm)		DA = 621 (sm)	
Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)
11/27/05	20,200	10/1/71	20,300	9/19/23	120,000	4/12/48	931	1/19/16	9,500	4/12/48	1,810	4/4/29	50,000
9/19/23	60,000	7/22/74	3,880	9/27/26	27,800	4/14/49	1,290	4/24/17	1,300	4/15/49	1,990	4/10/30	1,080
7/19/50	2,960	10/29/74	20,600	6/28/27	28,800	2/28/50	726	3/13/18	6,200	2/28/50	1,090	3/24/31	850
8/28/51	8,700	7/30/76	3,880	2/7/28	2,140	8/29/51	8,940	4/1/19	1,110	8/29/51	8,090	2/10/32	6,100
1/19/52	8,400	8/18/77	12,000	4/5/29	50,500	1/18/52	19,800	12/5/19	9,000	1/18/52	16,400	4/5/33	780
7/29/53	6,030	3/1/78	5,200	7/19/30	13,700	3/11/53	653	4/4/29	16,100	3/11/53	497	1/1/34	6,300
7/22/54	10,800	12/19/78	25,400	8/1/31	6,530	3/23/54	7,500	3/27/30	519	3/23/54	5,730	4/14/36	1,680
8/17/55	10,500	2/20/80	12,600	2/10/32	31,000	8/23/55	631	3/19/31	548	6/14/55	1,220	3/17/37	2,790
6/30/56	4,210	8/10/81	6,230	9/12/33	7,500	3/6/56	227	2/10/32	3,100	3/26/56	198	3/4/38	26,200
8/5/57	21,800	7/28/82	6,590	10/7/33	4,920	1/9/57	11,300	9/20/33	1,060	1/10/57	8,880	4/4/39	1,500
9/14/58	7,000	12/10/82	8,540	4/10/35	7,350	9/28/58	4,080	1/1/34	2,700	3/22/58	2,920	8/15/40	1,840
8/6/59	6,300	9/26/84	12,000	8/6/36	5,430	10/6/58	479	4/12/36	1,350	8/20/59	296	3/15/41	3,300
10/29/59	11,400	4/29/85	9,110	2/9/37	21,800	12/25/59	2,630	2/8/37	1,820	12/25/59	2,770	4/6/42	1,940
8/16/61	4,160	9/24/86	5,590	3/5/38	38,000	4/4/61	476	3/4/38	9,400	4/5/61	1,080	3/11/43	1,500
10/31/61	4,010	10/12/86	8,590	4/5/39	6,680	2/13/62	1,920	8/3/39	2,410	2/13/62	2,240	4/8/44	1,500
8/31/63	9,370	11/1/87	7,870	7/27/40	20,100	8/27/63	950	7/25/40	1,180	2/11/63	403	4/22/45	2,230
9/9/64	15,100	8/18/89	6,100	3/15/41	17,000	4/12/64	1,240	3/15/41	1,630	4/16/64	1,210	9/20/46	1,100
7/25/65	14,800	7/14/90	3,560	10/4/41	8,760	1/7/65	9,100	4/6/42	985	1/7/65	5,600	11/25/46	1,740
8/13/66	10,400	1/6/91	5,960	9/28/43	3,900	12/30/65	9,560	3/11/43	1,330	12/30/65	13,100	4/13/48	1,810
8/12/67	14,100	8/24/92	10,100	9/29/44	5,320	12/7/66	9,920	4/6/44	1,180	12/7/66	9,970	4/16/49	1,970
8/12/68	21,000	1/9/93	12,400	8/12/45	4,650	4/2/68	1,600	8/4/45	2,620	4/2/68	1,840	3/1/50	1,000
10/4/68	24,200	10/7/93	3,890	9/19/46	12,900	1/26/69	6,340	9/20/46	892	1/26/69	5,550	8/30/51	8,530
9/6/70	19,700	2/15/95	5,690	8/24/47	10,600	9/5/70	11,100	8/4/47	2,460	9/6/70	15,800	1/19/52	22,500
8/21/71	13,200	9/14/96	4,270	10/16/47	12,400	12/18/78	19,900	4/13/48	825	8/27/71	1,180	8/27/53	695
10/1/71	20,300	8/11/97	4,570	8/9/49	10,400	3/12/82	6,440	4/14/49	1,150	12/26/71	5,840	3/24/54	5,800
10/20/72	15,000	7/22/98	4,180	7/18/50	3,500	4/1/83	1,950	3/1/50	616	10/20/72	8,190	8/25/55	1,080
9/29/04	3,690	8/28/99	6,300	8/30/51	10,200	12/27/83	2,360	8/30/51	7,200	3/21/74	589	3/27/56	173
8/12/05	3,560	8/21/00	1,430	1/20/52	26,100	12/28/84	5,250	1/19/52	25,300	4/26/75	920	1/11/57	9,150
7/31/06	9,440	10/23/00	6,200	7/31/53	4,140	11/26/85	3,490	3/12/53	650	2/9/76	4,170	3/23/58	2,920
7/29/07	6,510	9/11/02	9,000	3/25/54	7,450	3/14/87	417	3/23/54	5,730	4/9/77	353	10/1/58	542
1/29/08	6,920	9/11/03	2,630	6/15/55	9,020	2/27/88	1,170	6/13/55	1,800	3/1/78	10,500	12/26/59	2,440
		9/20/04	5,090	8/17/56	2,320	3/10/89	525	7/23/56	562	12/18/78	19,700	4/6/61	925
		2/19/05	5,770	1/12/57	8,390	4/6/90	249	1/9/57	8,680	2/20/80	8,140	2/13/62	2,330

Table 3: Annual Peak-Discharge Data (Continued)

LCR at Holbrook- 09397000		LCR near Joseph City- 09397300		LCR at Grand Falls- 09401000		Chevelon Creek near Winslow- 09397500		Chevelon Creek near Winslow- 09398000		Clear Creek near Winslow- 09398500		Clear Creek near Winslow- 09399000	
DA = 11,462 (sm)		DA = 12,384 (sm)		DA = 21,068 (sm)		DA = 271 (sm)		DA = 785 (sm)		DA = 317 (sm)		DA = 621 (sm)	
Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)	Date	Peak flow (cfs)
		7/31/06	7,120	8/23/58	4,560	4/7/91	2,150	9/28/58	2,140	4/8/81	250	9/2/63	881
		8/5/07	5,290	8/7/59	3,080	8/23/92	5,200	8/14/59	1,320	3/12/82	5,230	4/17/64	1,060
		1/29/08	6,070	11/1/59	7,960	1/8/93	24,700	12/26/59	2,640	4/25/83	2,020	1/8/65	5,930
				9/6/70	11,400	11/23/93	3,530	7/30/61	500	12/27/83	2,130	12/30/65	18,500
				10/3/71	13,200	3/6/95	9,290	2/13/62	1,540	3/12/85	4,750	12/7/66	12,500
				8/17/90	1,920	3/17/97	790	8/21/63	1,620	11/26/85	2,570	4/2/68	1,840
				4/11/91	3,320	4/12/98	1,070	8/1/64	1,680	4/12/87	1,070	1/26/69	5,700
				8/29/92	3,716	4/15/99	511	1/8/65	13,100	11/1/87	1,270	9/6/70	9,650
				1/11/93	16,600	3/30/00	170	12/31/65	13,300	3/11/89	602	8/5/71	1,460
				3/23/94	2,760	11/6/00	557	12/7/66	8,890	4/6/90	194	12/27/71	5,480
						3/17/03	848	4/2/68	1,640	4/8/91	2,770	10/20/72	9,350
						3/12/04	454	1/26/69	5,120	1/8/93	29,100	3/22/74	538
						3/23/07	766	8/24/71	4,150			2/10/76	2,120
						12/8/07	9,050	12/27/71	9,040			4/10/77	372
								12/18/78	33,600			3/1/78	12,900
								8/7/06	4,100			12/19/78	36,300
												2/20/80	10,800
												4/9/82	570
												8/17/05	37
												8/17/06	15

Table 3: Annual Peak-Discharge Data (Continued)

LCR near Winslow- 09400350		Jacks Canyon Creek near Winslow- 09399420		Jacks Canyon Creek near Winslow- 09399400		Jacks Canyon Creek near Winslow- 09399300	
DA = 16,192 (sm)		DA = 0.25 (sm)		DA = 295 (sm)		DA = 0.29 (sm)	
Date	Peak discharge (cfs)	Date	Peak discharge (cfs)	Date	Peak discharge (cfs)	Date	Peak discharge (cfs)
9/12/02	10,800	8/17/70	137	9/5/70	1	8/21/63	55
9/11/03	2,310	9/29/71	37	8/15/71	151	1/1/64	168
9/20/04	4,230	7/16/72	285	12/26/71	1,970	7/17/65	156
12/30/04	20,000	10/19/72	86	10/20/72	2,600	1/1/66	0
8/1/06	7,630	9/1/74	6	1/1/74	0	1/1/67	0
8/6/07	6,010	9/7/75	75	9/7/75	1,080	2/1/68	192
1/29/08	11,200	1/1/76	13	12/18/78	4,600		
				8/27/07	142		
				3/2/08	647		

Table 4: Discharge-Frequency Statistics for Stream Gages near Winslow

	LCR at Holbrook 09397000	LCR near Joseph City 09397300	LCR at Holbrook - Combined Gage	LCR at Grand Falls 09401000	Chevelon Creek near Winslow 09397500	Chevelon Creek near Winslow 09398000	Clear Creek near Winslow 09398500	Clear Creek near Winslow 09399000
	DA = 11,462 (sm)	DA = 12,384 (sm)	DA = 11,462 (sm)	DA = 21,068 (sm)	DA = 271 (sm)	DA = 785 (sm)	DA = 317 (sm)	DA = 621 (sm)
Mean	3.99	3.85	3.90	3.95	3.34	3.42	3.39	3.40
Standard Dev	0.28	0.24	0.30	0.39	0.59	0.47	0.58	0.60
Station Skew	0.10	0.72	0.29	0.54	0.07	0.45	-0.13	-0.12
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	0.07	0.40	0.22	0.39	0.03	0.33	-0.12	-0.11
Adopted Skew	0.07	0.40	0.22	0.39	0.03	0.33	-0.12	-0.11

Table 5: Return Period Peak Discharges for Stream Gages near Winslow

Exceed. Prob.	Return Period (year)	LCR at Holbrook 09397000 (cfs)	LCR near Joseph City 09397300 (cfs)	LCR at Holbrook - Combined Gage (cfs)	*LCR near Winslow (cfs)	LCR at Grand Falls 09401000 (cfs)	Chevelon Creek near Winslow 09397500 (cfs)	Chevelon Creek near Winslow 09398000 (cfs)	Clear Creek near Winslow 09398500 (cfs)	Clear Creek near Winslow 09399000 (cfs)
		DA = 11,462 (sm)	DA = 12,384 (sm)	DA = 11,462 (sm)	DA = 16,192 (sm)	DA = 21,068 (sm)	DA = 271 (sm)	DA = 785 (sm)	DA = 317 (sm)	DA = 621 (sm)
0.002	500	67,080	46,280	69,300	127,250	186,990	114,910	94,270	91,140	106,990
0.005	200	54,410	36,670	53,860	90,660	128,590	75,250	61,180	63,720	73,740
0.01	100	45,820	30,440	43,910	69,200	95,270	53,130	43,220	47,260	54,050
0.02	50	38,020	24,980	35,270	52,020	69,290	36,360	29,830	33,970	38,360
0.04	25	30,940	20,190	27,770	38,310	49,170	23,880	19,990	23,430	26,090
0.1	10	22,550	14,740	19,370	24,400	29,590	12,490	11,000	13,060	14,240
0.2	5	16,820	11,150	13,960	16,360	18,840	6,830	6,450	7,470	7,990
0.5	2	9,670	6,810	7,680	8,070	8,480	2,170	2,480	2,500	2,570

*Interpolated from LCR stream gage results at Holbrook (combined gage) and Grand Falls

Table 6: Explanatory Variables for Regional Regression Equations

Stream Gage	Explanatory Variables		
	DA (sm)	Annual Mean Evaporation (inch)	Average Basin Slope (percent)
Chevelon Creek near Winslow - 09397500	271	55	0.11
Chevelon Creek near Winslow - 09398000	785	55	0.07
Clear Creek near Winslow - 09398500	317	55	0.15
Clear Creek near Winslow - 09399000	621	55	0.10
Jacks Canyon Creek near Winslow - 09399400	295	55	0.09

Table 7: Regional Regression Analysis Results

Exceed. Prob.	Return Period (year)	Chevelon Creek near Winslow - 09397500		Chevelon Creek near Winslow - 09398000		Clear Creek near Winslow - 09398500		Clear Creek near Winslow - 09399000		Jacks Canyon Creek near Winslow-09399400	
		DA = 271 (sm)		DA = 785 (sm)		DA = 317 (sm)		DA = 621 (sm)		DA = 295 (sm)	
		Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)
0.002	500	*39,700	23,700	*77,600	24,800	*43,800	32,700	*67,000	30,700	*41,900	19,300
0.01	100	21,000	13,600	39,000	14,800	23,100	18,500	34,000	17,900	22,100	11,300
0.02	50	15,000	10,300	26,600	11,400	16,300	13,900	23,400	13,600	15,700	8,580
0.04	25	9,470	7,480	16,500	8,470	10,300	10,000	14,600	10,000	9,900	6,310
0.1	10	5,570	4,530	9,680	5,270	6,040	6,000	8,570	6,120	5,820	3,870
0.2	5	3,000	2,850	5,430	3,390	3,270	3,740	4,770	3,880	3,140	2,460
0.5	2	840	1,170	1,620	1,430	920	1,510	1,400	1,610	880	1,020

*The Region-11 equations do not include the 500-year return interval. These values were extrapolated by the NSS program.

Table 8: Explanatory Variables for Regional Regression Equations for Ruby Wash

Concentration Points	Input Parameters		
	DA (sm)	Annual Mean Evaporation (inch)	Average Basin Slope (percent)
Upstream of the diversion levee	4.8	55	0.1
Ruby Wash at the diversion levee	8.6	55	0.1
Downstream of the diversion levee	20.1	55	0.1
Original Ice House Wash at Santa Fe Railroad Bridge	2.7	55	0.1
Original Ruby Wash at Santa Fe Railroad Bridge	2.9	55	0.1

Table 9: Regional Regression Analysis Results for Ruby Wash

		Upstream of the Diversion Levee		Ruby Wash at the Diversion Levee		Downstream of the Diversion Levee		Original Ice House Wash at Santa Fe Railroad Bridge		Original Ruby Wash at Santa Fe Railroad Bridge	
		DA = 4.8 (sm)		DA = 8.6 (sm)		DA = 20.1 (sm)		DA = 2.7 (sm)		DA = 2.9 (sm)	
Exceed. Prob.	Return Period (year)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Region-11 (cfs)	Navajo-11 (cfs)
0.002	500	*3,270	3,630	*4,670	4,690	*7,880	6,810	*2,300	2,820	*2,400	2,910
0.01	100	2,030	2,010	2,850	2,610	4,660	3,830	1,450	1,550	1,510	1,600
0.02	50	1,690	1,490	2,320	1,940	3,670	2,860	1,240	1,150	1,290	1,180
0.04	25	1,160	1,070	1,570	1,400	2,450	2,070	862	820	895	848
0.1	10	684	635	926	833	1,440	1,240	507	486	526	502
0.2	5	313	393	434	517	698	771	227	300	236	310
0.5	2	69	159	99	209	167	314	48	121	50	125

*The Region-11 equations do not include the 500-year return interval. These values were extrapolated by the NSS program.

Table 10: Comparison of Discharge Frequency and Regional Equations Results

		Chevelon Creek near Winslow- 09397500			Chevelon Creek near Winslow- 09398000		
		DA = 271 (sm)			DA = 785 (sm)		
Exceed. Prob.	Return Period (year)	Bulletin 17B (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Bulletin 17B (cfs)	Region-11 (cfs)	Navajo-11 (cfs)
0.002	500	114,910	*39,700	23,700	94,270	*77,600	24,800
0.01	100	53,130	21,000	13,600	43,220	39,000	14,800
0.02	50	36,360	15,000	10,300	29,830	26,600	11,400
0.04	25	23,880	9,470	7,480	19,990	16,500	8,470
0.1	10	12,490	5,570	4,530	11,000	9,680	5,270
0.2	5	6,830	3,000	2,850	6,450	5,430	3,390
0.5	2	2,170	840	1,170	2,480	1,620	1,430
		Clear Creek near Winslow- 09398500			Clear Creek near Winslow- 09399000		
		DA = 317 (sm)			DA = 621 (sm)		
Exceed. Prob.	Return Period (year)	Bulletin 17B (cfs)	Region-11 (cfs)	Navajo-11 (cfs)	Bulletin 17B (cfs)	Region-11 (cfs)	Navajo-11 (cfs)
0.002	500	91,140	*43,800	32,700	106,990	*67,000	30,700
0.01	100	47,260	23,100	18,500	54,050	34,000	17,900
0.02	50	33,970	16,300	13,900	38,360	23,400	13,600
0.04	25	23,430	10,300	10,000	26,090	14,600	10,000
0.1	10	13,060	6,040	6,000	14,240	8,570	6,120
0.2	5	7,470	3,270	3,740	7,990	4,770	3,880
0.5	2	2,500	920	1,510	2,570	1,400	1,610

*The Region-11 equations do not include the 500-year return interval. These values were extrapolated by the NSS program.

Table 11: Comparison of Peak Discharge Results with Previous Studies

Exceed. Prob.	Return Period (year)	This Study			USGS Water Supply Paper 2433 (Thomas, et. al., 1997)	USGS Scientific Investigation Report 2006-5306 (Waltemeyer, 2006)		
		Bulletin 17B (cfs)	Region -11 (cfs)	Navajo -11 (cfs)	Station Value Used in Regression Analysis (cfs)	Station Value Used in Regression Analysis (cfs)	Predicted by Regression Equation (cfs)	Weighted Value with Station and Predicted Values (cfs)
Chevelon Creek near Winslow – 09397500 (DA = 271 sm)								
0.002	500	114,910	*39,700	23,700	-	89,700	23,600	73,600
0.01	100	53,130	21,000	13,600	40,300	43,800	13,600	36,900
0.02	50	36,360	15,000	10,300	29,800	30,700	10,200	26,400
0.04	25	23,880	9,470	7,480	21,300	20,800	7,460	18,300
0.1	10	12,490	5,570	4,530	12,500	11,400	4,540	10,400
0.2	5	6,830	3,000	2,850	7,500	6,460	2,850	6,130
0.5	2	2,170	840	1,170	2,750	2,220	1,160	2,170
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)								
0.002	500	94,270	*77,600	24,800	-	89,700	27,400	78,300
0.01	100	43,220	39,000	14,800	41,900	41,600	16,400	37,500
0.02	50	29,830	26,600	11,400	29,000	28,900	12,600	26,500
0.04	25	19,990	16,500	8,470	19,400	19,500	9,370	18,200
0.1	10	11,000	9,680	5,270	10,700	10,800	5,880	10,300
0.2	5	6,450	5,430	3,390	6,270	6,370	3,770	6,210
0.5	2	2,480	1,620	1,430	2,420	2,470	1,590	2,450
Clear Creek near Winslow – 09398500 (DA = 317 sm)								
0.002	500	91,140	*43,800	32,700	-	87,500	32,600	76,600
0.01	100	47,260	23,100	18,500	31,100	45,300	18,500	40,200
0.02	50	33,970	16,300	13,900	24,000	32,500	13,800	29,200
0.04	25	23,430	10,300	10,000	17,900	22,400	10,000	20,500
0.1	10	13,060	6,040	6,000	11,200	12,500	6,030	11,800
0.2	5	7,470	3,270	3,740	7,170	7,180	3,740	6,910
0.5	2	2,500	920	1,510	2,950	2,420	1,510	2,390
*The Region-11 equations do not include the 500-year return interval. These values were extrapolated by the NSS program.								

Table 12: Comparison of LCR 100-year Peak Discharges with Other Studies

Stream Gage	DA (sm)	This Study (cfs)	Technical Data Notebook (Delph Engineering, 2009) (cfs)	Review Report (USACE, 1961)
LCR at Holbrook - 09397000	11,462	45,820	47,910	-
LCR at Grand Falls - 09401000	21,068	95,270	93,320	-
Chevelon Creek near Winslow - 09398000	785	43,220	42,930*	57,000**
Clear Creek near Winslow - 09399000	621	54,050	58,490*	74,000**
*As a typo. Chevelon and Clear Creek rows in the table (Page 11) were inadvertently switched, which was confirmed by Delph Engineering. **Approximated from discharge frequency curve (USACE, 1961)				

Table 13: Comparison of Peak Discharge Results for Ice House Wash at Santa Fe Railroad Bridge*

Exceed. Prob.	Return Period (year)	This Study		Design Memorandum - Flood Control Project at Winslow (USACE, 1969) (cfs)
		Region-11 (cfs)	Navajo-11 (cfs)	
0.002	500	2,300	2,820	-
0.004	250	-	-	4,600**
0.01	100	1,450	1,550	3,100
0.02	50	1,240	1,150	2,200
0.04	25	862	820	-
0.05	20	-	-	1,400
0.1	10	507	486	550
0.2	5	227	300	-
0.5	2	48	121	200

*Drainage area at this concentration point is 2.7 sm
**Standard Project Flood

Table 14: Daily Flow Records for Stream Gages near Winslow

Watershed Name	USGS Gage Number	Coordinates Latitude Longitude	DA (sm)	Period of Record	Number of Record Year	Maximum Daily Average Flow	
						Q (cfs)	Date
Little Colorado River At Holbrook, AZ	09397000	34°53'52" 110°09'45"	11,462	1905-1908, 1949-1974, 2003-2009	35	20,200	11/27/1905
Little Colorado River Near Joseph City, AZ	09397300	34°54'04" 110°15'17"	12,384	1989-1991, 2006-2009	6	7,190	7/31/2006
Little Colorado River Near Winslow AZ	09400000	35°00'10" 110°39'00"	16,100	1954-1956, 2001-2002	4	98	9/28/1954
Little Colorado River Near Winslow, AZ	09400350	35°00'42" 110°39'02"	16,192	2001-2009	8	15,200	12/30/04
Little Colo. River At Grand Falls, AZ	09401000	35°26'00" 111°12'00"	21,068	1925-1961, 1989-1995	41	27,100	4/5/1929
Chevelon Creek Below Wildcat Canyon, Near Winslow, AZ	09397500	34°38'11" 110°42'49"	271	1947-1970, 1995-2009	39	6,860	1/9/1957
Chevelon Creek Near Winslow, AZ	09398000	34°55'35" 110°31'51"	785	1906, 1916-1919, 1929-1972, 2005-2006	51	10,200	1/19/1952
Clear Creek Below Willow Creek, Near Winslow, AZ	09398500	34°40'03" 111°00'25"	317	1947-1991, 1993	46	9,300	12/18/1978
Clear Creek Near Winslow, AZ	09399000	34°58'10" 110°38'40"	621	1906, 1929-1982, 2005-2007	57	21,500	12/19/1978
Clear Creek Below McHood Lake Near Winslow, AZ	09399100	34°58'10 110°38'26"	601	2005-2007	2	5	2/23/2006
Jacks Canyon Cr Near Winslow, AZ	09399400	34°55'17" 110°47'49"	295	1969-1972, 2006-2009	7	635	12/26/1971
Salt Creek Near Winslow AZ	09399500	34°59'00" 110°39'00"	287	1939-1941	3	534	4/16/1941

Table 15: Relationship between Adjusted and Actual Dates

Watershed Name	USGS Gage Number	DA (sm)	Actual Period of Record		Adjusted Continuous Period of Record		Systematic Record Years	Historical Adjustment		
			Start Year	End Year	Start Year	End Year		Number of Years	Start Year	End Year
Little Colorado River at Holbrook, AZ	09397000	11,462	1905	2009	1946	1980	35	104	1876	1980
Little Colorado River near Joseph City, AZ	09397300	12,384	1989	2009	2003	2009	6	20	1989	2009
Little Colorado River near Winslow AZ	09400000	16,100	1954	2002	1954	1958	4	55	1910	1965
Little Colorado River near Winslow, AZ	09400350	16,192	2001	2009	2001	2009	8	8	2001	2009
Little Colorado River at Grand Falls, AZ	09401000	21,068	1925	1995	1925	1966	41	84	1896	1980
Chevelon Creek below Wildcat Canyon, near Winslow, AZ	09397500	271	1947	2009	1947	1985	39	62	1923	1985
Chevelon Creek near Winslow, AZ	09398000	785	1906	2006	1924	1974	51	103	1874	1977
Clear Creek Below Willow Creek, near Winslow, AZ	09398500	317	1947	1993	1947	1992	46	62	1946	2008
Clear Creek near Winslow, AZ	09399000	621	1906	2007	1928	1985	57	103	1884	1987
Clear Creek below McHood Lake near Winslow, AZ	09399100	601	2005	2007	2005	2007	2	4	2005	2009
Jacks Canyon Creek near Winslow, AZ	09399400	295	1969	2009	2002	2009	7	40	1969	2009
Salt Creek near Winslow AZ	09399500	287	1939	1941	1939	1941	3	70	1939	2009

Table 16: Volume-Frequency Statistics, LCR

Statistics (Log Scale)	1-day	2-day	3-day	4-day	5-day	6-day	7-day	8-day	9-day	10-day
LCR at Holbrook – 09397000 (DA = 11,462 sm)										
Mean	3.48	3.39	3.29	3.21	3.14	3.09	3.07	3.01	2.96	2.95
Standard Dev.	0.50	0.46	0.46	0.46	0.46	0.47	0.48	0.47	0.50	0.51
Station Skew	-0.67	-0.57	-0.58	-0.59	-0.63	-0.67	-0.65	-0.69	-0.81	-0.79
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	-0.54	-0.47	-0.48	-0.48	-0.52	-0.54	-0.53	-0.55	-0.63	-0.62
Adjusted Std. Dev.	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Adjusted Skew	-0.54	-0.54	-0.54	-0.54	-0.54	-0.54	-0.54	-0.54	-0.54	-0.54
LCR at Grand Falls – 09401000 (DA = 21,068 sm)										
Mean	3.61	3.53	3.46	3.40	3.35	3.32	3.28	3.25	3.22	3.18
Standard Dev.	0.52	0.52	0.50	0.49	0.49	0.49	0.49	0.50	0.50	0.50
Station Skew	-1.31	-1.28	-1.38	-1.50	-1.60	-1.66	-1.75	-1.79	-1.86	-1.90
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	-0.82	-0.81	-0.83	-0.85	-0.88	-0.89	-0.91	-0.92	-0.93	-0.94
Adopted Skew	-0.82	-0.81	-0.83	-0.85	-0.88	-0.89	-0.91	-0.92	-0.93	-0.94

Table 17: Volume-Frequency Statistics, Chevelon Creek

Statistics (Log Scale)	1-day	2-day	3-day	4-day	5-day	6-day	7-day
Chevelon Creek near Winslow – 09397500 (DA = 271 sm)							
Mean	2.94	2.87	2.81	2.76	2.73	2.69	2.66
Standard Dev.	0.53	0.49	0.45	0.42	0.41	0.39	0.38
Station Skew	0.19	0.13	0.04	-0.05	-0.14	-0.22	-0.29
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	0.12	0.07	0.01	-0.06	-0.13	-0.19	-0.24
Adjusted Std. Dev.	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Adjusted Skew	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Adopted Std. Dev.	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Adopted Skew	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)							
Mean	2.95	2.90	2.84	2.79	2.75	2.71	2.67
Standard Dev.	0.51	0.43	0.42	0.41	0.42	0.42	0.42
Station Skew	-0.33	-0.15	-0.38	-0.64	-0.85	-0.97	-1.11
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	-0.29	-0.14	-0.33	-0.52	-0.66	-0.72	-0.79
Adjusted Std. Dev.	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Adjusted Skew	-0.29	-0.29	-0.29	-0.29	-0.29	-0.29	-0.29
Adopted Std. Dev.	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Adopted Skew	-0.29	-0.29	-0.29	-0.29	-0.29	-0.29	-0.29

Table 18: Volume-Frequency Statistics, Clear Creek

Statistics (Log Scale)	1-day	2-day	3-day	4-day	5-day	6-day	7-day
Clear Creek near Winslow – 09398500 (DA = 317 sm)							
Mean	3.13	3.07	3.01	2.96	2.92	2.89	2.87
Standard Dev.	0.50	0.48	0.46	0.45	0.44	0.43	0.43
Station Skew	-0.52	-0.58	-0.71	-0.82	-0.91	-0.95	-0.99
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	-0.40	-0.44	-0.52	-0.59	-0.64	-0.65	-0.67
Adjusted Std. Dev.	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Adjusted Skew	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40
Adopted Std. Dev.	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Adopted Skew	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40
Clear Creek near Winslow – 09399000 (DA = 621 sm)							
Mean	3.14	3.07	3.02	2.96	2.92	2.90	2.86
Standard Dev.	0.53	0.49	0.48	0.46	0.46	0.46	0.46
Station Skew	0.11	-0.23	-0.37	-0.58	-0.72	-0.81	-0.94
Regional Skew	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
Weighted Skew	0.08	-0.21	-0.32	-0.47	-0.58	-0.64	-0.71
Adjusted Std. Dev.	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Adjusted Skew	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Adopted Std. Dev.	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Adopted Skew	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Table 19: Volume-Frequency Results, LCR

Exceed. Prob.	Return Period (years)	Average Daily Flows (cfs)									
		1-day	2-day	3-day	4-day	5-day	6-day	7-day	8-day	9-day	10-day
LCR at Holbrook – 09397000 (DA = 11,462 sm)											
0.002	500	35,800	28,840	23,290	19,110	16,330	14,680	13,790	12,140	10,770	10,460
0.005	200	29,800	24,010	19,390	15,910	13,590	12,220	11,480	10,110	8,960	8,710
0.01	100	25,350	20,420	16,490	13,530	11,560	10,390	9,760	8,600	7,620	7,400
0.02	50	20,990	16,910	13,660	11,200	9,570	8,610	8,080	7,120	6,310	6,130
0.04	25	16,780	13,520	10,920	8,960	7,650	6,880	6,460	5,690	5,050	4,900
0.1	10	11,500	9,260	7,480	6,140	5,240	4,710	4,430	3,900	3,460	3,360
0.2	5	7,780	6,270	5,060	4,150	3,550	3,190	3,000	2,640	2,340	2,270
0.5	2	3,330	2,690	2,170	1,780	1,520	1,370	1,280	1,130	1,000	970
LCR near Winslow (DA = 16,192 sm) Interpolated from LCR stream gage results at Holbrook (Combined Gage) and Grand Falls											
0.002	500	38,080	31,260	24,710	20,310	17,280	15,860	14,430	13,240	11,880	11,160
0.005	200	32,620	26,780	21,260	17,520	14,960	13,750	12,530	11,520	10,350	9,720
0.01	100	28,370	23,290	18,550	15,340	13,130	12,090	11,020	10,150	9,130	8,580
0.02	50	24,020	19,730	15,790	13,090	11,240	10,370	9,460	8,730	7,870	7,390
0.04	25	19,630	16,120	12,970	10,790	9,300	8,590	7,850	7,250	6,550	6,150
0.1	10	13,810	11,350	9,208	7,710	6,680	6,180	5,660	5,240	4,740	4,460
0.2	5	9,480	7,800	6,380	5,370	4,680	4,330	3,980	3,680	3,340	3,140
0.5	2	4,030	3,320	2,770	2,350	2,070	1,910	1,760	1,620	1,480	1,390
LCR at Grand Falls – 09401000 (DA = 21,068 sm)											
0.002	500	40,430	33,750	26,170	21,550	18,270	17,070	15,100	14,380	13,030	11,880
0.005	200	35,520	29,640	23,180	19,190	16,370	15,330	13,610	12,970	11,780	10,770
0.01	100	31,480	26,260	20,680	17,200	14,750	13,840	12,330	11,750	10,690	9,790
0.02	50	27,150	22,640	17,980	15,030	12,960	12,180	10,890	10,380	9,470	8,680
0.04	25	22,560	18,810	15,080	12,680	11,010	10,350	9,290	8,860	8,100	7,440
0.1	10	16,180	13,500	10,990	9,320	8,170	7,690	6,930	6,620	6,070	5,590
0.2	5	11,220	9,370	7,740	6,630	5,850	5,510	4,980	4,750	4,370	4,030
0.5	2	4,750	3,980	3,390	2,950	2,630	2,470	2,240	2,130	1,970	1,820

Table 20: Volume-Frequency Results, Chevelon Creek

Exceed. Prob.	Return Period (years)	Average Daily Flows (cfs)						
		1-day	2-day	3-day	4-day	5-day	6-day	7-day
Chevelon Creek near Winslow – 09397500 (DA = 271 sm)								
0.002	500	35,660	30,230	26,380	23,510	21,720	19,720	18,380
0.005	200	23,630	20,030	17,480	15,580	14,390	13,060	12,180
0.01	100	16,890	14,310	12,490	11,130	10,280	9,340	8,700
0.02	50	11,740	9,950	8,680	7,740	7,150	6,490	6,050
0.04	25	7,870	6,670	5,820	5,190	4,790	4,350	4,060
0.1	10	4,280	3,630	3,170	2,820	2,610	2,370	2,210
0.2	5	2,440	2,070	1,810	1,610	1,490	1,350	1,260
0.5	2	860	730	630	570	520	470	440
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)								
0.002	500	17,540	15,590	13,610	12,100	10,940	10,170	9,260
0.005	200	13,450	11,950	10,430	9,280	8,390	7,790	7,100
0.01	100	10,720	9,530	8,320	7,400	6,690	6,220	5,660
0.02	50	8,310	7,390	6,450	5,730	5,190	4,820	4,390
0.04	25	6,210	5,520	4,810	4,280	3,870	3,600	3,270
0.1	10	3,870	3,440	3,000	2,670	2,420	2,240	2,040
0.2	5	2,440	2,170	1,890	1,680	1,520	1,410	1,290
0.5	2	950	840	730	650	590	550	500

Table 21: Volume-Frequency Results, Clear Creek

Exceed. Prob.	Return Period (years)	Average Daily Flows (cfs)						
		1-day	2-day	3-day	4-day	5-day	6-day	7-day
Clear Creek - 09398500 (DA = 317 sm)								
0.002	500	21,660	18,870	16,410	14,670	13,400	12,550	11,740
0.005	200	17,220	15,000	13,040	11,660	10,650	9,980	9,330
0.01	100	14,120	12,290	10,690	9,560	8,730	8,180	7,650
0.02	50	11,260	9,800	8,530	7,620	6,960	6,520	6,100
0.04	25	8,650	7,530	6,550	5,850	5,350	5,010	4,690
0.1	10	5,610	4,880	4,250	3,800	3,470	3,250	3,040
0.2	5	3,630	3,160	2,750	2,460	2,240	2,100	1,970
0.5	2	1,460	1,270	1,110	990	900	850	790
Clear Creek - 09399000 (DA = 621 sm)								
0.002	500	50,600	42,530	38,030	33,530	30,530	28,660	26,250
0.005	200	34,210	28,750	25,720	22,670	20,640	19,380	17,750
0.01	100	24,820	20,860	18,660	16,450	14,970	14,060	12,880
0.02	50	17,520	14,720	13,170	11,610	10,570	9,922	9,090
0.04	25	11,930	10,020	8,960	7,900	7,190	6,750	6,190
0.1	10	6,610	5,560	4,970	4,380	3,990	3,750	3,430
0.2	5	3,830	3,220	2,880	2,540	2,310	2,170	1,990
0.5	2	1,370	1,150	1,030	910	820	770	710

Table 22: Standard Project Flood Hydrograph, LCR at Holbrook

Clock Time [1]		Hours	Adjusted Hour [2]	Discharge[1] (cfs)
Days	Hours			
2	12	60	0	0
2	14	62	2	0
2	16	64	4	250
2	18	66	6	500
2	20	68	8	1,100
2	22	70	10	3,000
3	0	72	12	5,500
3	2	74	14	12,500
3	4	76	16	25,000
3	6	78	18	42,000
3	8	80	20	62,750
3	10	82	22	68,500
3	12	84	24	66,000
3	14	86	26	64,000
3	16	88	28	70,000
3	18	90	30	83,500
3	20	92	32	99,000
3	22	94	34	107,000
4	0	96	36	96,500
4	2	98	38	77,000
4	4	100	40	61,000
4	6	102	42	47,000
4	8	104	44	38,000
4	10	106	46	29,500
4	12	108	48	24,000
4	14	110	50	19,500
4	16	112	52	15,000
4	18	114	54	11,500
4	20	116	56	9,750
4	22	118	58	7,500
5	0	120	60	6,500
5	2	122	62	5,250
5	4	124	64	4,500
5	6	126	66	3,750
5	8	128	68	3,000
5	10	130	70	2,500
5	12	132	72	1,750
5	14	134	74	1,250
5	16	136	76	1,000
5	18	138	78	750
5	20	140	80	500
5	22	142	82	250
6	0	144	84	0

1) From USACE 1977, Plate H-14. See Figure 11
2) Clock time adjusted to hours, beginning at t = 0.

Table 23: Balanced Hydrographs, Little Colorado River near Winslow

LCR near Winslow (DA = 16,192 sm) Interpolated from LCR stream gage results at Holbrook (Combined Gage) and Grand Falls					
Time (hr)	**500-year**	**200-year**	**100-year**	**50-year**	**25-year**
0	0	0	0	0	0
2	11,450	8,160	9,000	9,360	8,810
4	12,730	9,070	9,690	9,880	9,190
6	14,000	9,970	10,380	10,400	9,580
8	15,270	10,880	11,070	10,920	9,960
10	16,540	11,790	11,760	11,440	10,340
12	17,820	12,690	12,460	11,960	10,730
14	19,090	14,510	13,840	13,010	11,490
16	20,360	16,320	15,220	14,050	12,260
18	21,630	18,130	16,610	15,090	13,030
20	22,910	19,950	17,990	16,130	13,790
22	24,180	21,760	19,380	17,170	14,560
24	25,450	23,570	20,760	18,210	15,320
26	28,000	25,380	22,140	19,250	16,090
28	30,540	27,200	23,530	20,290	16,860
30	33,090	29,010	24,910	21,330	17,620
32	35,630	30,820	26,300	22,370	18,390
34 (1)	**127,250**	**90,660**	**69,200**	**52,020**	**38,310**
36	35,630	29,920	24,910	21,850	18,770
38	34,360	29,010	24,220	21,330	18,390
40	33,090	28,100	23,530	20,810	18,010
42	31,810	27,200	22,840	20,290	17,620
44	30,540	26,290	22,140	19,770	17,240
46	29,270	25,380	21,450	19,250	16,860
48	28,000	24,480	20,760	18,730	16,470
50	26,720	23,570	20,070	18,210	16,090
52	25,450	22,670	19,380	17,690	15,710
54	24,180	21,760	18,680	17,170	15,320
56	22,910	20,850	17,990	16,650	14,940
58	21,630	19,950	17,300	16,130	14,560
60	20,360	19,040	16,610	15,610	14,170
62	19,090	18,130	15,920	15,090	13,410
64	17,820	17,230	15,220	14,570	12,640
66	16,540	16,320	14,530	14,050	11,880
68	15,270	15,410	13,840	13,530	11,110
70	14,000	14,510	13,150	13,010	10,340
72	12,730	13,600	12,460	12,480	9,580
74	11,450	12,690	11,760	11,960	8,810
76	10,180	11,790	11,070	11,440	8,050
78	8,910	10,880	10,380	10,920	7,280
80	7,630	9,970	9,690	10,400	6,510
82	6,360	9,070	9,000	9,880	5,750
84	0	0	0	0	0
1) Peak Discharge occurs at t = 34 hours.					

Table 24: Equivalent Record Lengths for Stream Gages near Winslow

Watershed Name	USGS Gage Number	DA (sm)	Equivalent Record Length			
			Peak discharge Frequency Analysis	Volume Flow Frequency Analysis	Regional Regression Analysis	
					Region-11	Navajo-11
Little Colorado River at Holbrook, AZ	09397000	11,462	104	105	N/A	N/A
Little Colorado River Near Joseph City, AZ	09397300	12,384	39	N/A	N/A	N/A
Little Colo. River at Grand Falls, AZ	09401000	21,068	87	85	N/A	N/A
Chevelon Creek Below Wildcat Canyon, near	09397500	271	62	63	20	22
Chevelon Creek near Winslow, AZ	09398000	785	94	104	20	22
Clear Creek Below Willow Creek, near Winslow, AZ	09398500	317	62	63	20	22
Clear Creek near Winslow, AZ	09399000	621	81	104	20	22
Little Colorado River at Holbrook, AZ	Combined 09397000 & 09397300	11,462	104	N/A	N/A	N/A
Ice House Wash at the Upstream of Diversion Levee	ungaged	4.8	N/A	N/A	20	22
Ruby Wash at the Diversion Levee	ungaged	8.6	N/A	N/A	20	22
Downstream of the Diversion Levee	ungaged	20.1	N/A	N/A	20	22
Ice House Wash at the Santa Fe Railroad Bridge	ungaged	2.7	N/A	N/A	20	22
Ruby Wash at the Santa Fe Railroad Bridge	ungaged	2.9	N/A	N/A	20	22

Table 25: Expected and Computed Peak Discharges with Confidence Limits for LCR

Exceed. Prob.	Return Period (year)	95% Confidence Limit (cfs)*	Computed Peak Discharge (cfs)*	Expected Peak Discharge (cfs)*	5% Confidence Limit (cfs)*
LCR at Holbrook – 09397000 (DA = 11,462 sm)					
0.002	500	45,840	67,080	82,090	117,800
0.005	200	38,380	54,410	63,280	90,720
0.01	100	33,160	45,820	51,520	73,280
0.02	50	28,260	38,020	41,490	58,180
0.04	25	23,640	30,940	32,900	45,160
0.1	10	17,890	22,550	23,320	30,780
0.2	5	13,690	16,820	17,110	21,750
0.5	2	7,940	9,670	9,670	11,770
LCR near Joseph City – 09397300 (DA = 12,384 sm)					
0.002	500	32,960	46,280	56,240	75,580
0.005	200	27,030	36,670	42,300	56,800
0.01	100	23,040	30,440	33,920	45,220
0.02	50	19,430	24,980	27,030	35,540
0.04	25	16,150	20,190	21,310	27,470
0.1	10	12,220	14,740	15,160	18,850
0.2	5	9,460	11,150	11,300	13,620
0.5	2	5,810	6,810	6,810	7,950
LCR at Holbrook - Combined Gage (DA = 11,462 sm)					
0.002	500	50,580	69,300	78,020	104,970
0.005	200	40,480	53,860	58,850	78,320
0.01	100	33,770	43,910	47,010	61,810
0.02	50	27,780	35,270	37,090	47,990
0.04	25	22,420	27,770	28,760	36,460
0.1	10	16,160	19,370	19,740	24,200
0.2	5	11,920	13,960	14,100	16,790
0.5	2	6,620	7,680	7,680	8,890
LCR near Winslow (DA = 16,192 sm) Interpolated from LCR stream gage results at Holbrook (Combined Gage) and Grand Falls					
0.002	500	81,120	127,250	158,760	240,380
0.005	200	60,680	90,660	106,440	159,000
0.01	100	48,090	69,200	78,060	114,590
0.02	50	37,540	52,020	56,740	81,240
0.04	25	28,720	38,310	40,630	56,360
0.1	10	19,220	24,400	25,160	33,140
0.2	5	13,320	16,360	16,610	20,960
0.5	2	6,670	8,070	8,070	9,760
*See Figure 3 for the plots					
** Interpolated from LCR stream gage results at Holbrook (Combined Gage) and Grand Falls					

Table 25: Expected and Computed Peak Discharges with Confidence Limits for LCR (Continued)

Exceed. Prob.	Return Period (year)	95% Confidence Limit (cfs)*	Computed Peak Discharge (cfs)*	Expected Peak Discharge (cfs)*	5% Confidence Limit (cfs)*
LCR at Grand Falls – 09401000 (DA = 21,068 sm)					
0.002	500	112,610	186,990	242,000	379,960
0.005	200	81,510	128,590	155,500	242,170
0.01	100	62,840	95,270	110,070	169,000
0.02	50	47,600	69,290	76,990	115,520
0.04	25	35,220	49,170	52,850	76,880
0.1	10	22,370	29,590	30,740	42,370
0.2	5	14,770	18,840	19,200	25,260
0.5	2	6,720	8,480	8,480	10,670
*See Figure 3 for the plots					

Table 26: Expected and Computed Peak Discharges with Confidence Limits for Chevelon Creek

Exceed. Prob.	Return Period (year)	95% Confidence Limit (cfs)*	Computed Peak Discharge (cfs)*	Expected Peak Discharge (cfs)*	5% Confidence Limit (cfs)*
Chevelon Creek near Winslow – 09397500 (DA = 271 sm)					
0.002	500	60,090	114,910	147,990	277,920
0.005	200	41,520	75,250	91,110	168,240
0.01	100	30,590	53,130	61,680	111,470
0.02	50	21,900	36,360	40,670	71,310
0.04	25	15,080	23,880	25,850	43,580
0.1	10	8,410	12,490	13,050	20,570
0.2	5	4,810	6,830	6,983	10,360
0.5	2	1,560	2,170	2,170	3,000
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)					
0.002	500	53,750	94,270	121,360	202,580
0.005	200	36,860	61,180	73,760	121,410
0.01	100	27,180	43,220	49,850	80,540
0.02	50	19,620	29,830	33,130	52,080
0.04	25	13,750	19,990	21,480	32,590
0.1	10	8,030	11,000	11,430	16,340
0.2	5	4,900	6,450	6,572	8,920
0.5	2	1,910	2,480	2,480	3,200
*See Figure 3 for the plots					

Table 27: Expected and Computed Peak Discharges with Confidence Limits for Clear Creek

Exceed. Prob.	Return Period (year)	95% Confidence Limit (cfs)*	Computed Peak Discharge (cfs)*	Expected Peak Discharge (cfs)*	5% Confidence Limit (cfs)*
Clear Creek near Winslow – 09398500 (DA = 317 sm)					
0.002	500	49,070	91,140	114,260	213,050
0.005	200	35,910	63,720	75,760	139,080
0.01	100	27,640	47,260	54,200	97,520
0.02	50	20,670	33,970	37,700	65,980
0.04	25	14,870	23,430	25,260	42,620
0.1	10	8,790	13,060	13,620	21,580
0.2	5	5,250	7,470	7,640	11,410
0.5	2	1,790	2,500	2,500	3,470
Clear Creek near Winslow – 09399000 (DA = 621 sm)					
0.002	500	59,240	106,990	129,870	235,210
0.005	200	42,670	73,740	85,540	152,110
0.01	100	32,420	54,050	60,800	105,850
0.02	50	23,900	38,360	41,960	71,040
0.04	25	16,930	26,090	27,830	45,470
0.1	10	9,780	14,240	14,760	22,710
0.2	5	5,720	7,990	8,140	11,850
0.5	2	1,890	2,570	2,570	3,510
*See Figure 3 for the plots					

Table 28: Flow Exceedance, Average Number of Days, LCR

LCR at Holbrook – 09397000 (DA = 11,462 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	0	0	0	0	0	4	3	0	0	0	0	0	8	2.1
0	31	28	31	30	31	26	28	31	30	31	30	31	358	97.9
5	26	24	24	16	13	8	16	26	21	20	22	25	240	65.8
10	17	16	13	9	4	3	12	24	16	10	9	12	146	40.0
25	9	9	9	6	3	3	10	19	11	6	4	5	94	25.9
50	6	7	8	5	3	2	8	17	9	4	3	3	74	20.2
100	4	5	6	4	2	1	6	13	6	3	2	2	55	15.0
250	2	2	3	3	1	0	3	9	4	2	1	1	33	8.9
500	1	1	2	2	1	0	2	7	2	1	0	1	21	5.7
LCR near Winslow – 09400350 (DA = 16,192 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	31	28	31	30	31	30	31	31	30	31	30	31	365	100
5	30	27	31	29	22	9	16	27	23	25	29	29	298	81.6
10	16	18	23	21	8	2	11	25	18	10	4	13	167	45.8
25	10	14	21	18	3	0	9	22	15	6	2	9	128	35.0
50	9	13	20	14	2	0	7	19	11	5	2	8	108	29.6
100	7	10	19	10	1	0	6	15	8	4	1	4	85	23.3
250	6	8	17	6	0	0	4	10	4	2	0	2	60	16.3
500	5	6	11	2	0	0	3	6	3	1	0	1	37	10.2
LCR at Grand Falls – 09401000 (DA = 21,068 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	10	6	4	3	17	27	20	6	9	15	13	13	143	39.0
0	21	23	27	27	14	3	11	25	21	16	17	18	223	61.0
5	17	20	26	26	11	1	10	22	18	12	13	14	191	52.2
10	15	19	26	25	11	1	9	21	17	11	10	11	174	47.7
25	10	15	25	24	9	1	8	19	14	8	6	6	144	39.4
50	8	12	24	21	7	1	7	17	12	5	4	4	123	33.6
100	6	10	21	18	5	1	6	15	10	4	3	3	100	27.5
250	3	6	16	15	3	0	4	11	6	2	1	1	69	18.8
500	2	4	12	11	2	0	2	7	4	1	1	1	47	12.9

Table 29: Flow Exceedance, Average Number of Days, Chevelon Creek

Chevelon Creek near Winslow – 09397500 (DA = 271 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
No Flow	17	11	5	3	17	29	30	27	25	28	24	19	237	64.8
0	14	17	26	27	14	1	1	4	5	3	6	12	129	35.2
1	13	17	26	25	10	0	0	3	4	2	5	10	115	31.4
2	12	17	25	24	8	0	0	3	4	2	4	9	109	29.7
5	11	16	25	21	6	0	0	3	3	1	3	8	97	26.6
10	10	15	24	19	4	0	0	2	2	1	3	7	88	24.0
25	7	13	22	16	3	0	0	2	1	1	2	4	71	19.5
50	6	9	19	12	1	0	0	1	1	0	1	3	54	14.7
100	3	4	13	8	0	0	0	1	0	0	1	1	33	9.1
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
No Flow	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
0	31	28	31	30	31	30	31	31	30	31	30	31	365	99.9
1	31	28	31	30	30	29	30	31	29	30	29	31	361	98.7
2	30	28	31	30	29	28	30	29	28	30	29	31	352	96.4
5	14	17	26	25	13	7	8	12	7	7	8	10	155	42.6
10	9	14	25	22	7	1	3	6	3	2	4	7	102	27.9
25	7	11	23	18	4	0	1	3	2	1	3	5	79	21.7
50	5	8	20	15	2	0	1	2	1	1	2	4	60	16.4
100	2	5	14	12	1	0	0	1	1	1	1	2	40	10.8

Table 30: Flow Exceedance, Average Number of Days, Clear Creek

Clear Creek near Winslow – 09398500 (DA = 317 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
No Flow	12	7	2	1	10	26	30	25	25	25	20	18	201	54.9
0	19	22	29	29	21	4	1	6	5	6	10	13	165	45.1
1	18	21	29	29	18	2	1	5	4	5	8	12	152	41.6
2	17	21	29	29	16	2	1	5	4	4	7	11	144	39.5
5	13	19	28	28	14	1	0	4	3	4	6	9	128	35.1
10	11	16	27	27	12	1	0	3	2	3	5	8	114	31.3
25	9	13	25	24	9	0	0	3	1	2	4	6	96	26.4
50	5	10	23	21	6	0	0	2	1	2	3	4	77	21.1
100	3	6	17	17	4	0	0	1	1	1	1	2	53	14.6
Clear Creek near Winslow – 09399000 (DA = 621 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
No Flow	8	6	2	1	9	17	19	17	16	14	10	8	128	35.0
0	23	22	29	29	22	13	12	14	14	17	20	23	238	65.0
1	17	19	26	28	19	5	6	10	8	10	14	17	178	48.7
2	12	16	25	28	17	4	4	7	6	6	10	12	145	39.6
5	9	13	24	27	16	2	2	4	4	3	6	8	116	31.9
10	7	12	23	26	14	1	1	2	2	1	4	6	100	27.3
25	6	9	22	24	10	0	0	2	1	1	3	5	85	23.2
50	4	7	20	21	8	0	0	1	1	1	2	3	69	18.8
100	3	4	16	18	5	0	0	1	1	1	1	2	52	14.2

Table 31: Flow Exceedance, Total Number of Days, LCR

LCR at Holbrook – 09397000 (DA = 11,462 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	0	0	0	1	4	30	22	2	0	0	0	2	61	16.7
0	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
5	31	29	31	30	31	30	25	31	30	31	30	31	360	98.6
10	31	29	31	30	31	30	23	31	30	31	30	31	358	98.0
25	31	29	31	30	31	30	18	31	27	28	30	31	347	95.0
50	31	29	31	30	31	18	18	31	22	14	15	15	285	78.0
100	31	20	31	30	31	3	11	31	13	7	9	10	227	62.1
250	24	11	31	30	24	2	8	29	8	5	6	6	184	50.4
500	7	8	31	30	21	2	8	28	4	5	3	3	150	41.1
LCR near Winslow – 09400350 (DA = 16,192 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
0	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
5	31	29	31	30	31	30	22	31	30	31	30	31	357	97.7
10	31	29	31	30	31	5	13	31	25	19	7	31	283	77.5
25	31	29	31	30	15	1	11	31	20	17	7	31	254	69.5
50	31	29	31	30	11	1	11	31	18	16	7	30	246	67.4
100	31	29	31	30	4	0	11	31	10	8	6	24	215	58.9
250	31	29	31	20	1	0	10	19	10	7	2	10	170	46.5
500	15	17	19	7	0	0	8	11	9	2	1	6	95	26.0
LCR at Grand Falls – 09401000 (DA = 21,068 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	31	28	31	20	31	30	31	31	30	31	30	31	355	97.2
0	31	29	31	30	31	16	31	31	30	31	30	31	352	96.4
5	31	29	31	30	31	14	31	31	30	31	30	31	350	95.8
10	31	29	31	30	31	13	31	31	30	31	30	31	349	95.6
25	31	29	31	30	31	12	31	31	30	31	30	31	348	95.3
50	31	29	31	30	31	11	31	31	30	21	25	31	332	90.9
100	31	29	31	30	31	9	31	31	25	19	22	26	315	86.2
250	31	28	31	30	22	4	14	28	22	16	9	12	247	67.6
500	31	22	31	30	18	3	9	28	19	9	8	5	213	58.3

Table 32: Flow Exceedance, Total Number of Days, Chevelon Creek

Chevelon Creek near Winslow – 09397500 (DA = 271 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
0	31	29	31	30	31	9	8	31	30	31	30	31	322	88.2
1	31	29	31	30	31	7	4	31	27	31	30	31	313	85.7
2	31	29	31	30	30	5	4	31	25	31	30	31	308	84.3
5	31	29	31	30	29	3	4	31	20	21	30	31	290	79.4
10	31	29	31	30	29	2	4	28	18	18	26	31	277	75.8
25	31	29	31	30	26	0	3	23	8	15	20	31	247	67.6
50	31	29	31	30	9	0	1	16	7	4	17	31	206	56.4
100	16	20	31	30	5	0	0	7	6	3	14	9	141	38.6
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	0	0	0	0	0	0	0	0	23	0	0	0	23	6.3
0	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
1	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
2	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
5	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
10	31	29	31	30	31	16	17	24	13	21	30	31	304	83.2
25	31	29	31	30	21	2	7	18	9	17	30	31	256	70.1
50	31	23	31	30	16	2	4	9	7	14	16	31	214	58.6
100	15	21	31	30	14	1	1	8	5	14	8	18	166	45.4

Table 33: Flow Exceedance, Total Number of Days, Clear Creek

Clear Creek near Winslow – 09398500 (DA = 317 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	12	7	2	1	10	26	30	25	25	25	20	18	201	54.9
0	19	22	29	29	21	4	1	6	5	6	10	13	165	45.1
1	18	21	29	29	18	2	1	5	4	5	8	12	152	41.6
2	17	21	29	29	16	2	1	5	4	4	7	11	144	39.5
5	13	19	28	28	14	1	0	4	3	4	6	9	128	35.1
10	11	16	27	27	12	1	0	3	2	3	5	8	114	31.3
25	9	13	25	24	9	0	0	3	1	2	4	6	96	26.4
50	5	10	23	21	6	0	0	2	1	2	3	4	77	21.1
100	3	6	17	17	4	0	0	1	1	1	1	2	53	14.6
Clear Creek near Winslow – 09399000 (DA = 621 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
No Flow	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
0	31	29	31	30	31	30	31	31	30	31	30	31	238	65.0
1	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
2	31	29	31	30	31	30	31	31	30	31	30	31	366	100.2
5	31	29	31	30	31	30	31	31	30	26	30	31	361	98.8
10	31	29	31	30	31	9	5	25	27	20	30	31	299	81.9
25	31	29	31	30	31	5	3	25	12	14	30	31	272	74.5
50	31	28	31	30	31	4	2	25	6	13	15	29	245	67.1
100	18	21	31	30	28	2	1	11	5	11	15	20	193	52.8

Table 34: Flow Exceedance, Consecutive Number of Days, LCR

LCR at Holbrook – 09397000 (DA = 11,462 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
0	10	9	10	10	10	8	8	9	9	10	9	10	111	30.4
5	8	7	7	4	3	2	4	7	6	5	6	7	66	18.2
10	4	5	4	3	1	1	3	6	4	3	2	3	38	10.5
25	2	3	3	2	1	1	2	4	2	2	1	1	24	6.5
50	2	2	2	2	1	0	2	3	2	1	1	1	18	4.8
100	1	1	2	1	1	0	1	2	1	1	0	1	13	3.4
250	1	1	1	1	0	0	1	2	1	0	0	0	7	2.0
500	0	0	1	1	0	0	0	1	0	0	0	0	5	1.3
LCR near Winslow – 09400350 (DA = 16,192 sm)														
Q (cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Percent**
0	31	28	31	30	31	29	31	31	30	31	30	29	363	99.3
5	29	26	31	28	22	9	12	25	20	24	28	27	281	76.9
10	16	17	23	21	7	1	8	21	14	7	3	11	149	40.9
25	9	14	20	17	3	0	6	17	11	5	2	7	110	30.1
50	7	12	19	14	2	0	5	14	7	4	2	6	92	25.2
100	6	9	19	8	1	0	4	12	4	3	1	4	71	19.5
250	6	7	16	5	0	0	4	7	3	1	0	2	51	13.9
500	3	5	6	2	0	0	3	5	2	0	0	1	27	7.3
LCR at Grand Falls – 09401000 (DA = 21,068 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
0	11	12	15	15	7	1	5	12	10	8	9	10	115	31.5
5	9	10	14	14	6	1	4	11	8	6	7	7	97	26.4
10	7	9	14	13	6	1	4	10	7	5	5	5	87	23.7
25	5	7	13	12	4	1	4	9	6	4	3	3	71	19.3
50	4	6	13	11	4	0	3	7	5	2	2	2	60	16.4
100	3	5	10	10	3	0	2	6	4	2	2	1	48	13.1
250	1	3	8	8	1	0	1	4	2	1	1	1	32	8.7
500	1	2	6	6	1	0	1	3	1	1	0	0	21	5.7

Table 35: Flow Exceedance, Consecutive Number of Days, Chevelon Creek

Chevelon Creek near Winslow – 09397500 (DA = 271 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
0	8	10	15	16	8	1	0	2	3	2	3	7	76	20.8
1	7	10	15	15	6	0	0	2	2	1	3	6	68	18.6
2	7	10	15	14	5	0	0	2	2	1	2	5	64	17.5
5	6	9	15	13	3	0	0	2	2	1	2	4	57	15.6
10	6	9	14	11	2	0	0	1	1	1	2	4	51	13.9
25	4	7	13	9	2	0	0	1	1	0	1	2	40	10.9
50	3	4	11	7	1	0	0	1	0	0	1	2	30	8.2
100	2	2	7	5	0	0	0	0	0	0	0	1	17	4.7
Chevelon Creek near Winslow – 09398000 (DA = 785 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
0	14	13	14	14	14	14	14	15	14	15	15	15	172	47.1
1	14	13	14	14	14	13	14	15	14	15	14	15	169	46.4
2	14	13	14	14	13	12	13	13	13	14	13	14	162	44.2
5	6	8	12	11	6	3	3	5	3	3	3	5	66	18.1
10	4	6	11	10	3	0	1	2	1	1	1	3	44	12.2
25	3	5	10	8	2	0	1	1	1	1	1	2	34	9.4
50	2	3	9	7	1	0	0	1	0	0	1	2	26	7.1
100	1	2	6	5	1	0	0	0	0	0	0	1	16	4.5

Table 36: Flow Exceedance, Consecutive Number of Days, Clear Creek

Clear Creek near Winslow – 09398500 (DA= 317 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
0	18	21	28	28	20	4	1	5	4	5	9	12	157	42.9
1	17	20	28	28	17	2	1	5	3	4	8	12	144	39.5
2	16	20	27	28	16	1	0	4	3	4	7	10	136	37.3
5	12	17	26	26	13	1	0	3	2	3	6	9	120	32.8
10	10	15	25	25	11	0	0	3	2	2	5	7	106	29.1
25	7	12	24	23	8	0	0	2	1	2	4	5	88	24.2
50	5	8	21	20	6	0	0	2	1	1	2	3	68	18.6
100	2	5	14	16	4	0	0	1	0	1	1	2	46	12.6
Clear Creek near Winslow – 09399000 (DA= 621 sm)														
Q (cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Percent
0	12	12	15	15	12	7	6	7	7	9	11	13	238	65.0
1	9	10	14	15	10	3	3	5	4	5	8	9	93	25.4
2	6	8	13	15	9	2	2	3	3	3	5	6	75	20.7
5	4	7	12	14	8	1	1	2	2	1	3	4	60	16.4
10	4	6	12	14	7	0	0	1	1	1	2	3	51	14.1
25	3	5	11	13	5	0	0	1	1	1	2	2	43	11.7
50	2	3	10	11	4	0	0	1	0	0	1	2	34	9.4
100	1	2	8	9	3	0	0	0	0	0	1	1	25	6.9

Figures

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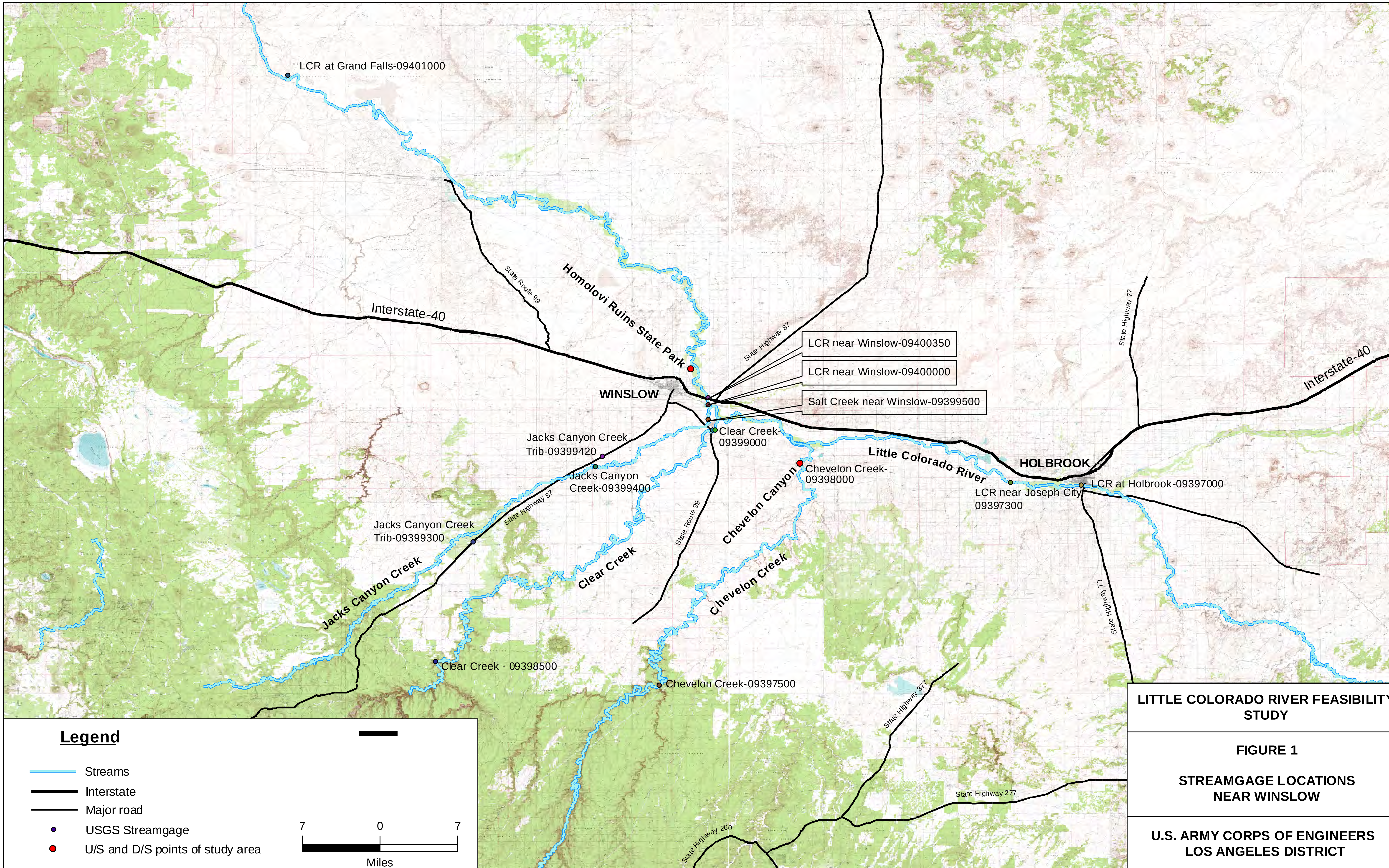
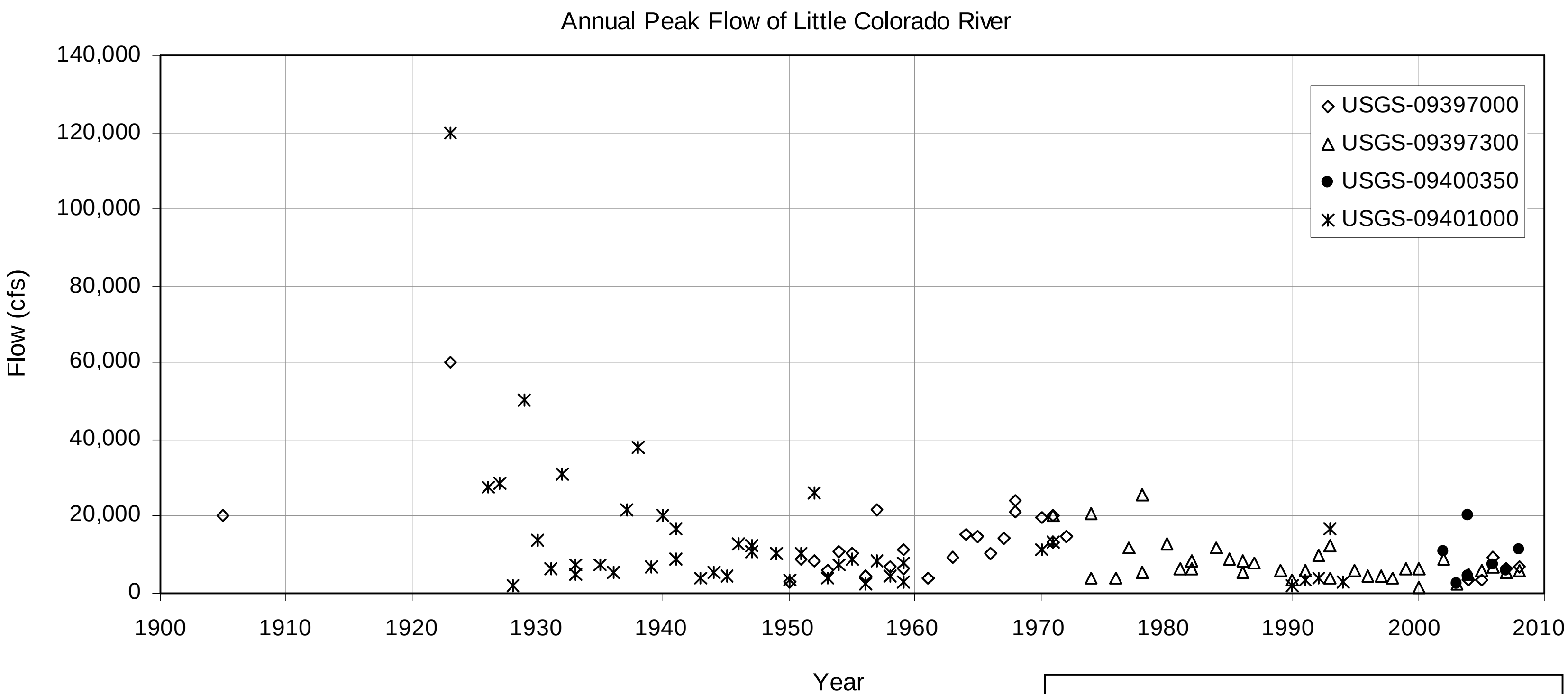


LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 1

STREAMGAGE LOCATIONS NEAR WINSLOW

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



Number of record year
USGS-09397000 => 31
USGS-09397300 => 36
USGS-09400350 => 7
USGS-09401000 => 43

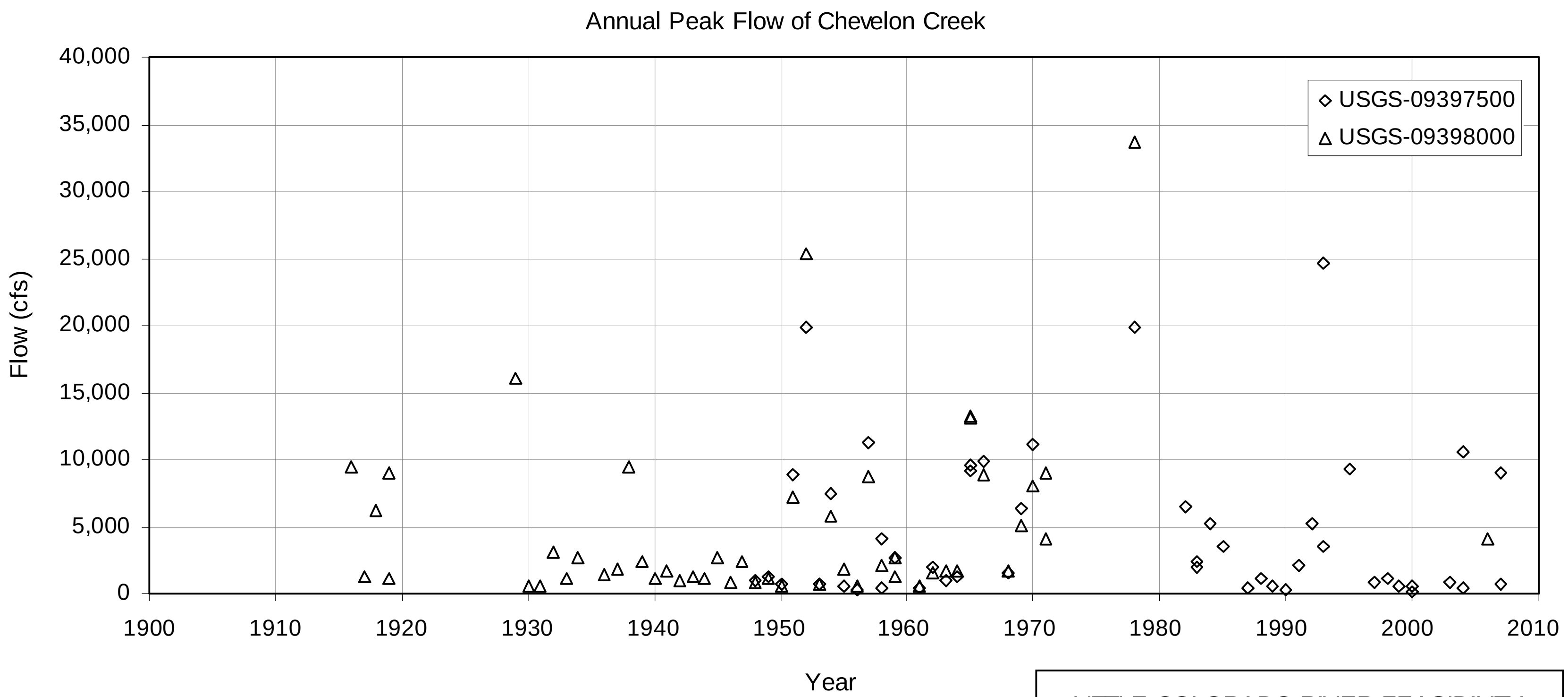
Drainage area (sq. miles)
USGS-09397000 => 11,462
USGS-09397300 => 12,384
USGS-09400350 => 16,192
USGS-09401000 => 21,068

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 2a

ANNUAL PEAK FLOW OF LITTLE COLORADO RIVER

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



Number of record year
USGS-09397500 => 48
USGS-09398000 => 50

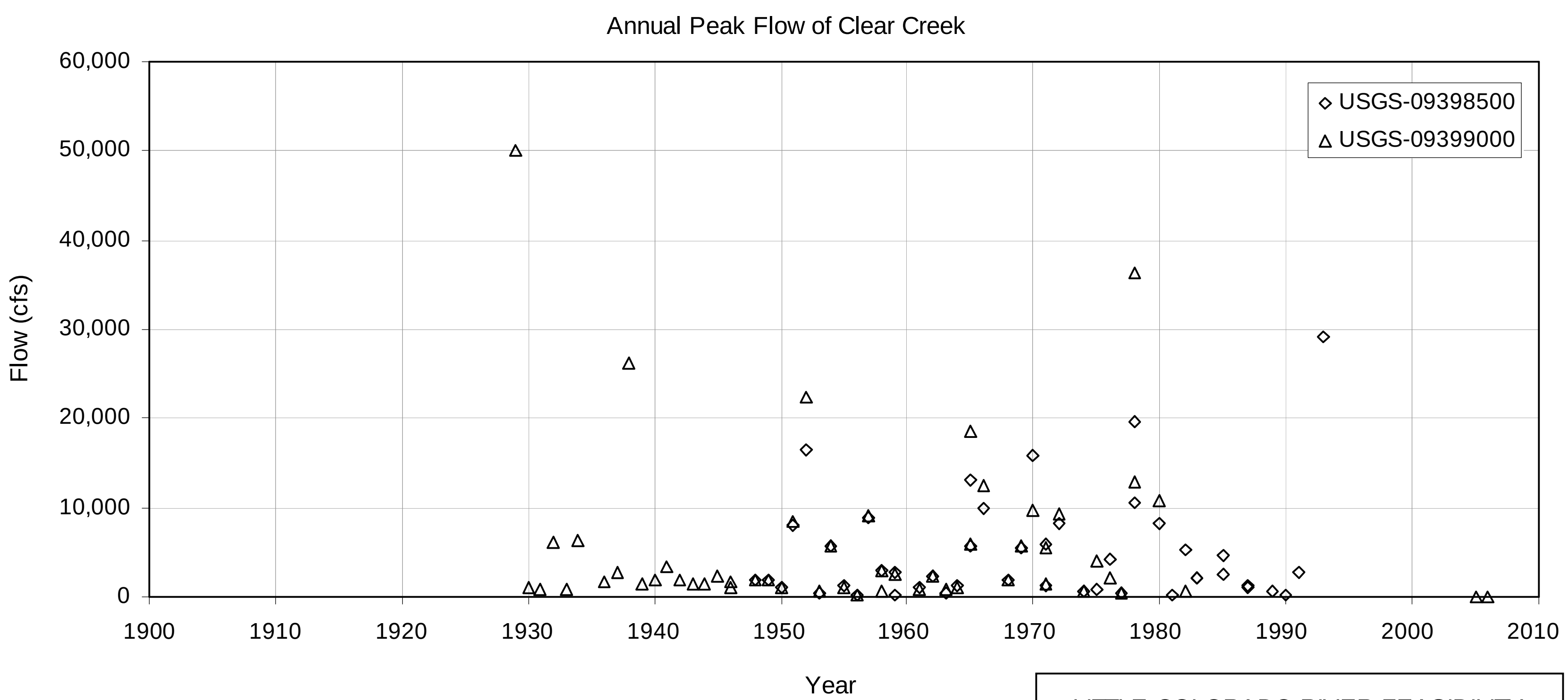
Drainage area (sq. miles)
USGS-09397500 => 271
USGS-09398000 => 785

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 2b

ANNUAL PEAK FLOW OF CHEVELON CREEK

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 2c

ANNUAL PEAK FLOW OF CLEAR CREEK

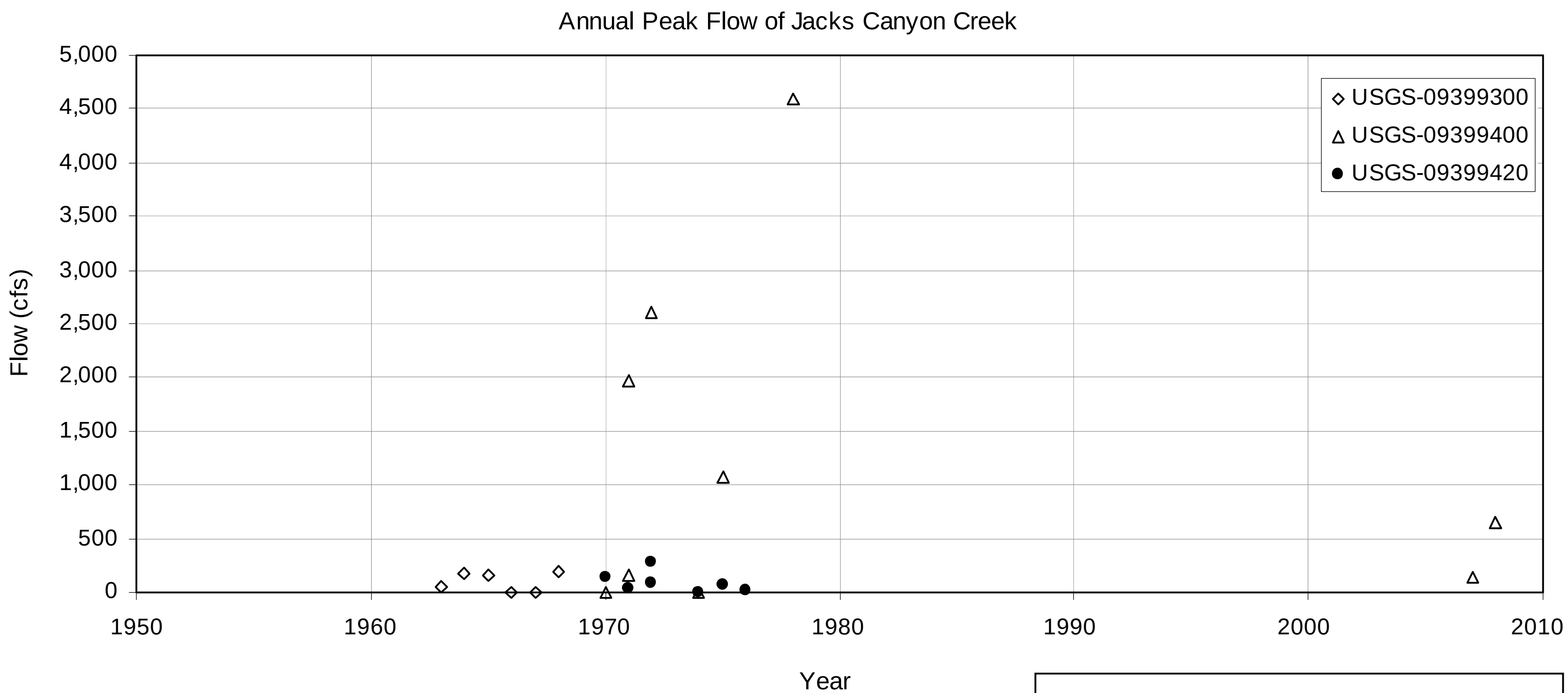
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

Number of record year

USGS-09398500 => 45
USGS-09399000 => 54

Drainage area (sq. miles)

USGS-09398500 => 317
USGS-09399000 => 621



LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 2d

ANNUAL PEAK FLOW OF JACKS CANYON CREEK

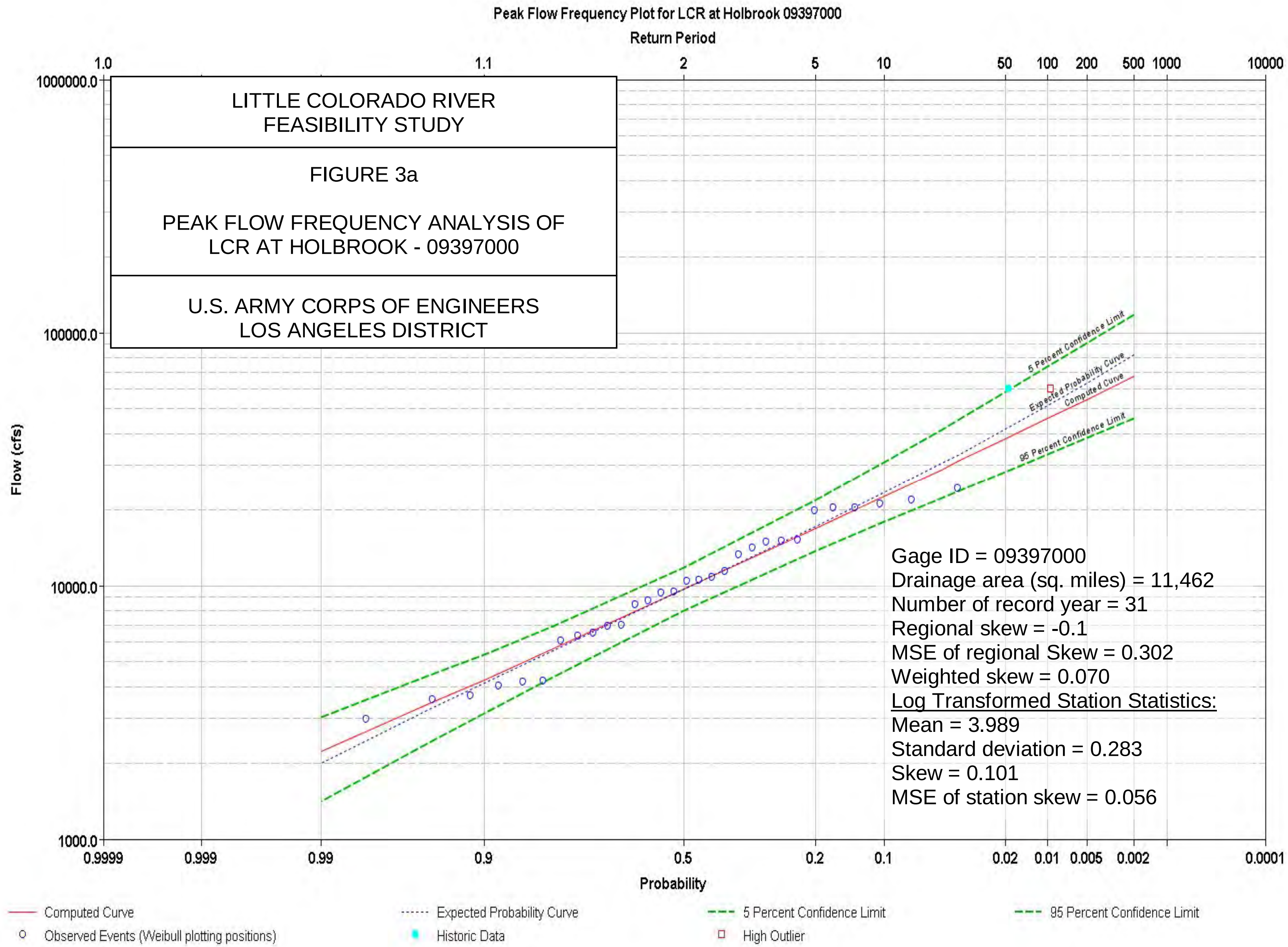
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

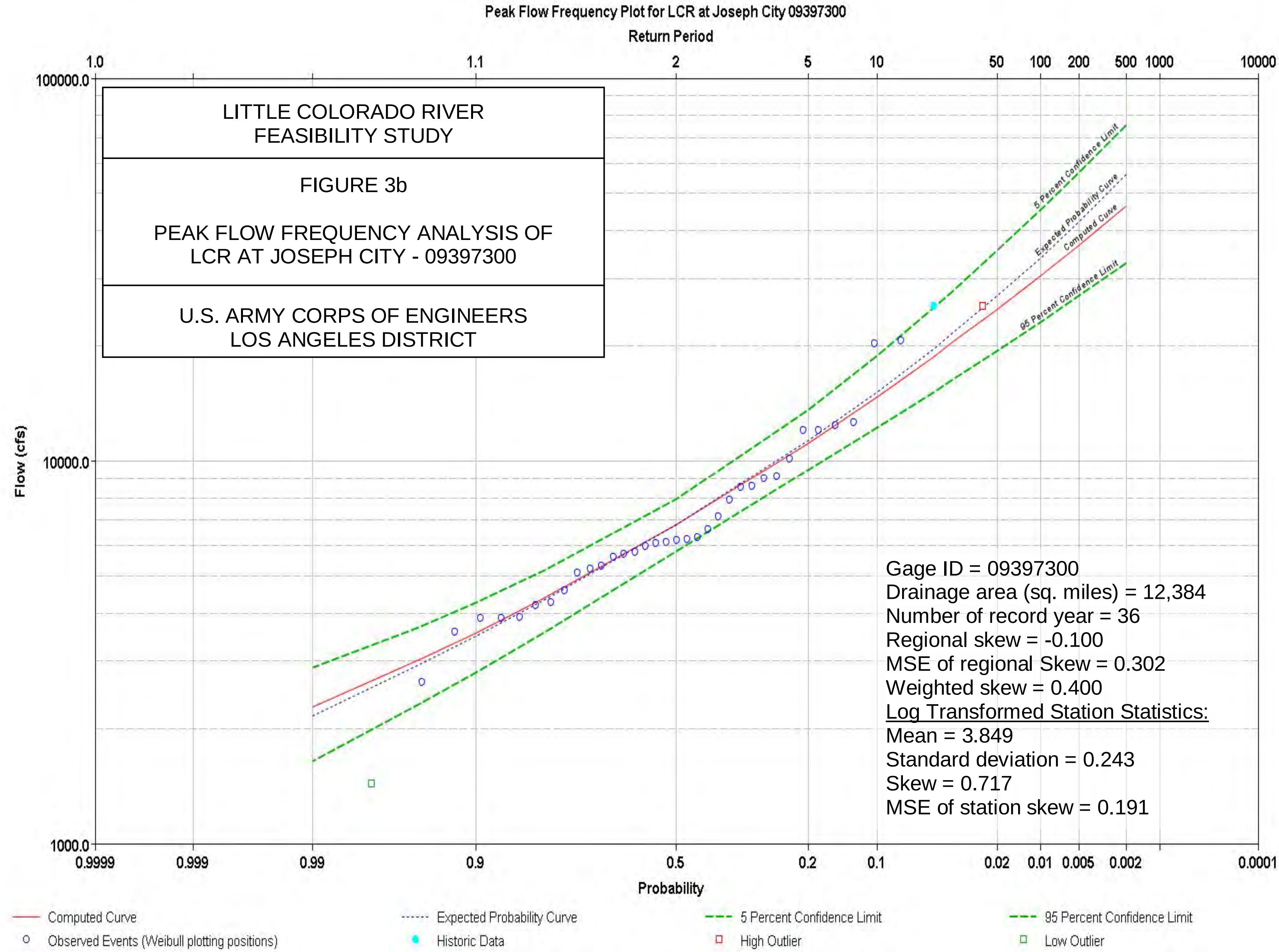
<u>Number of record year</u>

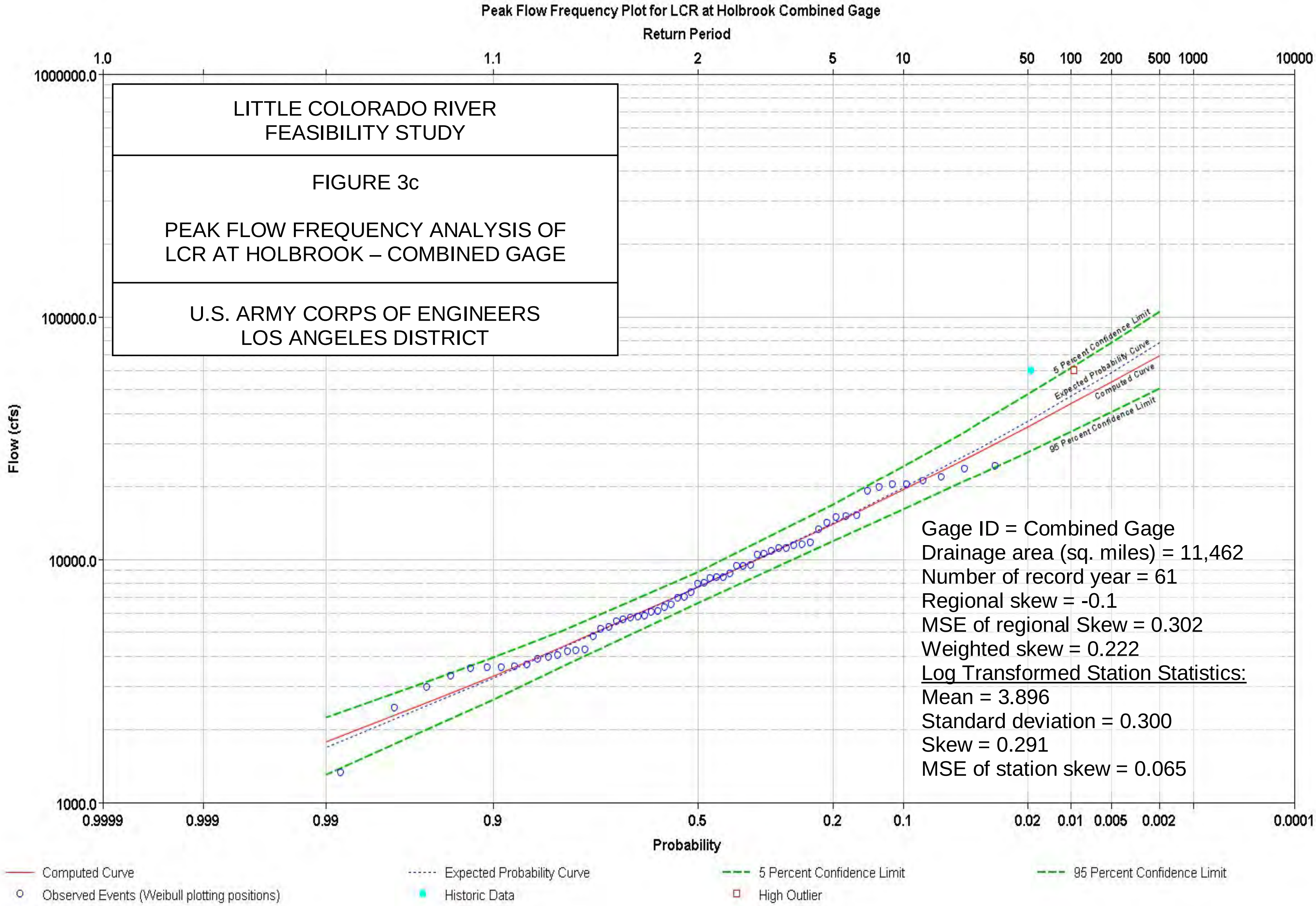
USGS-09399300 => 6
USGS-09399400 => 9
USGS-09399420 => 7

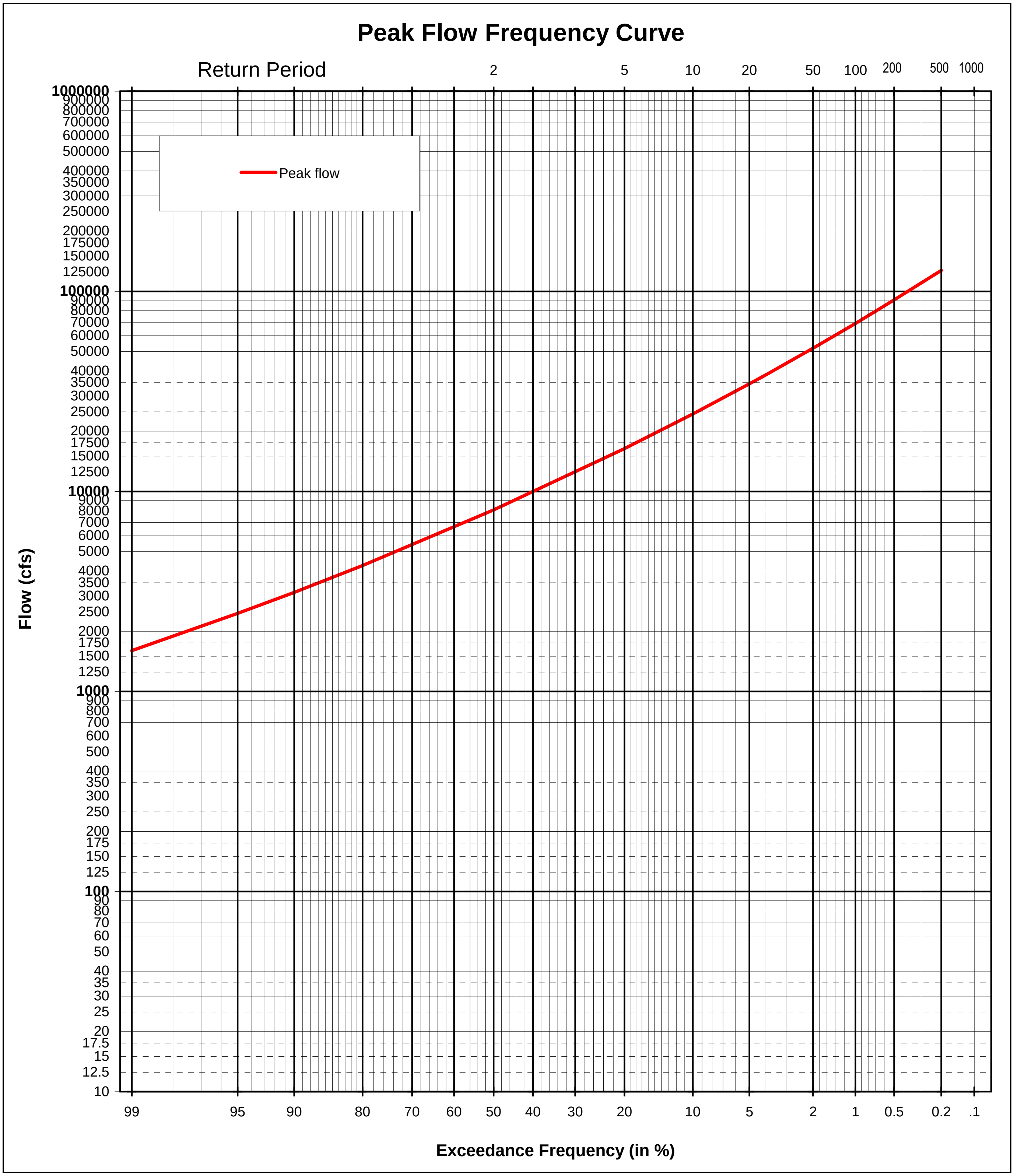
<u>Drainage area (sq. miles)</u>

USGS-09399300 => 0.29
USGS-09399400 => 295
USGS-09399420 => 0.25

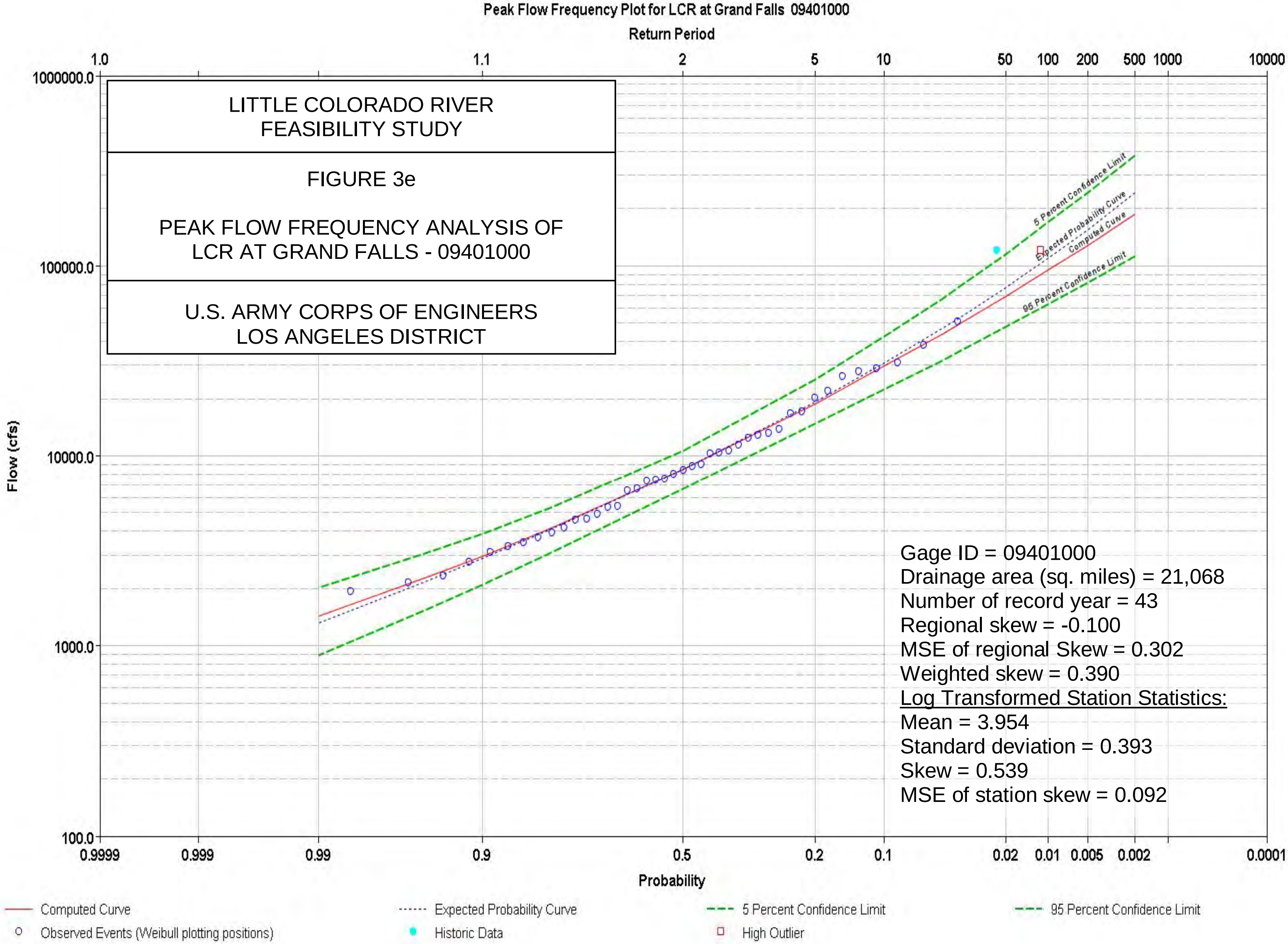

Peak Flow Frequency Plot for LCR at Holbrook 09397000
Return Period
1.0
1.1
2
5
10
50
100
200
500
1000
10000
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3a
PEAK FLOW FREQUENCY ANALYSIS OF
LCR AT HOLBROOK - 09397000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
1000000.0
100000.0
10000.0
1000.0
Flow (cfs)
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = 09397000
Drainage area (sq. miles) = 11,462
Number of record year = 31
Regional skew = -0.1
MSE of regional Skew = 0.302
Weighted skew = 0.070
Log Transformed Station Statistics:
Mean = 3.989
Standard deviation = 0.283
Skew = 0.101
MSE of station skew = 0.056
0.9999
0.999
0.99
0.9
0.5
0.2
0.1
0.02
0.01
0.005
0.002
0.0001
Probability
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier

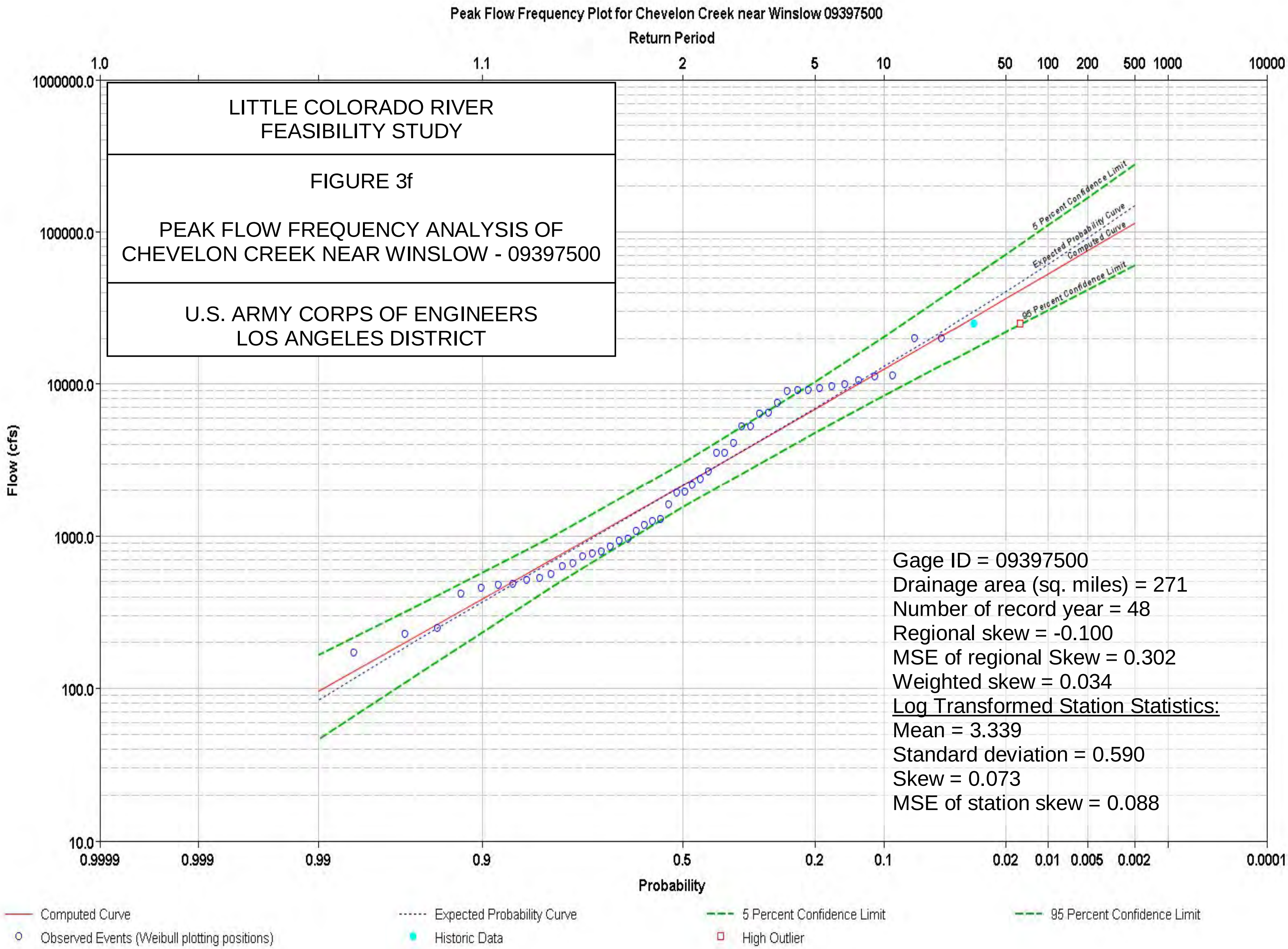

Peak Flow Frequency Plot for LCR at Joseph City 09397300
Return Period
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3b
PEAK FLOW FREQUENCY ANALYSIS OF
LCR AT JOSEPH CITY - 09397300
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
Probability
Gage ID = 09397300
Drainage area (sq. miles) = 12,384
Number of record year = 36
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = 0.400
Log Transformed Station Statistics:
Mean = 3.849
Standard deviation = 0.243
Skew = 0.717
MSE of station skew = 0.191
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier
Low Outlier

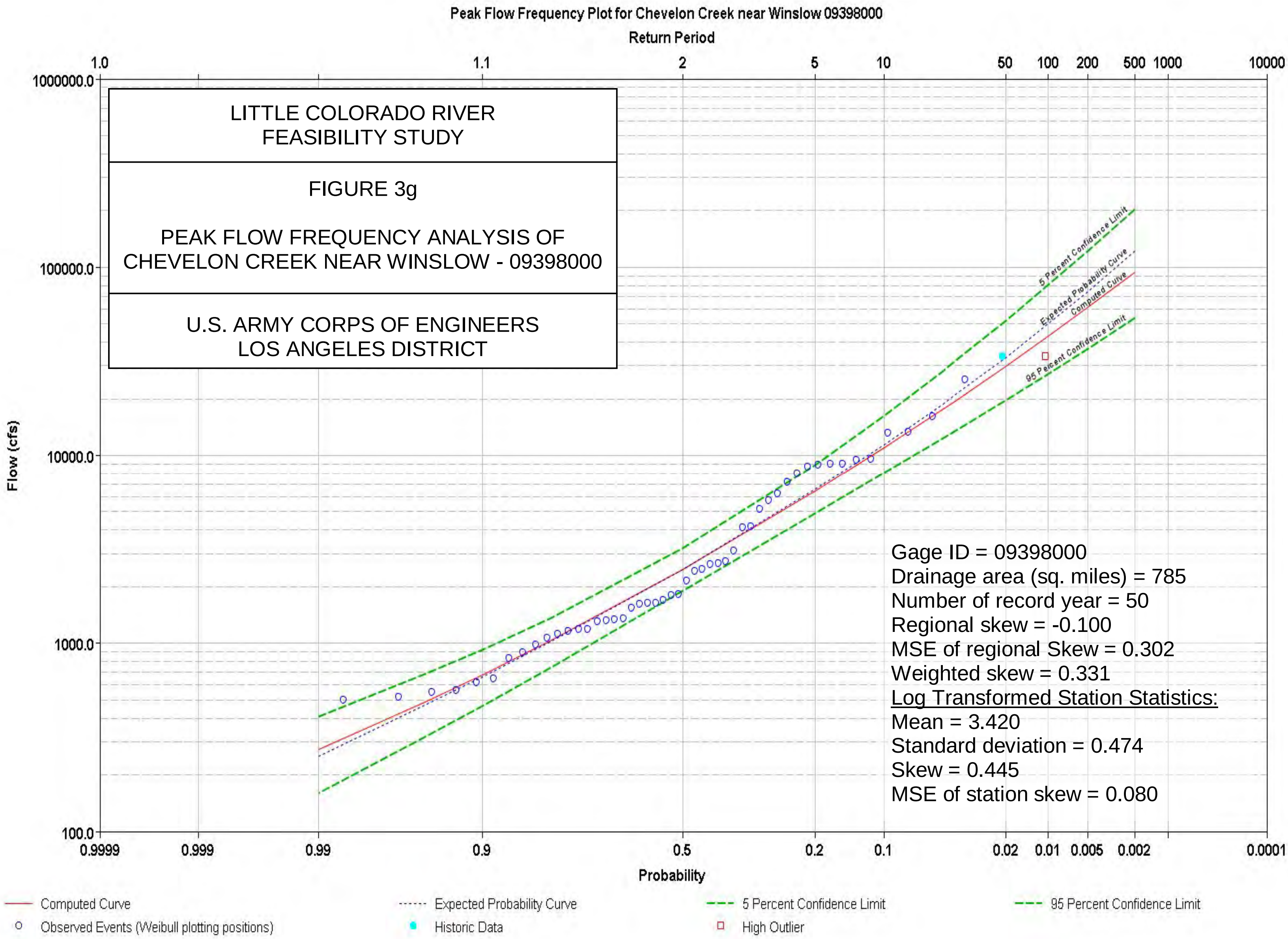

Peak Flow Frequency Plot for LCR at Holbrook Combined Gage
Return Period
1.0
1.1
2
5
10
50
100
200
500
1000
10000
1000000.0
100000.0
10000.0
1000.0
Flow (cfs)
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3c
PEAK FLOW FREQUENCY ANALYSIS OF
LCR AT HOLBROOK – COMBINED GAGE
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = Combined Gage
Drainage area (sq. miles) = 11,462
Number of record year = 61
Regional skew = -0.1
MSE of regional Skew = 0.302
Weighted skew = 0.222
Log Transformed Station Statistics:
Mean = 3.896
Standard deviation = 0.300
Skew = 0.291
MSE of station skew = 0.065
0.9999
0.999
0.99
0.9
0.5
0.2
0.1
0.02
0.01
0.005
0.002
0.0001
Probability
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier

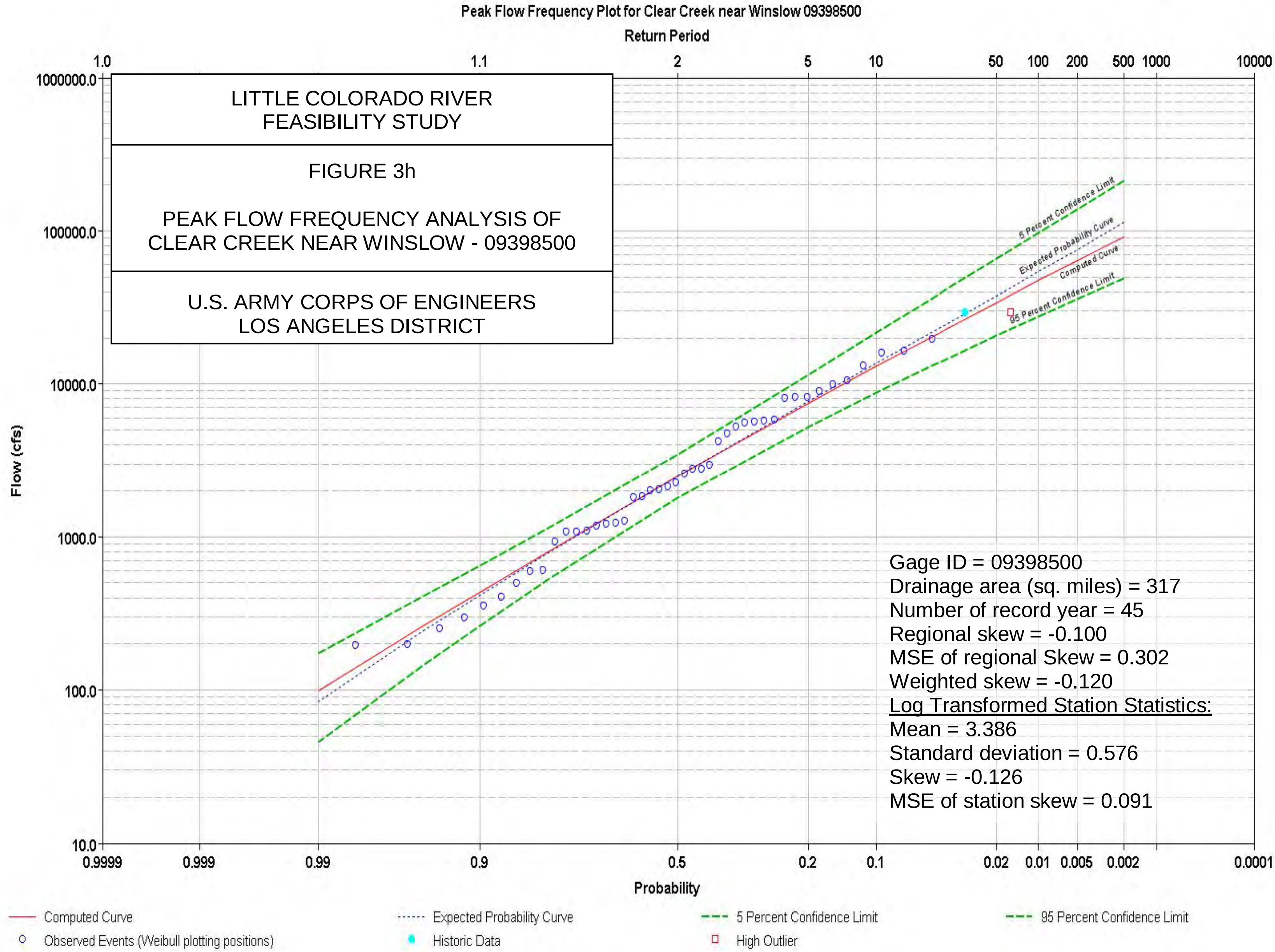


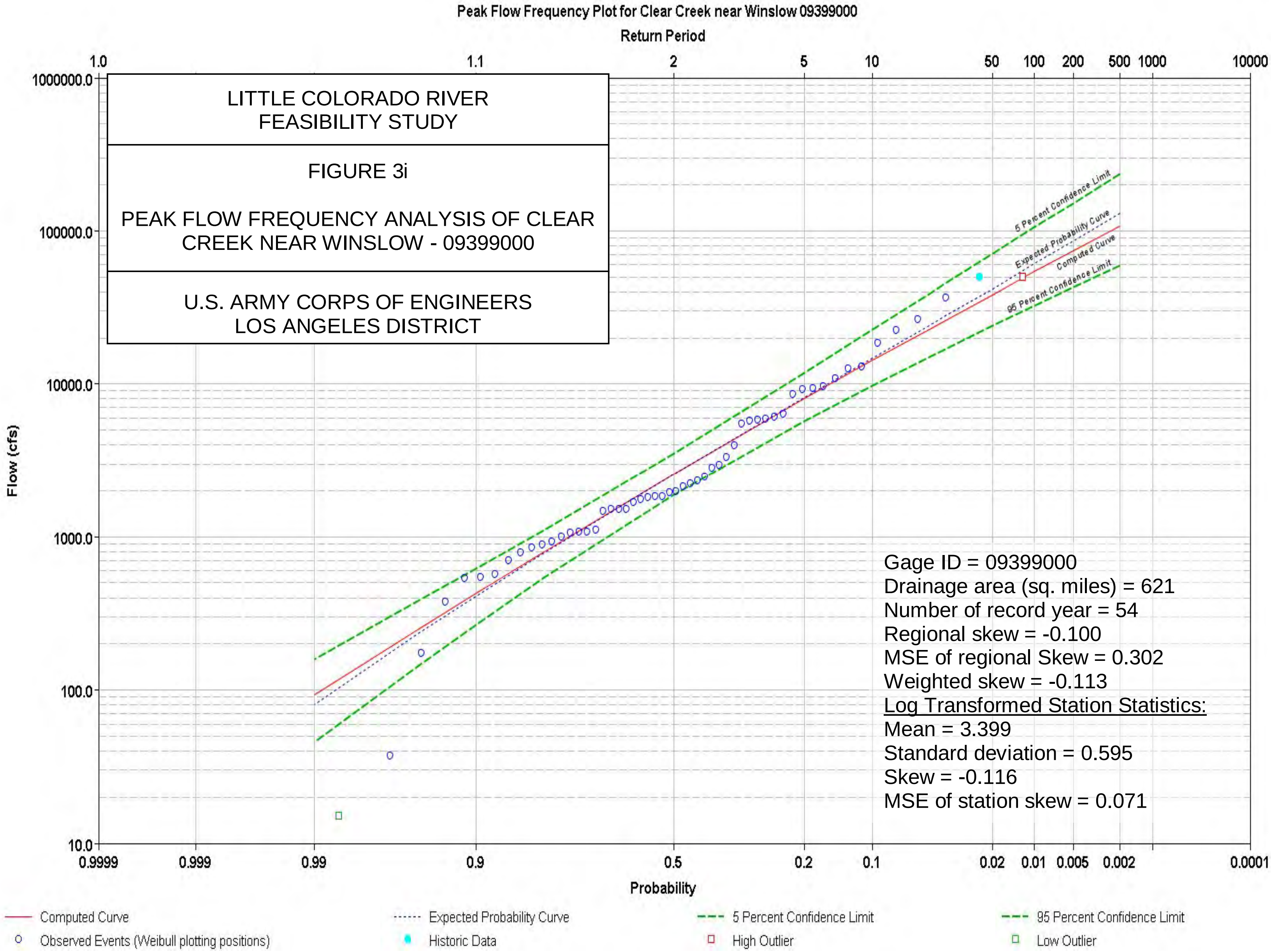
Drainage area (sq. miles) = 16,192 Streamgage number = USGS-09400350 *Number of record year for peak flow = 7 *Due to short record of period results are interpolated from frequency results at Grand Falls and Holbrook (combined gage) based on drainage area	LITTLE COLORADO RIVER FEASIBILITY STUDY FIGURE 3d LCR NEAR WINSLOW - 09400350 INTERPOLATED PEAK FLOW FREQUENCY CURVES US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

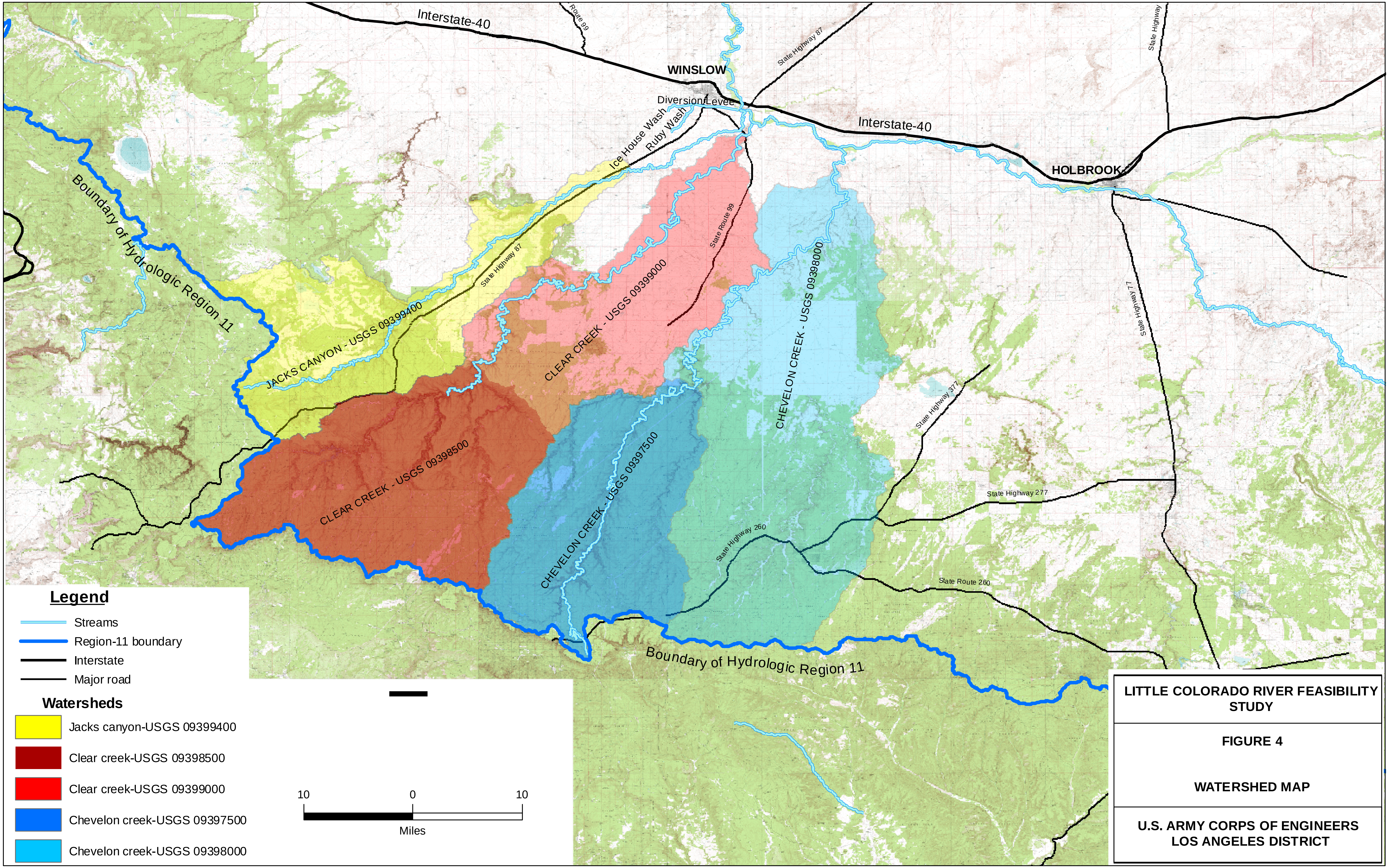

Peak Flow Frequency Plot for LCR at Grand Falls 09401000
Return Period
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3e
PEAK FLOW FREQUENCY ANALYSIS OF
LCR AT GRAND FALLS - 09401000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Gage ID = 09401000
Drainage area (sq. miles) = 21,068
Number of record year = 43
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = 0.390
Log Transformed Station Statistics:
Mean = 3.954
Standard deviation = 0.393
Skew = 0.539
MSE of station skew = 0.092
Flow (cfs)
Probability
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier

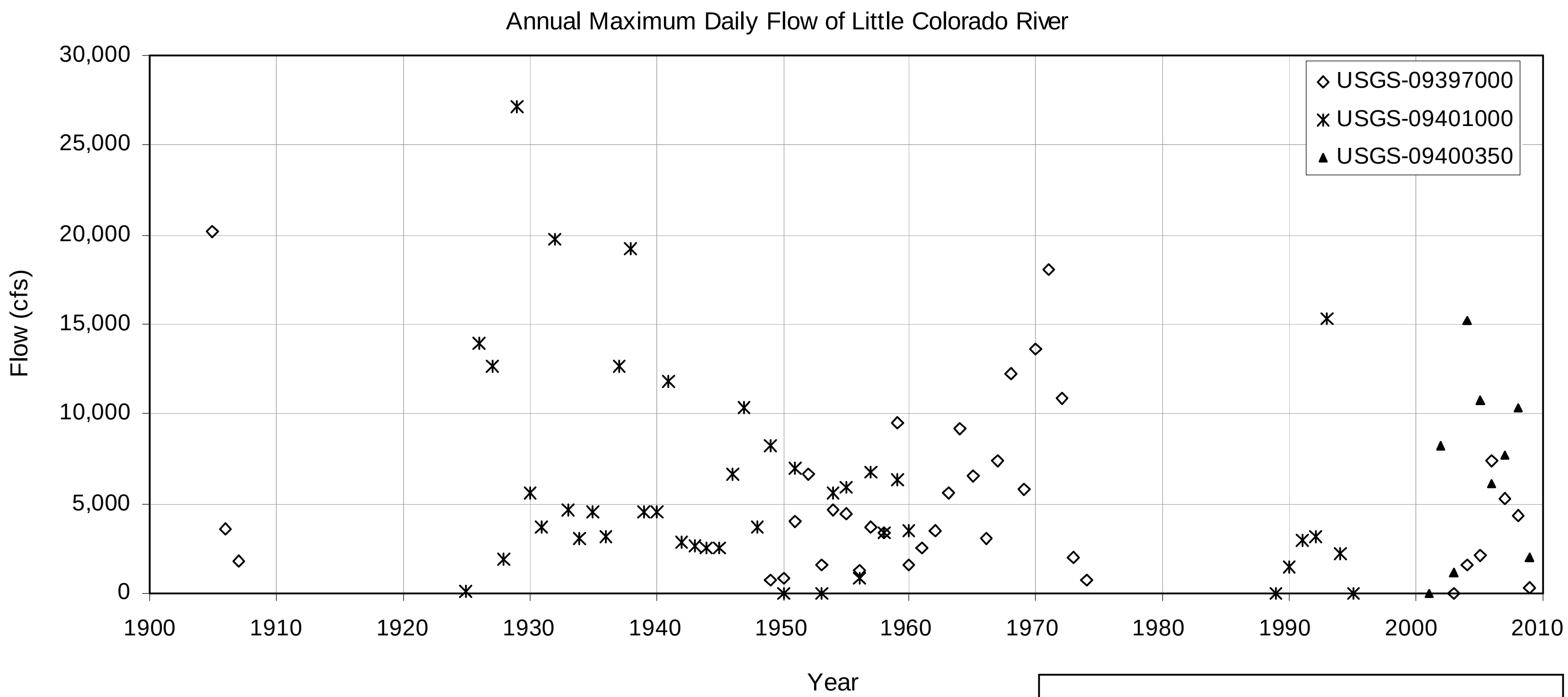

Peak Flow Frequency Plot for Chevelon Creek near Winslow 09397500
Return Period
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3f
PEAK FLOW FREQUENCY ANALYSIS OF
CHEVELON CREEK NEAR WINSLOW - 09397500
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
Probability
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = 09397500
Drainage area (sq. miles) = 271
Number of record year = 48
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = 0.034
Log Transformed Station Statistics:
Mean = 3.339
Standard deviation = 0.590
Skew = 0.073
MSE of station skew = 0.088
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier


Peak Flow Frequency Plot for Chevelon Creek near Winslow 09398000
Return Period
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3g
PEAK FLOW FREQUENCY ANALYSIS OF
CHEVELON CREEK NEAR WINSLOW - 09398000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
Probability
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = 09398000
Drainage area (sq. miles) = 785
Number of record year = 50
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = 0.331
Log Transformed Station Statistics:
Mean = 3.420
Standard deviation = 0.474
Skew = 0.445
MSE of station skew = 0.080
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier


Peak Flow Frequency Plot for Clear Creek near Winslow 09398500
Return Period
1.0
1.1
2
5
10
50
100
200
500
1000
10000
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3h
PEAK FLOW FREQUENCY ANALYSIS OF
CLEAR CREEK NEAR WINSLOW - 09398500
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
1000000.0
100000.0
10000.0
1000.0
100.0
10.0
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = 09398500
Drainage area (sq. miles) = 317
Number of record year = 45
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = -0.120
Log Transformed Station Statistics:
Mean = 3.386
Standard deviation = 0.576
Skew = -0.126
MSE of station skew = 0.091
0.9999
0.999
0.99
0.9
0.5
0.2
0.1
0.02
0.01
0.005
0.002
0.0001
Probability
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier


Peak Flow Frequency Plot for Clear Creek near Winslow 09399000
Return Period
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 3i
PEAK FLOW FREQUENCY ANALYSIS OF CLEAR CREEK NEAR WINSLOW - 09399000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
Probability
5 Percent Confidence Limit
Expected Probability Curve
Computed Curve
95 Percent Confidence Limit
Gage ID = 09399000
Drainage area (sq. miles) = 621
Number of record year = 54
Regional skew = -0.100
MSE of regional Skew = 0.302
Weighted skew = -0.113
Log Transformed Station Statistics:
Mean = 3.399
Standard deviation = 0.595
Skew = -0.116
MSE of station skew = 0.071
Computed Curve
Expected Probability Curve
5 Percent Confidence Limit
95 Percent Confidence Limit
Observed Events (Weibull plotting positions)
Historic Data
High Outlier
Low Outlier


Interstate-40
WINSLOW
Diversion Levee
Ice House Wash
Ruby Wash
Interstate-40
HOLBROOK
Route 99
State Highway 87
State Highway
State Highway 87
State Route 99
State Highway 77
State Highway 377
State Highway 277
State Highway 260
State Route 260
Boundary of Hydrologic Region 11
JACKS CANYON - USGS 09399400
CLEAR CREEK - USGS 09399000
CHEVELON CREEK - USGS 09398000
CLEAR CREEK - USGS 09398500
CHEVELON CREEK - USGS 09397500
Boundary of Hydrologic Region 11
Legend
Streams
Region-11 boundary
Interstate
Major road
Watersheds
Jacks canyon-USGS 09399400
Clear creek-USGS 09398500
Clear creek-USGS 09399000
Chevelon creek-USGS 09397500
Chevelon creek-USGS 09398000
10
0
10
Miles
LITTLE COLORADO RIVER FEASIBILITY STUDY
FIGURE 4
WATERSHED MAP
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



<u>Number of record year</u>

USGS-09397000 => 35
USGS-09400350 => 8
USGS-09401000 => 41

<u>Drainage area (sq. miles)</u>

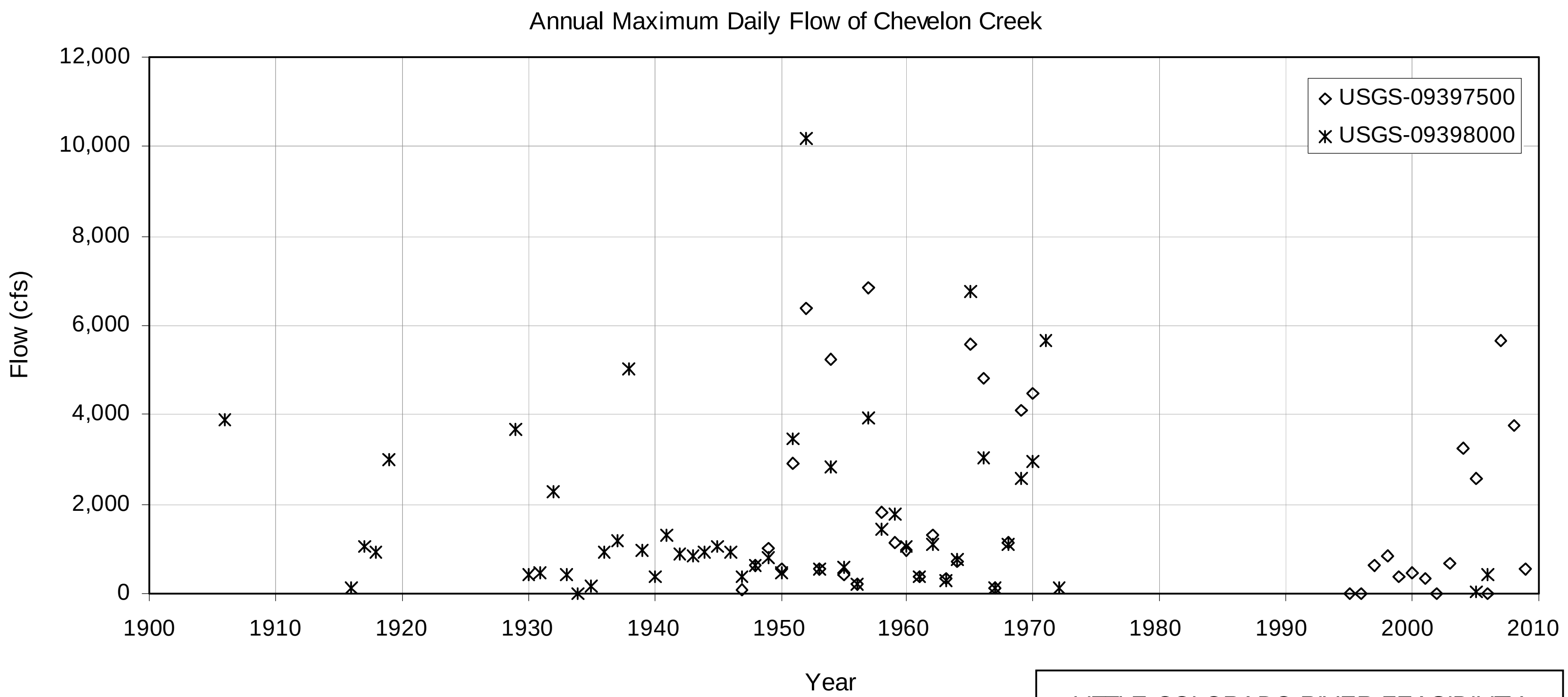
USGS-09397000 => 11,462
USGS-09400350 => 16,192
USGS-09401000 => 21,068

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 5a

ANNUAL MAXIMUM DAILY FLOW OF LITTLE COLORADO RIVER

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



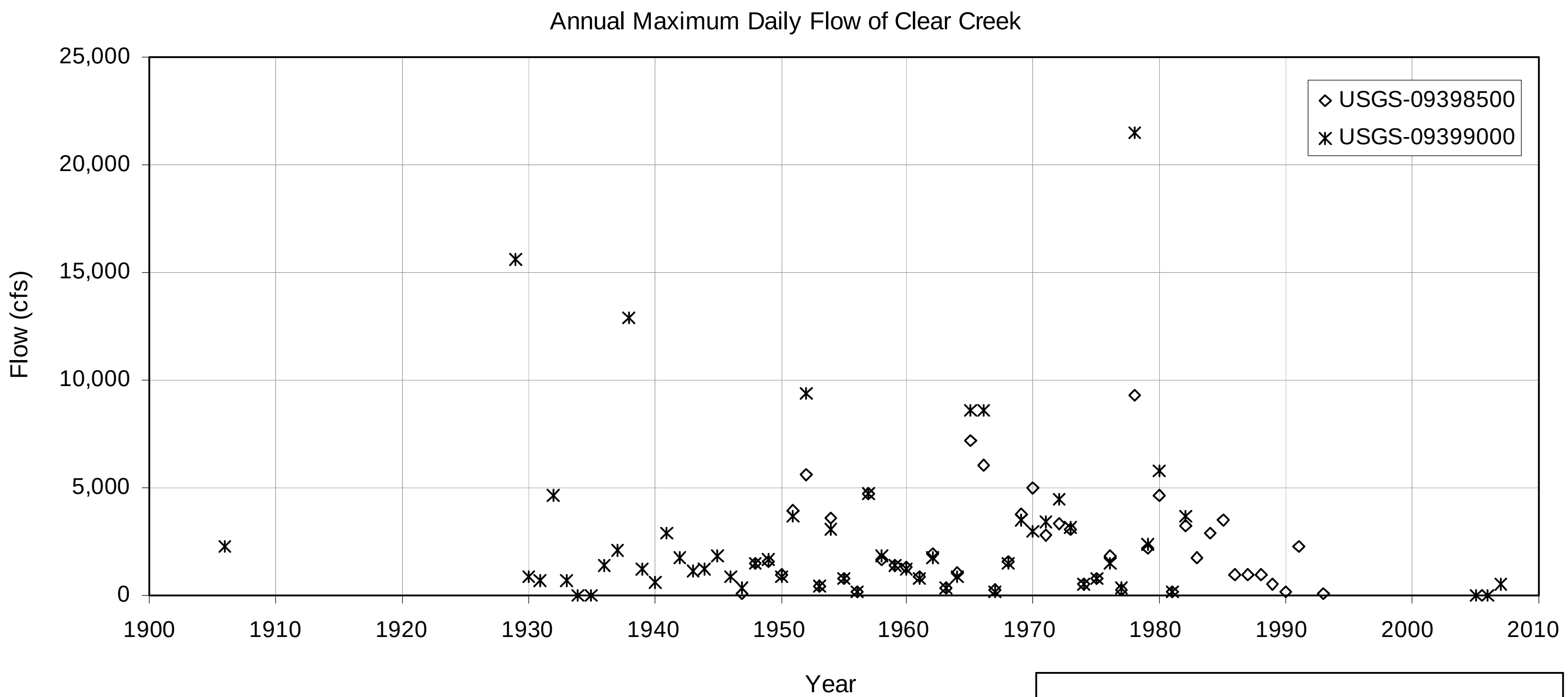
Number of record year	Drainage area (sq. miles)
USGS-09397500 => 39	USGS-09397500 => 271
USGS-09398000 => 51	USGS-09398000 => 785

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 5b

ANNUAL MAXIMUM DAILY FLOW OF CHEVELON CREEK

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



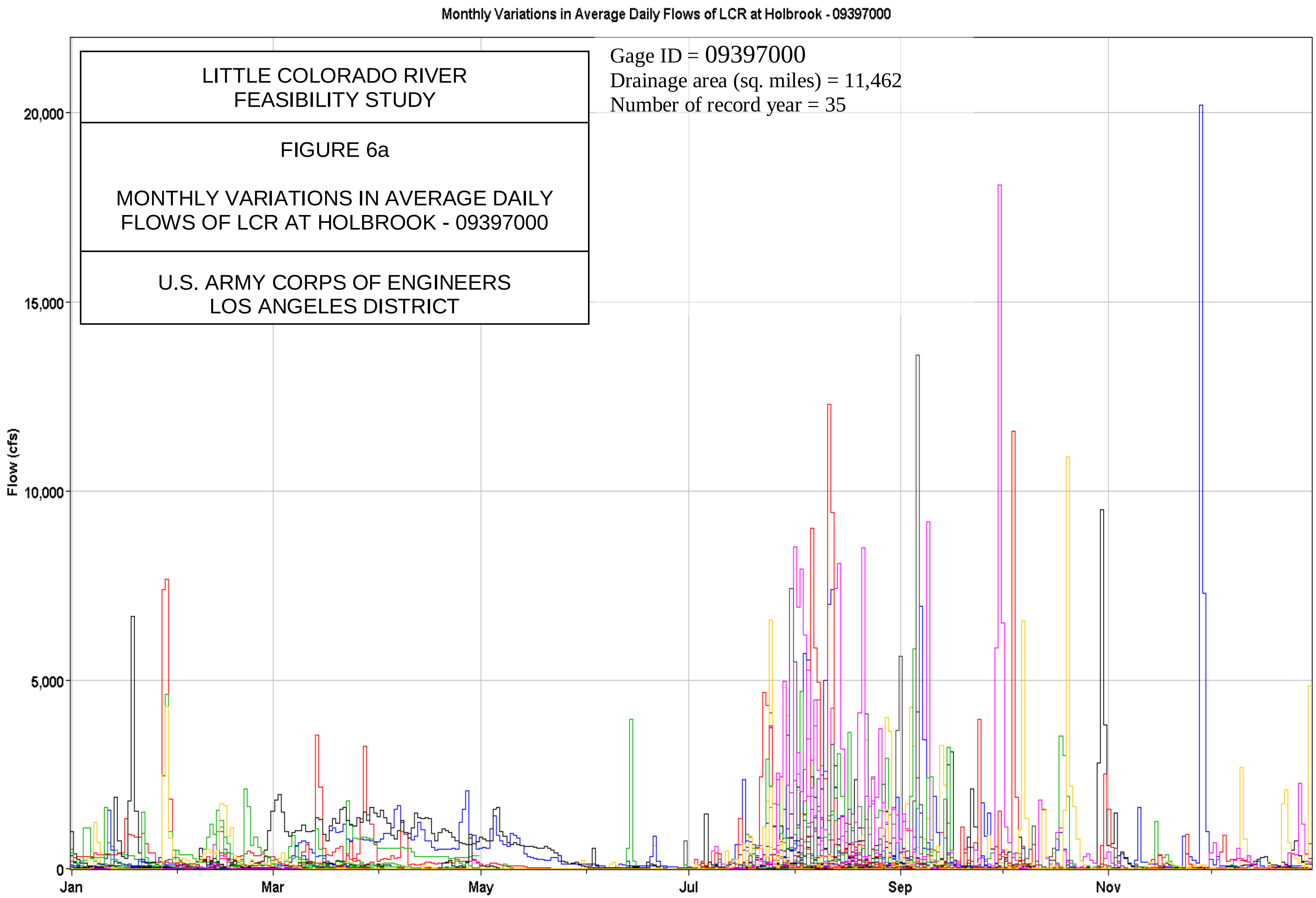
Number of record year	Drainage area (sq. miles)
USGS-09398500 => 46 USGS-09399000 => 57	USGS-09398500 => 317 USGS-09399000 => 621

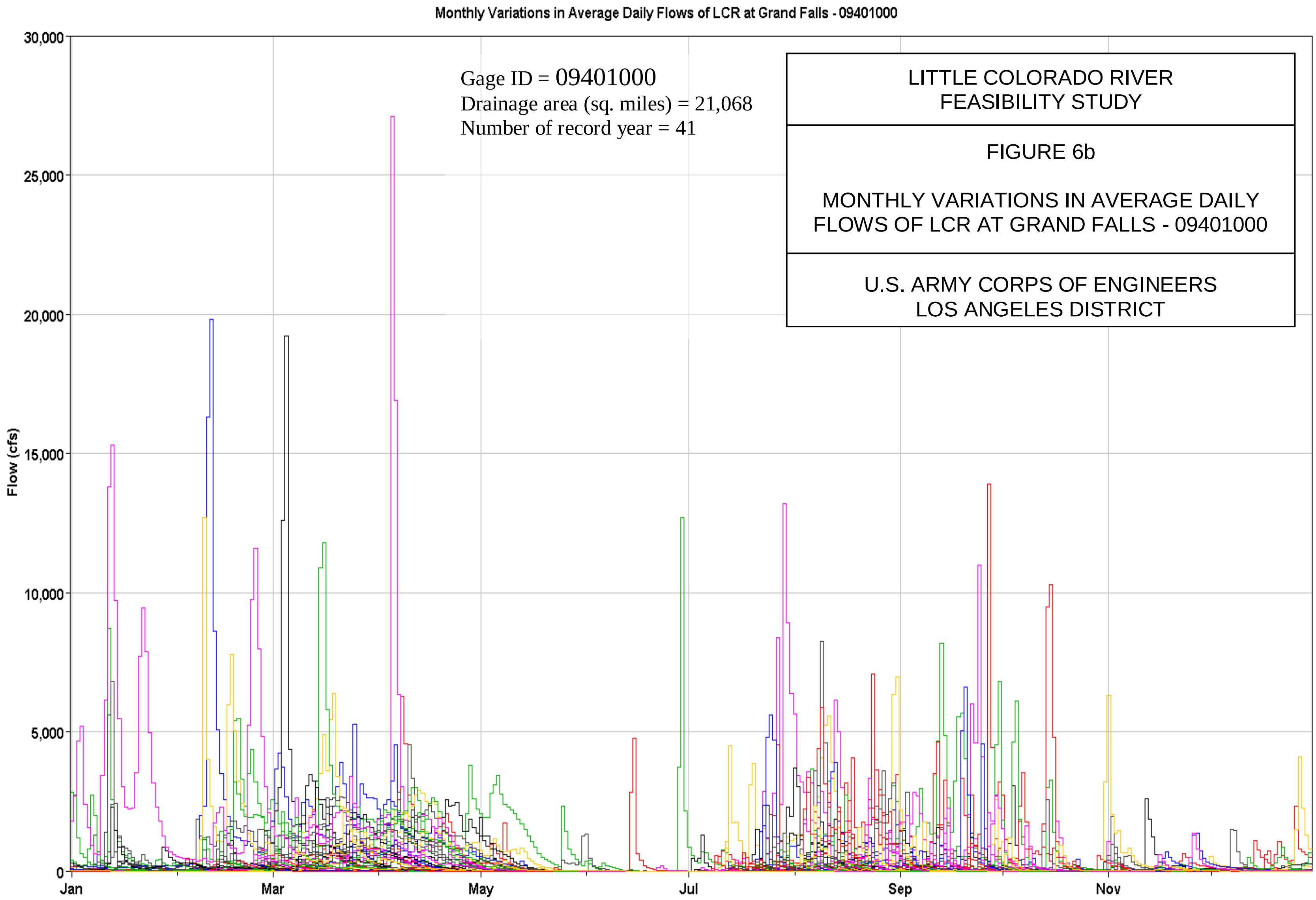
LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 5c

ANNUAL MAXIMUM DAILY FLOW OF CLEAR CREEK

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT


Monthly Variations in Average Daily Flows of LCR at Holbrook - 09397000
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 6a
MONTHLY VARIATIONS IN AVERAGE DAILY
FLOWS OF LCR AT HOLBROOK - 09397000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Gage ID = 09397000
Drainage area (sq. miles) = 11,462
Number of record year = 35
Flow (cfs)
20,000
15,000
10,000
5,000
0
Jan
Mar
May
Jul
Sep
Nov

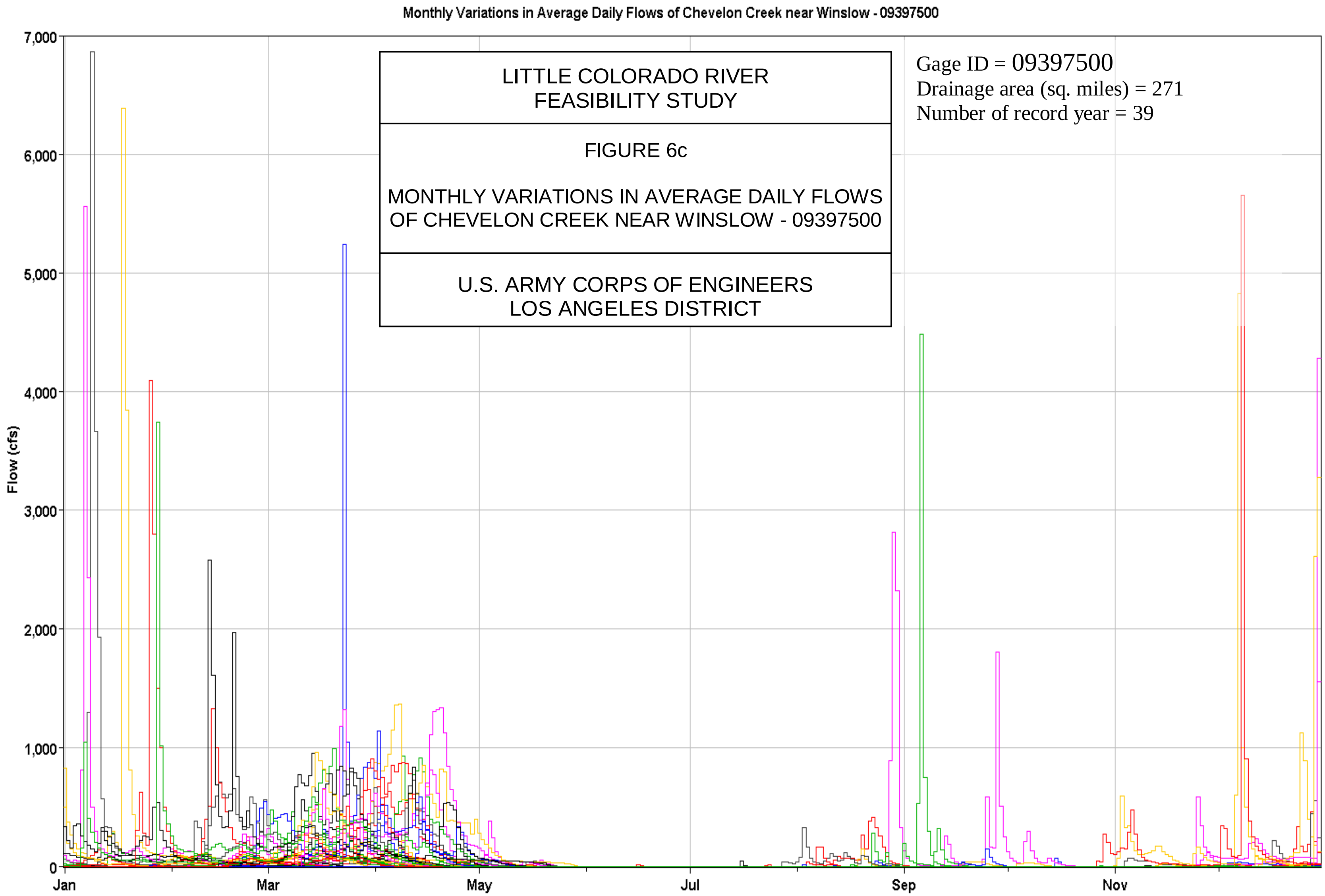


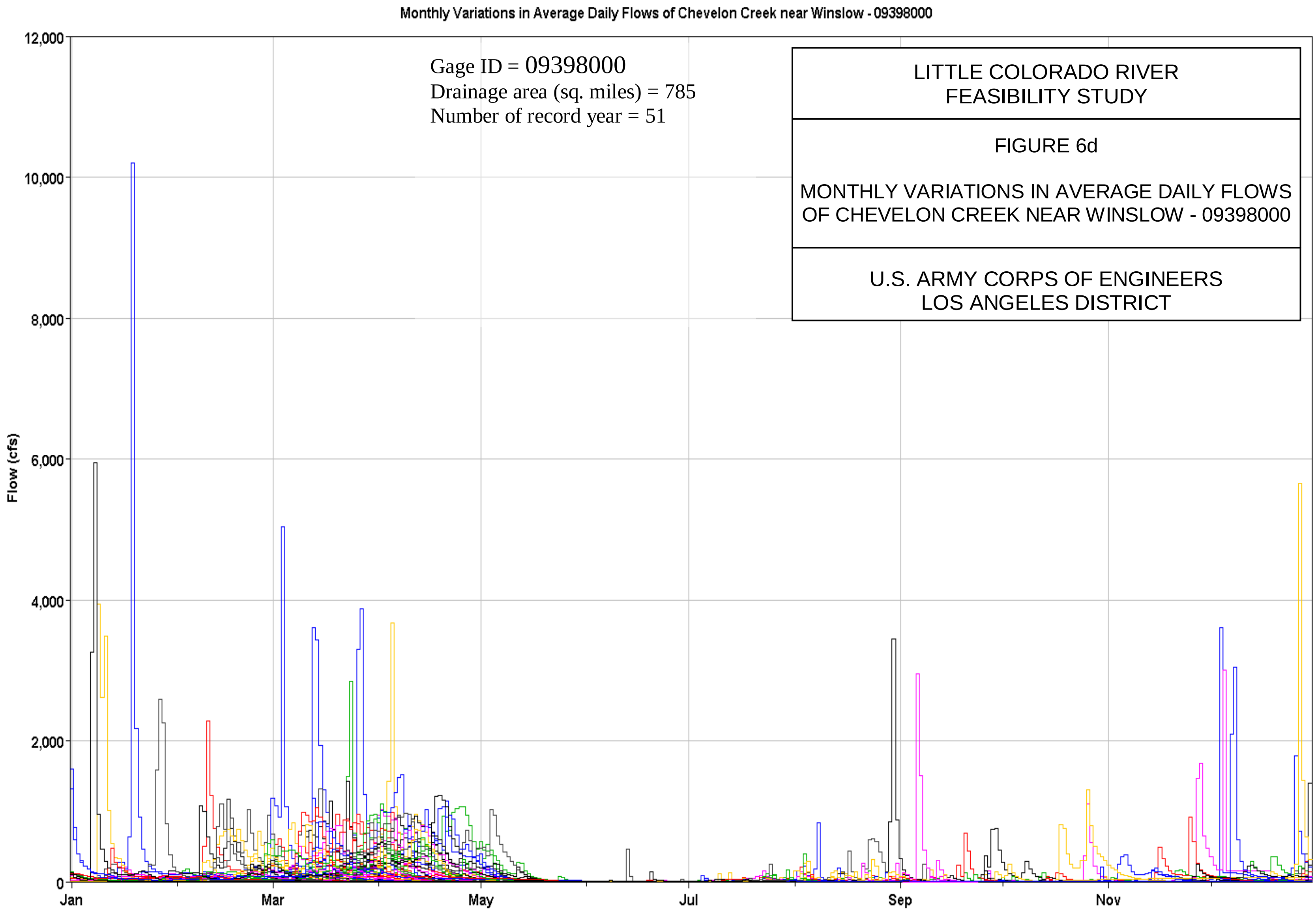
LITTLE COLORADO RIVER
FEASIBILITY STUDY

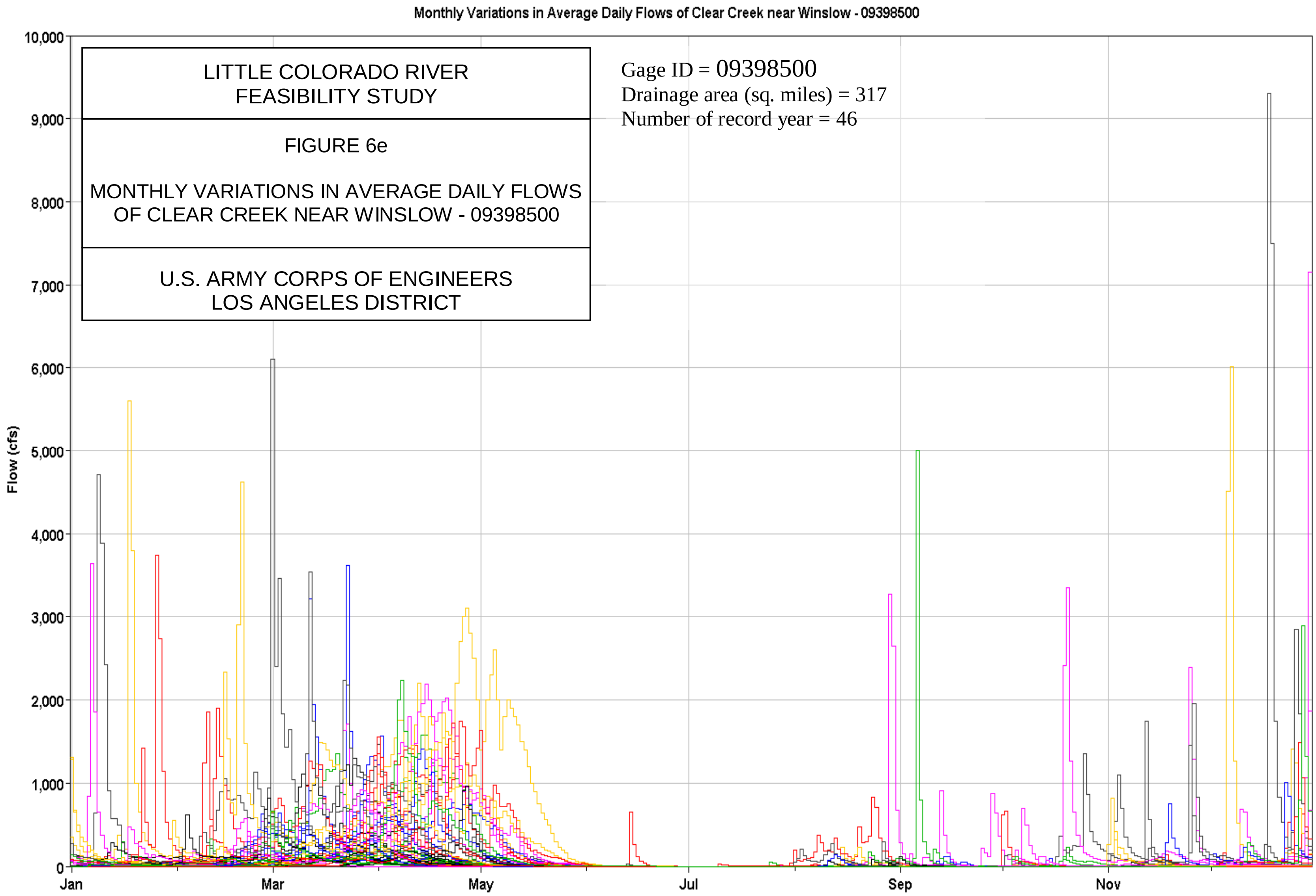
FIGURE 6b

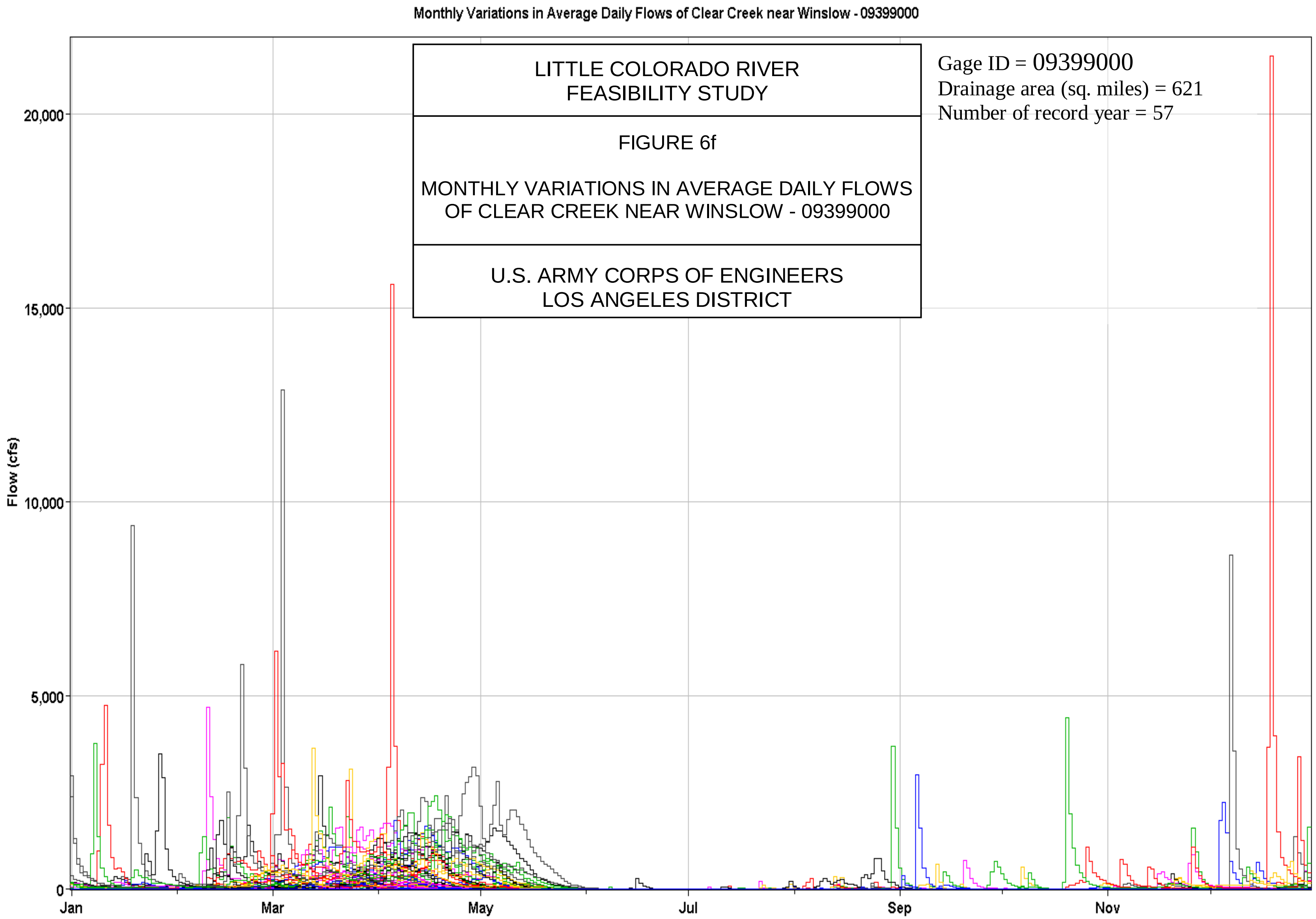
MONTHLY VARIATIONS IN AVERAGE DAILY FLOWS OF LCR AT GRAND FALLS - 09401000

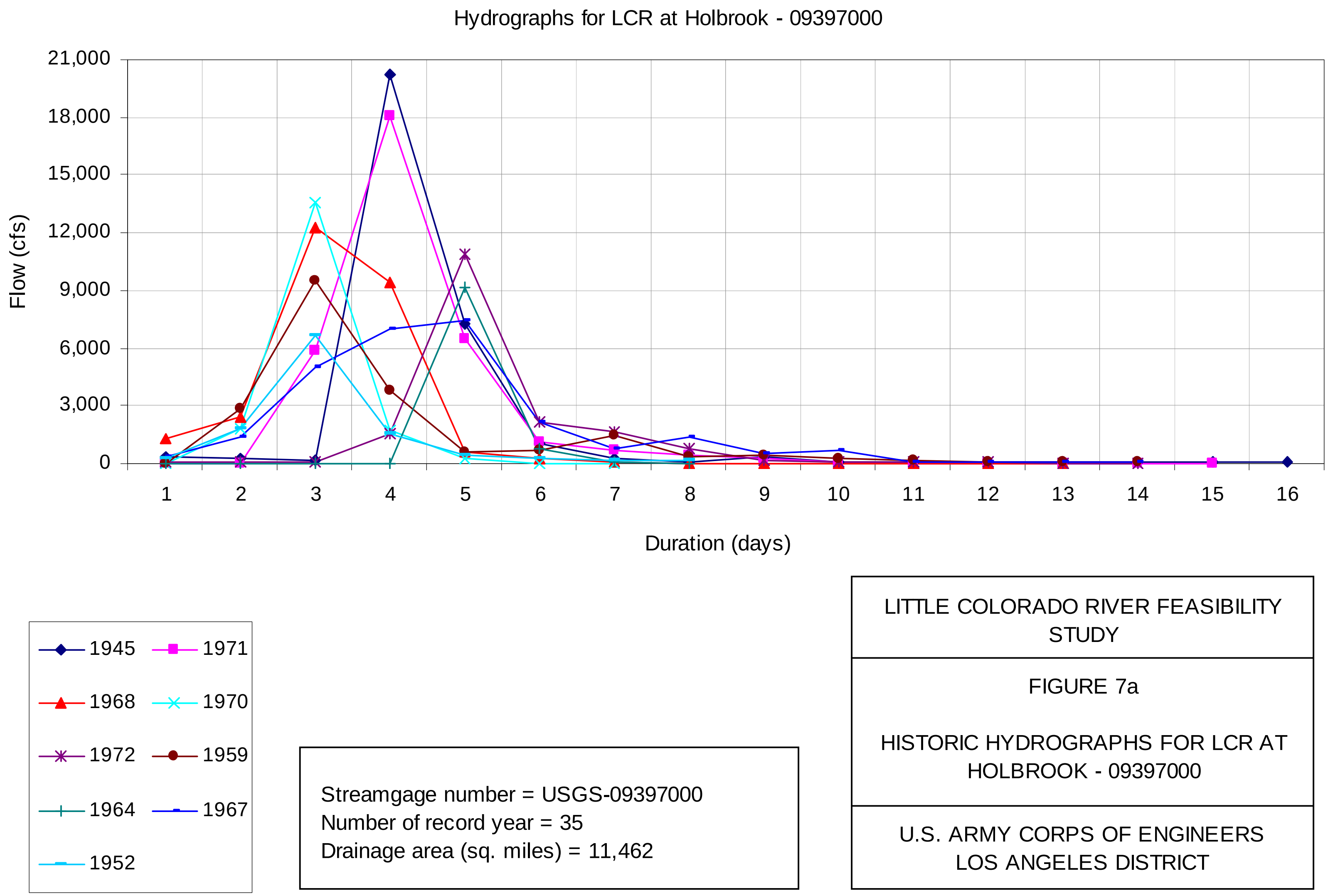
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT


Monthly Variations in Average Daily Flows of Chevelon Creek near Winslow - 09397500
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 6c
MONTHLY VARIATIONS IN AVERAGE DAILY FLOWS
OF CHEVELON CREEK NEAR WINSLOW - 09397500
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Gage ID = 09397500
Drainage area (sq. miles) = 271
Number of record year = 39
Flow (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan
Mar
May
Jul
Sep
Nov


Monthly Variations in Average Daily Flows of Chevelon Creek near Winslow - 09398000
Gage ID = 09398000
Drainage area (sq. miles) = 785
Number of record year = 51
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 6d
MONTHLY VARIATIONS IN AVERAGE DAILY FLOWS OF CHEVELON CREEK NEAR WINSLOW - 09398000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan
Mar
May
Jul
Sep
Nov


Monthly Variations in Average Daily Flows of Clear Creek near Winslow - 09398500
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 6e
MONTHLY VARIATIONS IN AVERAGE DAILY FLOWS
OF CLEAR CREEK NEAR WINSLOW - 09398500
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Gage ID = 09398500
Drainage area (sq. miles) = 317
Number of record year = 46
Flow (cfs)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan
Mar
May
Jul
Sep
Nov


Monthly Variations in Average Daily Flows of Clear Creek near Winslow - 09399000
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 6f
MONTHLY VARIATIONS IN AVERAGE DAILY FLOWS
OF CLEAR CREEK NEAR WINSLOW - 09399000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Gage ID = 09399000
Drainage area (sq. miles) = 621
Number of record year = 57
Flow (cfs)
20,000
15,000
10,000
5,000
0
Jan
Mar
May
Jul
Sep
Nov



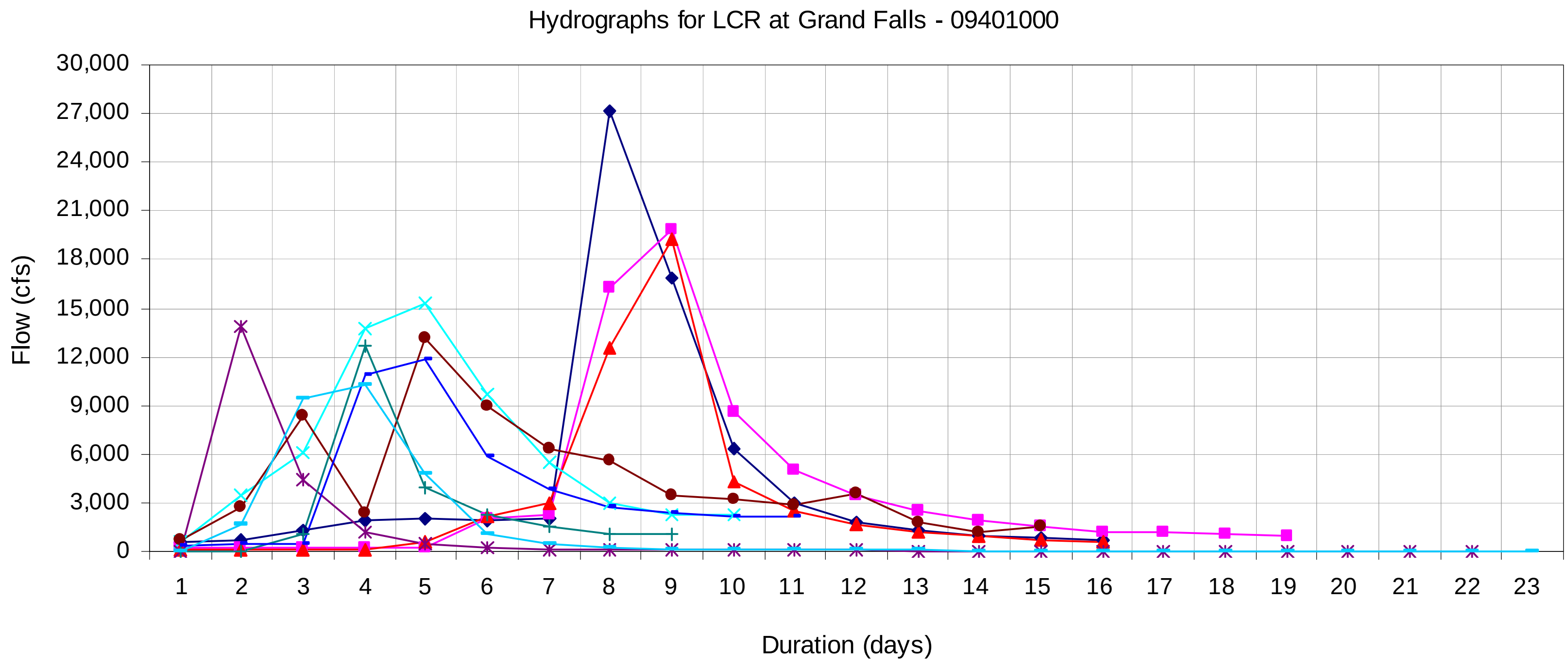
Streamgage number = USGS-09397000
Number of record year = 35
Drainage area (sq. miles) = 11,462

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7a

HISTORIC HYDROGRAPHS FOR LCR AT HOLBROOK - 09397000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



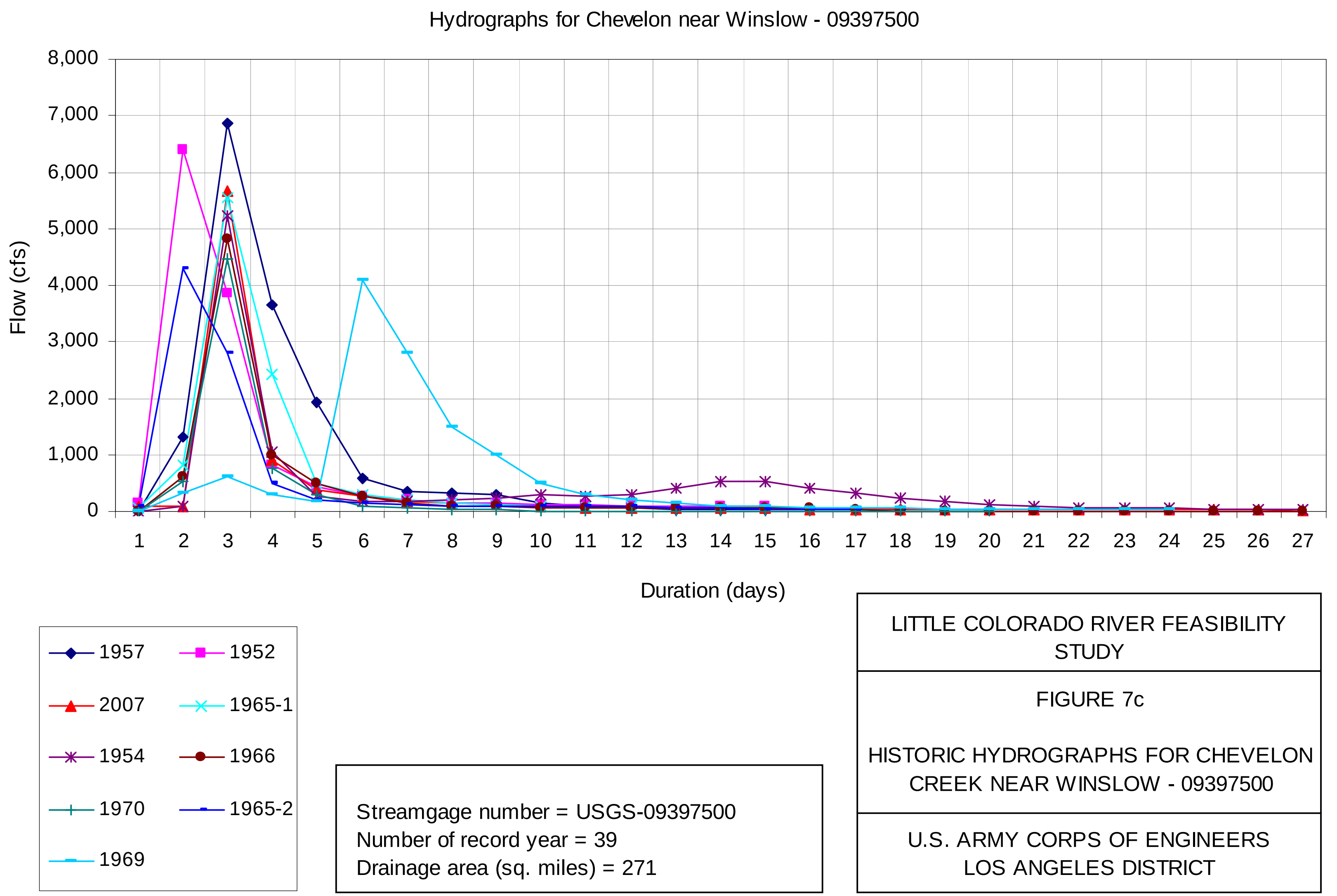
Streamgage number = USGS-09401000
Number of record year = 41
Drainage area (sq. miles) = 21,068

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7b

HISTORIC HYDROGRAPHS FOR LCR AT GRAND FALLS - 09401000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



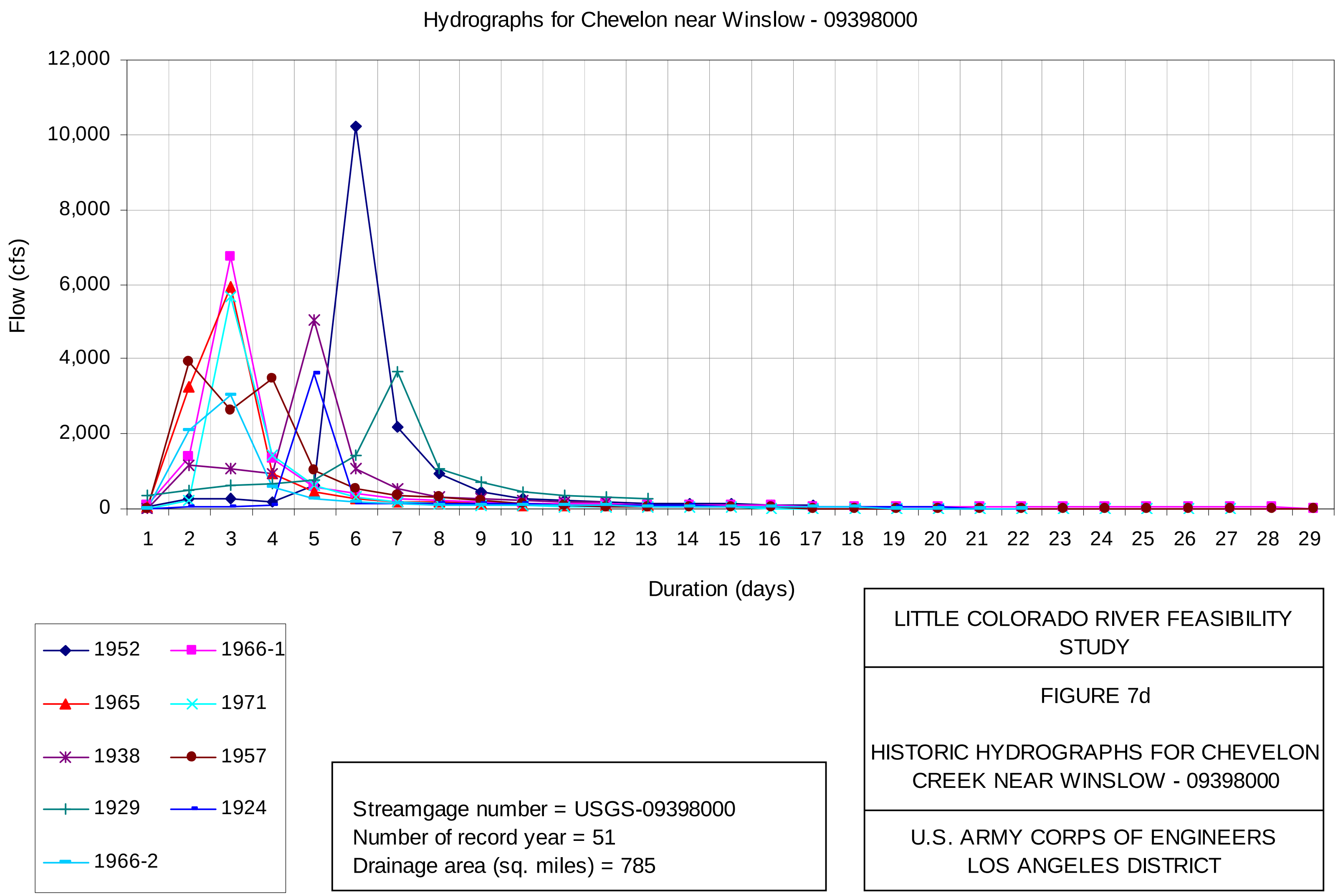
Streamgage number = USGS-09397500
Number of record year = 39
Drainage area (sq. miles) = 271

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7c

HISTORIC HYDROGRAPHS FOR CHEVELON CREEK NEAR WINSLOW - 09397500

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



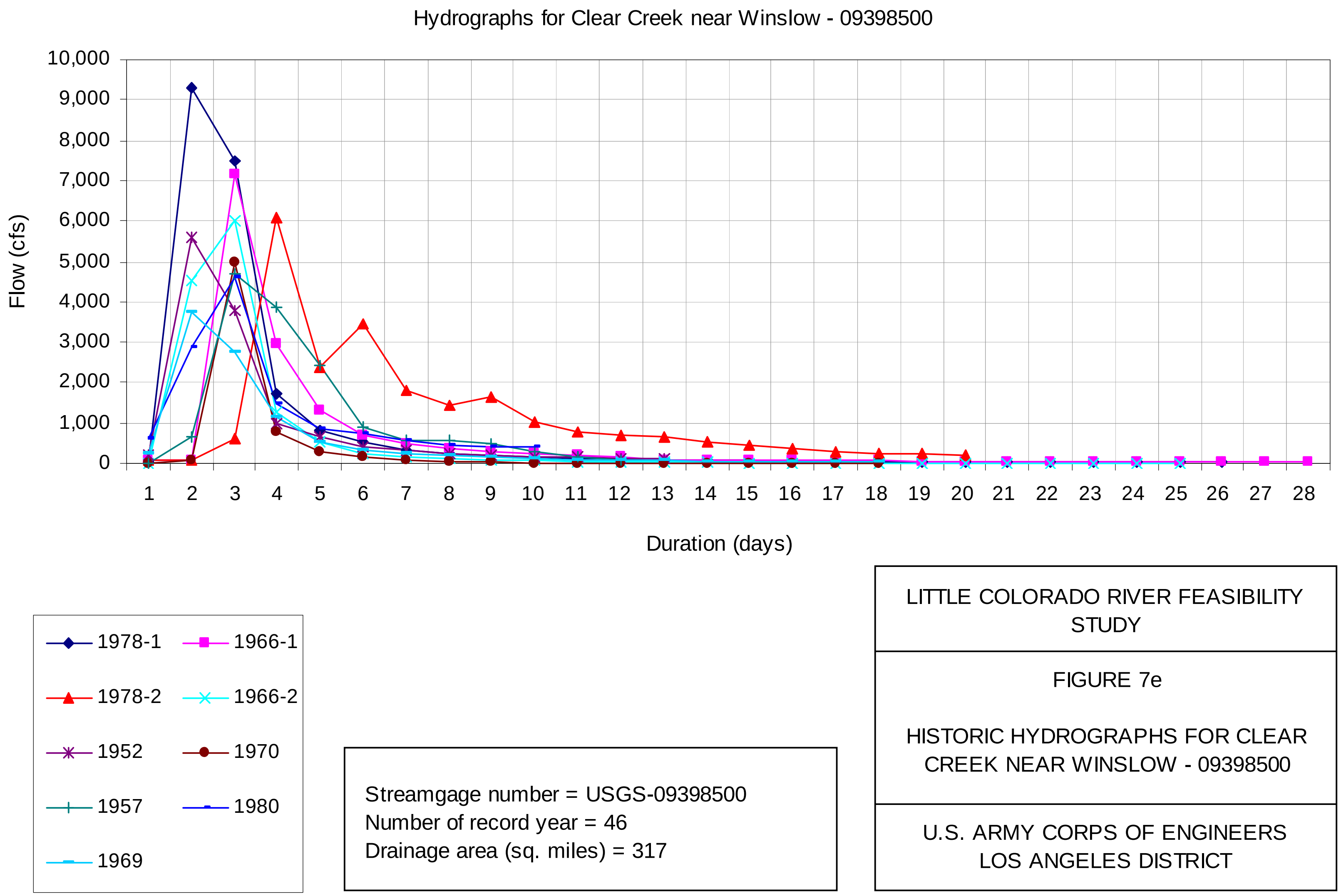
Streamgage number = USGS-09398000
Number of record year = 51
Drainage area (sq. miles) = 785

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7d

HISTORIC HYDROGRAPHS FOR CHEVELON CREEK NEAR WINSLOW - 09398000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



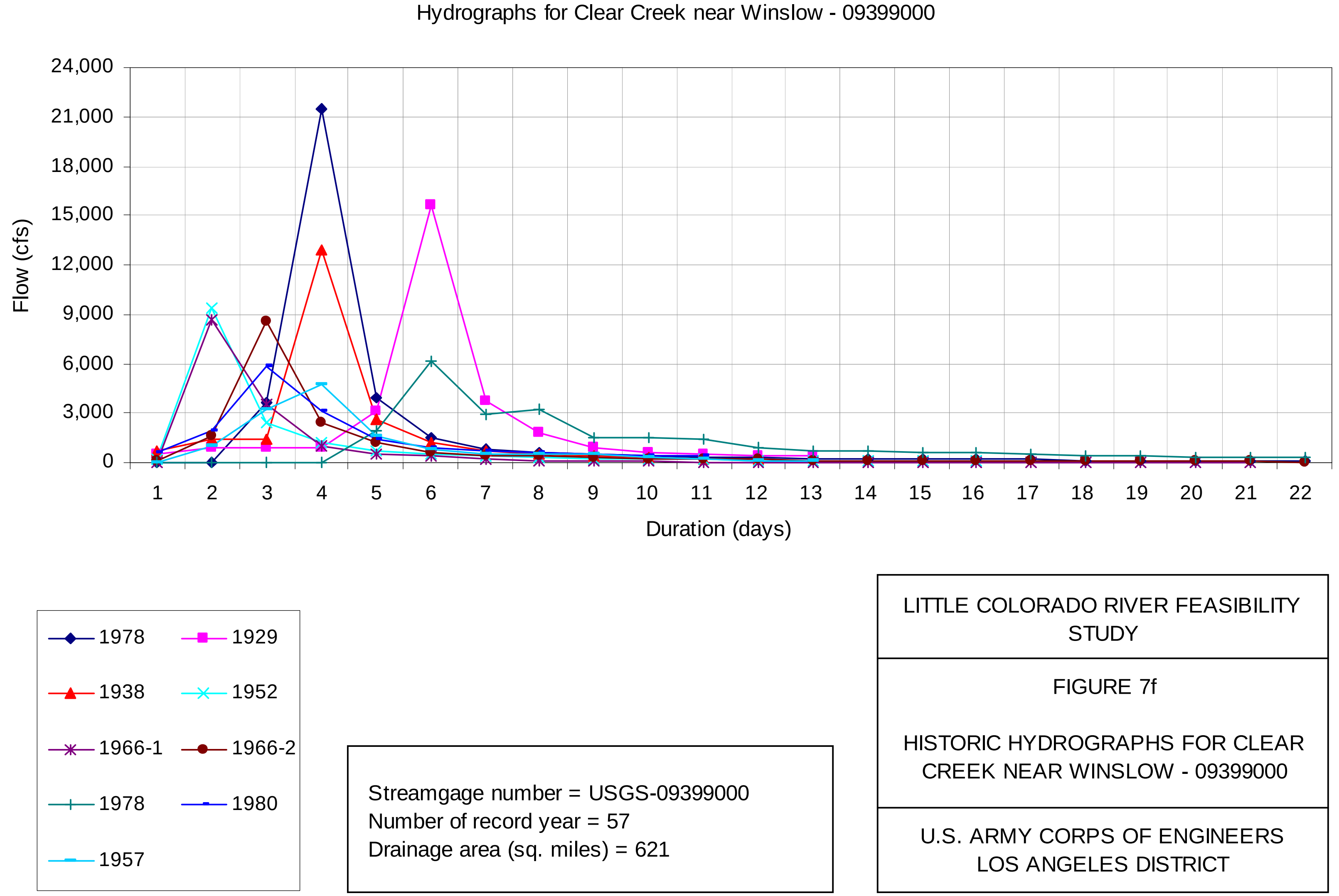
Streamgage number = USGS-09398500
Number of record year = 46
Drainage area (sq. miles) = 317

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7e

HISTORIC HYDROGRAPHS FOR CLEAR CREEK NEAR WINSLOW - 09398500

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



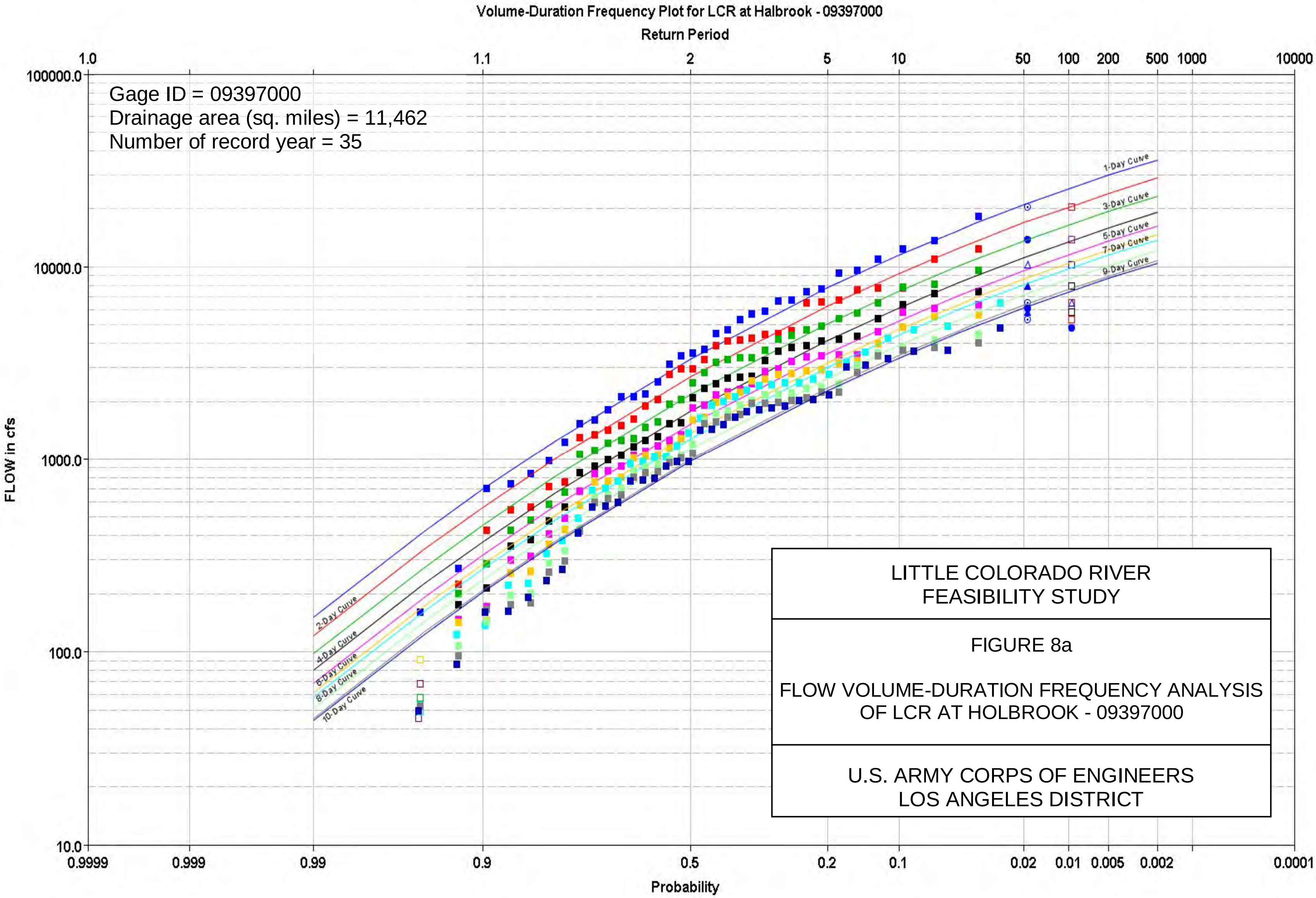
Streamgage number = USGS-09399000
Number of record year = 57
Drainage area (sq. miles) = 621

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 7f

HISTORIC HYDROGRAPHS FOR CLEAR CREEK NEAR WINSLOW - 09399000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

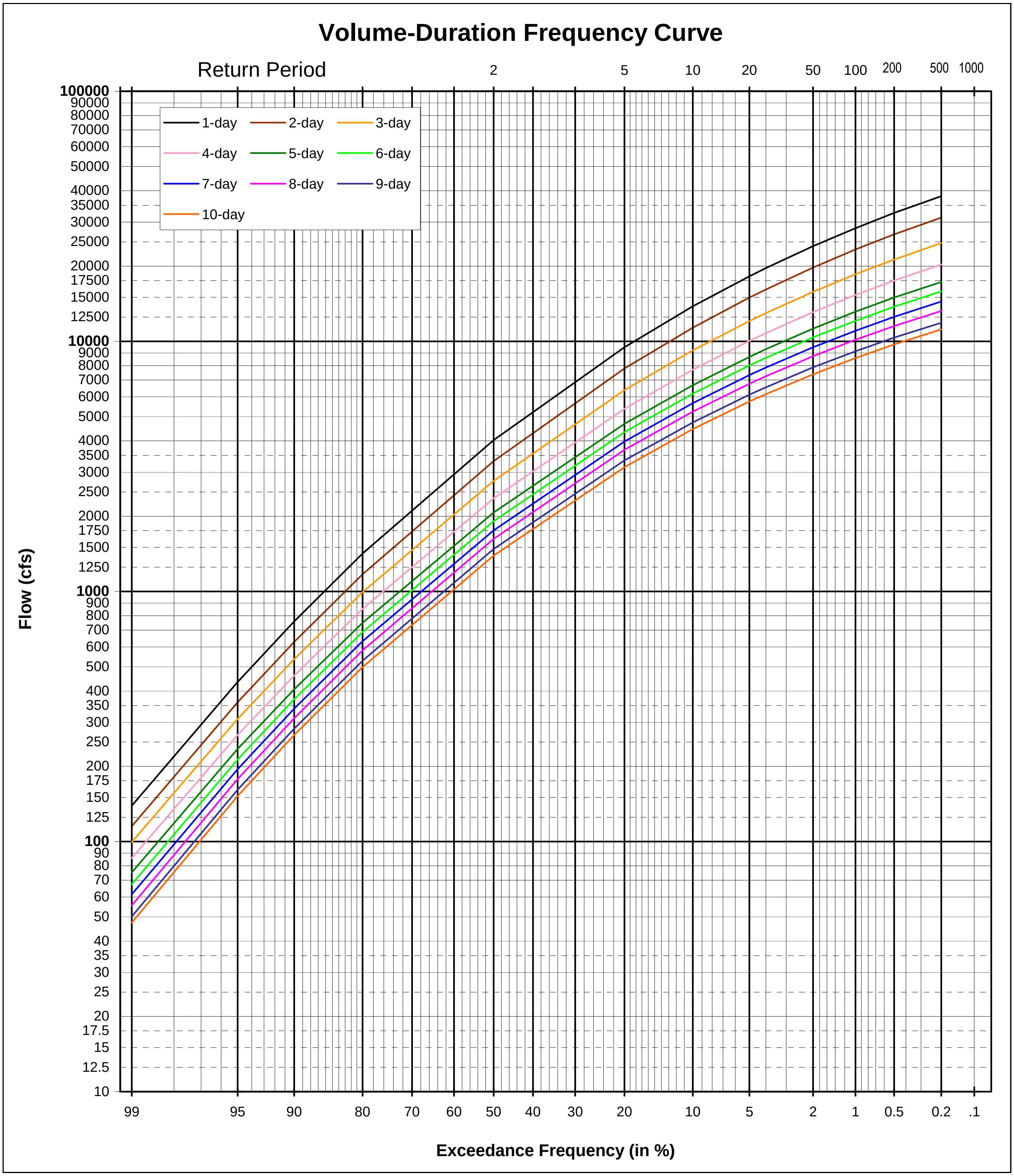


LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 8a

FLOW VOLUME-DURATION FREQUENCY ANALYSIS
OF LCR AT HOLBROOK - 09397000

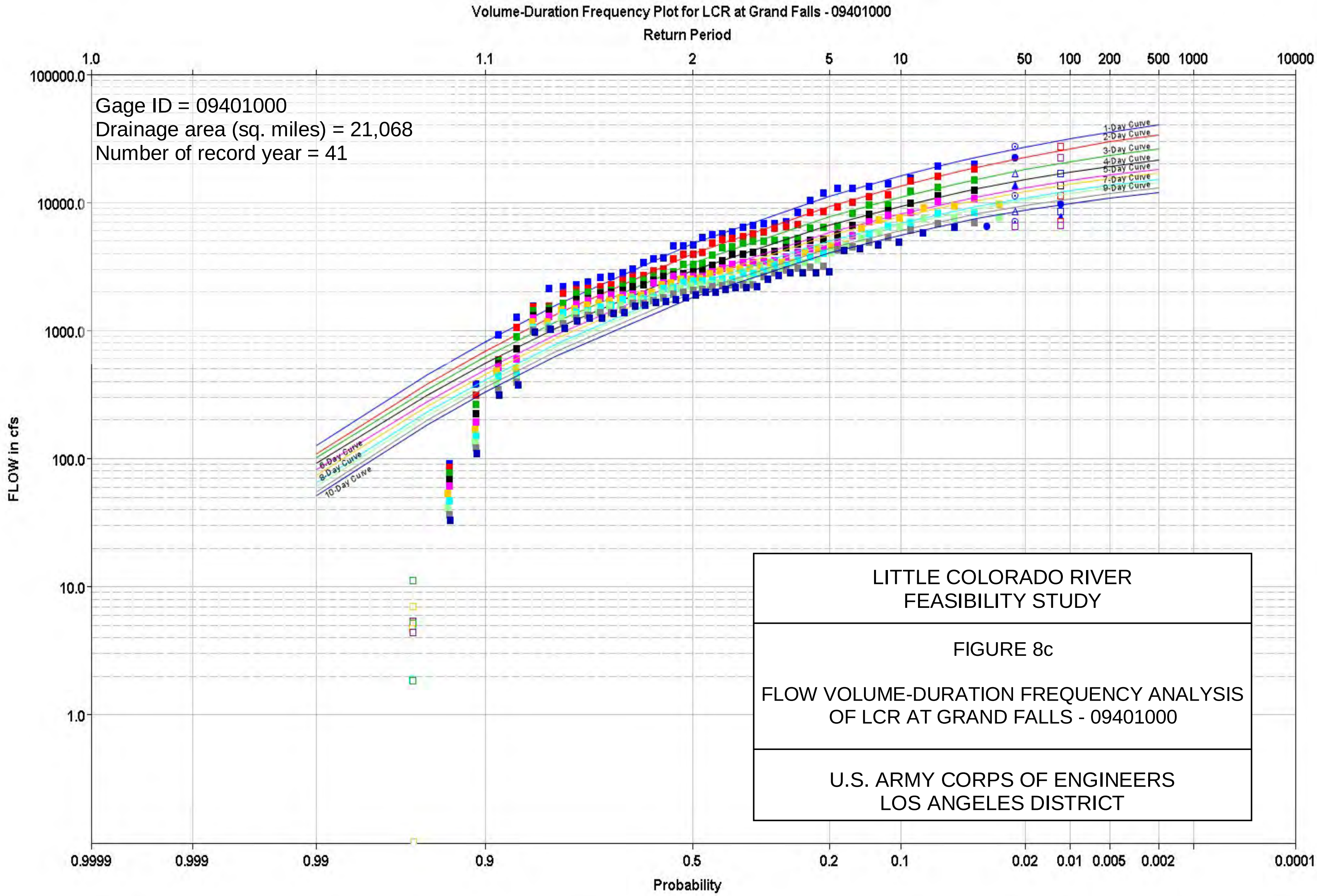
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



LITTLE COLORADO RIVER FEASIBILITY STUDY
FIGURE 8b LCR NEAR WINSLOW - 09400350 INTERPOLATED VOLUME-DURATION FREQUENCY CURVES
US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

Drainage area (sq. miles) = 16,192
Streamgage number = USGS-09400350
*Number of record year for volume duration = 8

*Due to short record of period results are interpolated from frequency results at Grand Falls and Holbrook based on drainage area

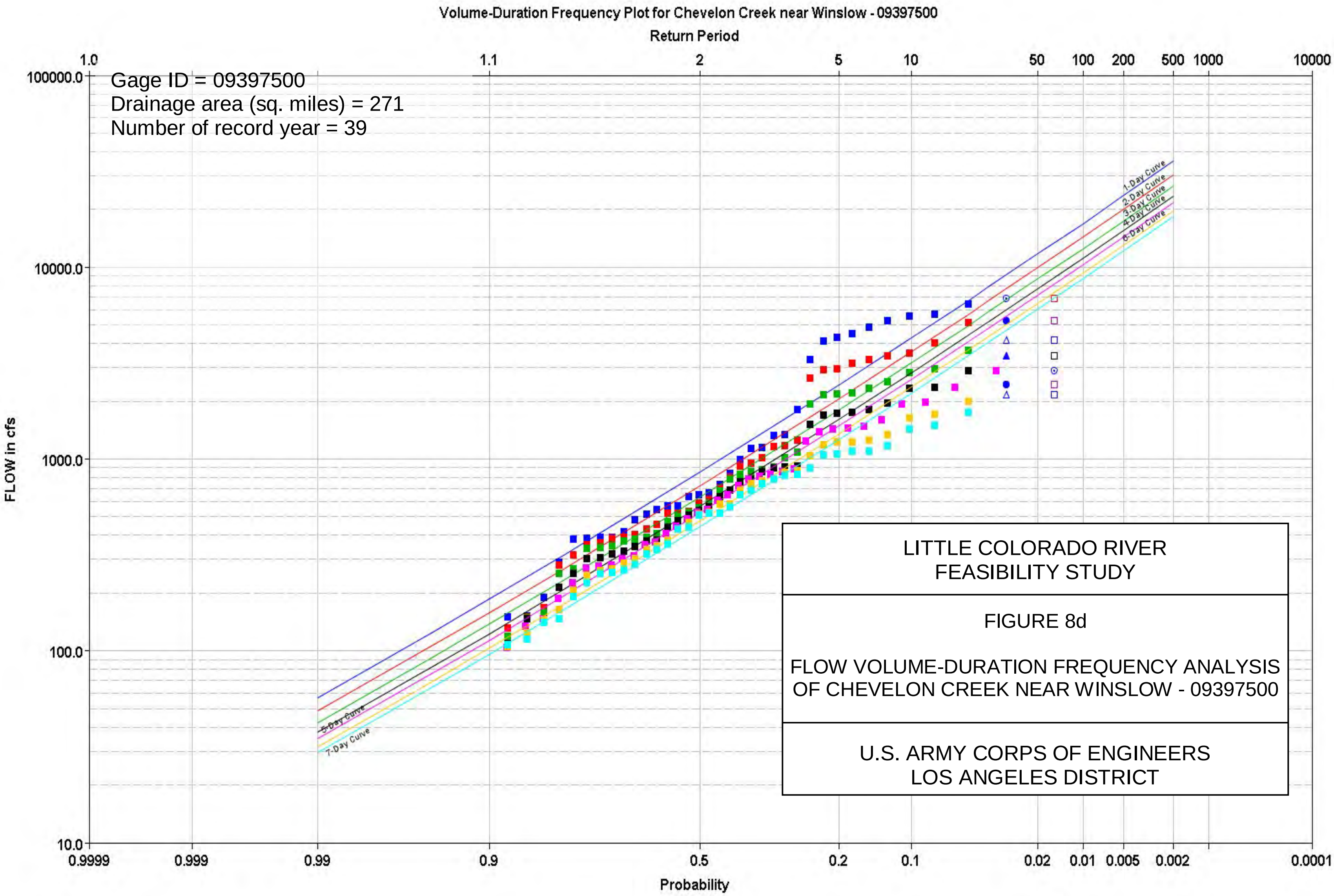


LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 8c

FLOW VOLUME-DURATION FREQUENCY ANALYSIS
OF LCR AT GRAND FALLS - 09401000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

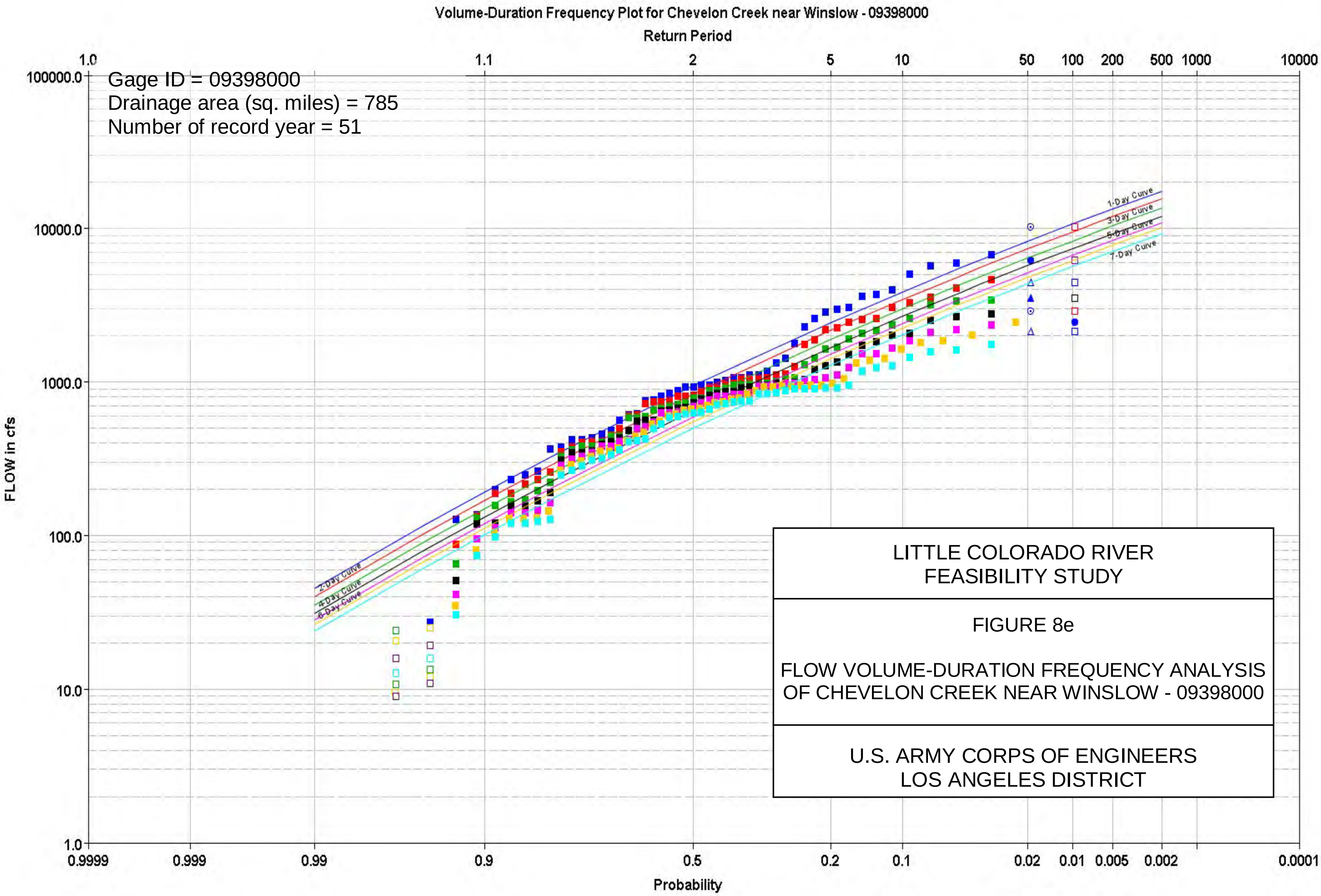


LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 8d

FLOW VOLUME-DURATION FREQUENCY ANALYSIS OF CHEVELON CREEK NEAR WINSLOW - 09397500

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

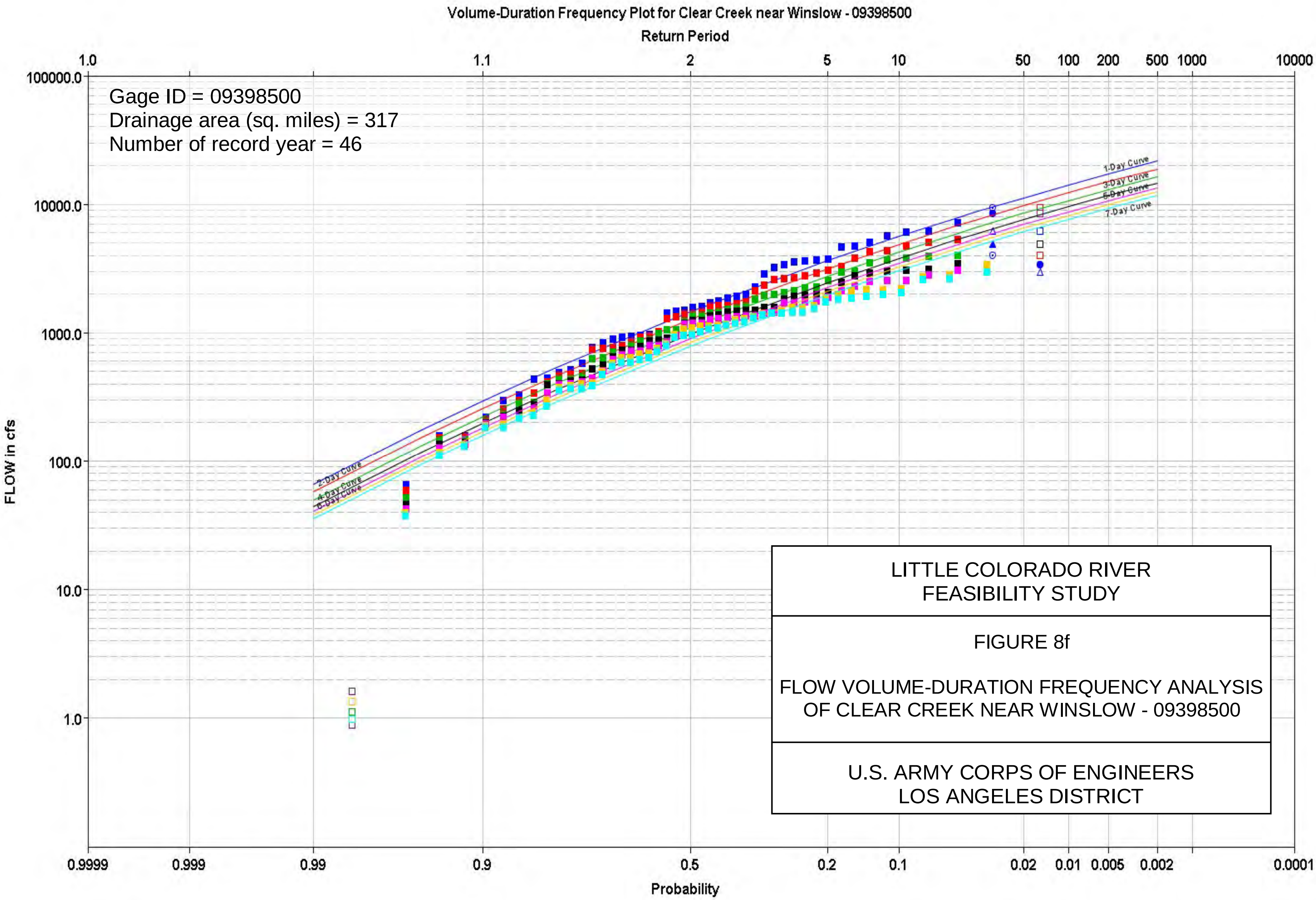


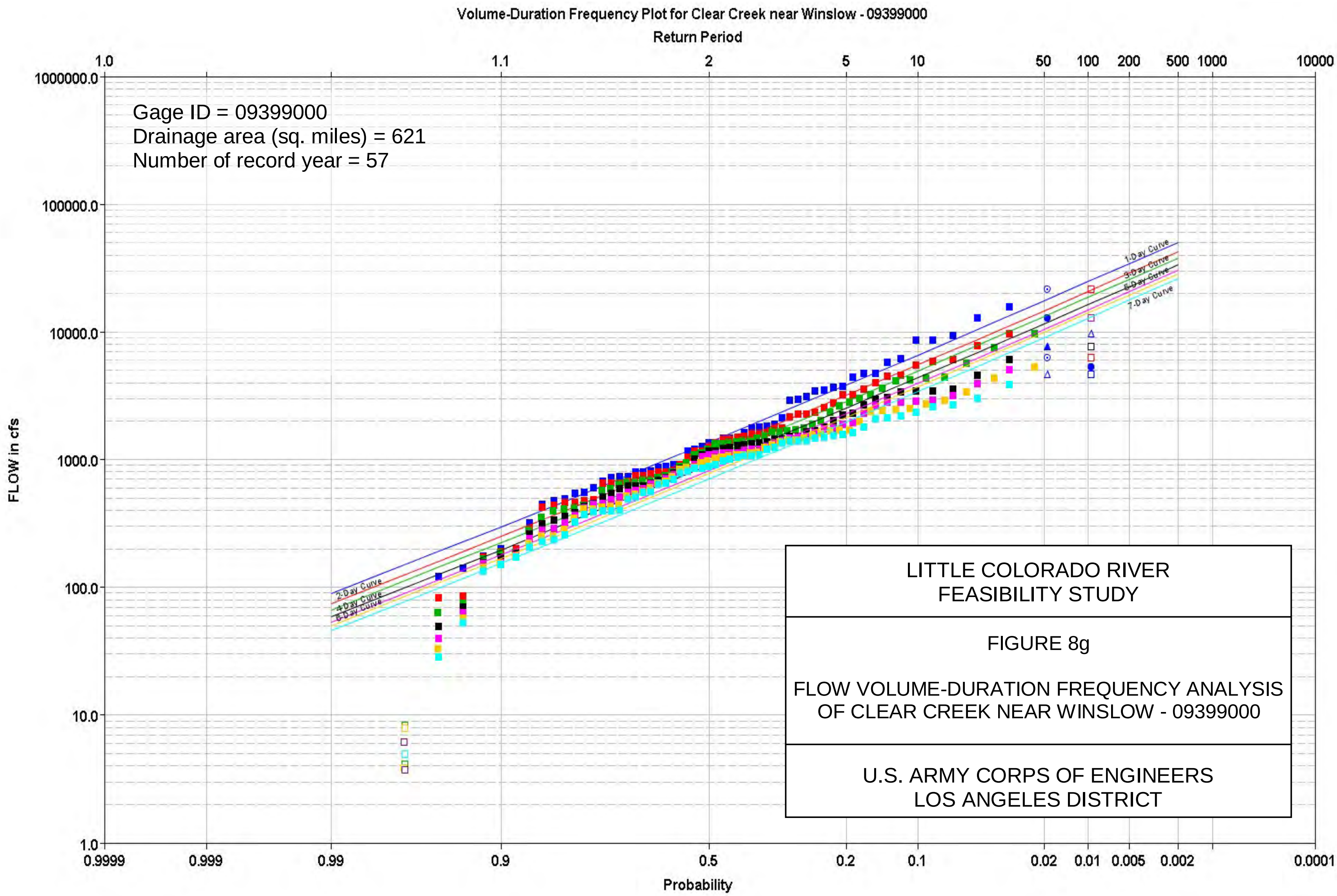
LITTLE COLORADO RIVER
FEASIBILITY STUDY

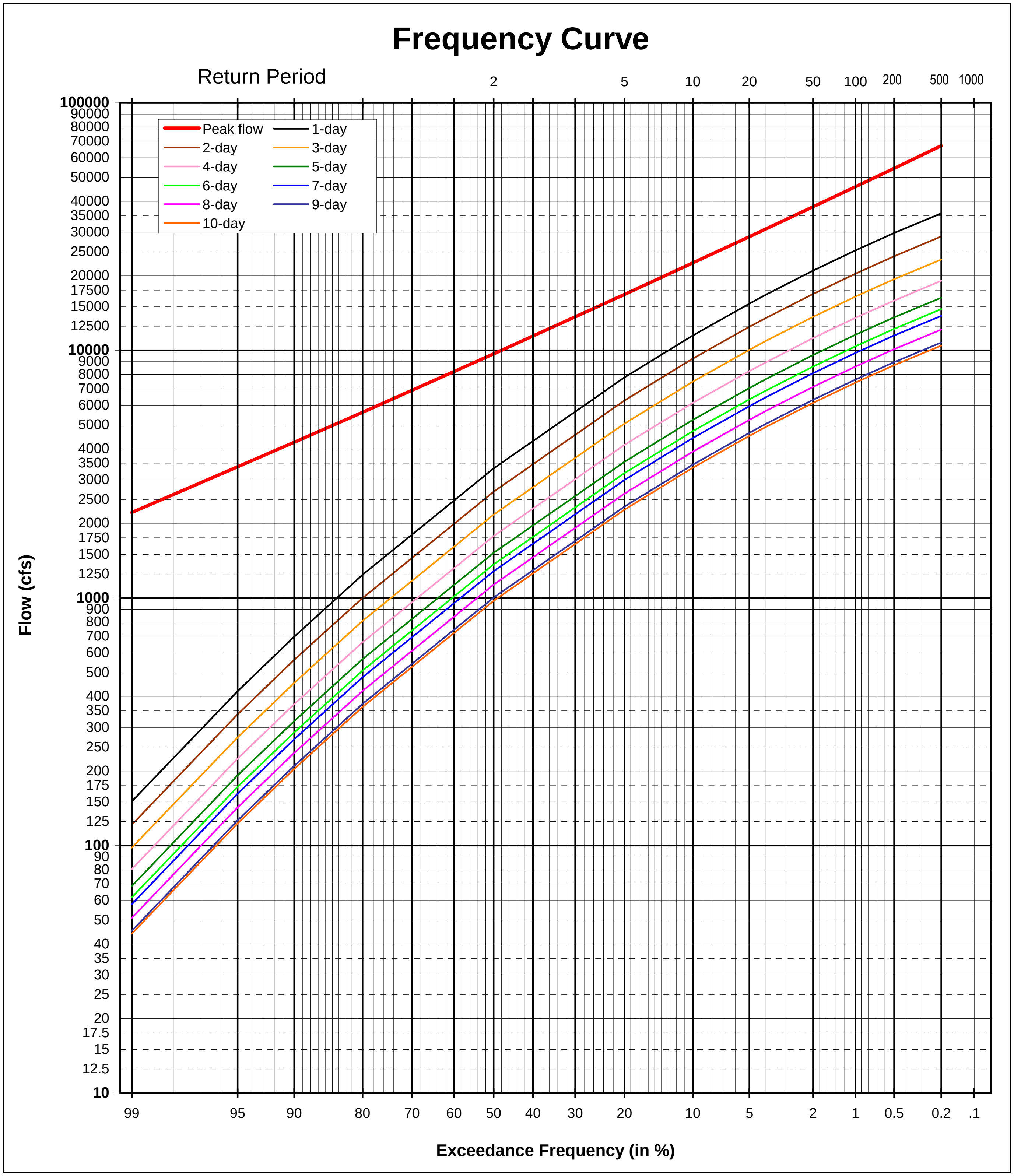
FIGURE 8e

FLOW VOLUME-DURATION FREQUENCY ANALYSIS
OF CHEVELON CREEK NEAR WINSLOW - 09398000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

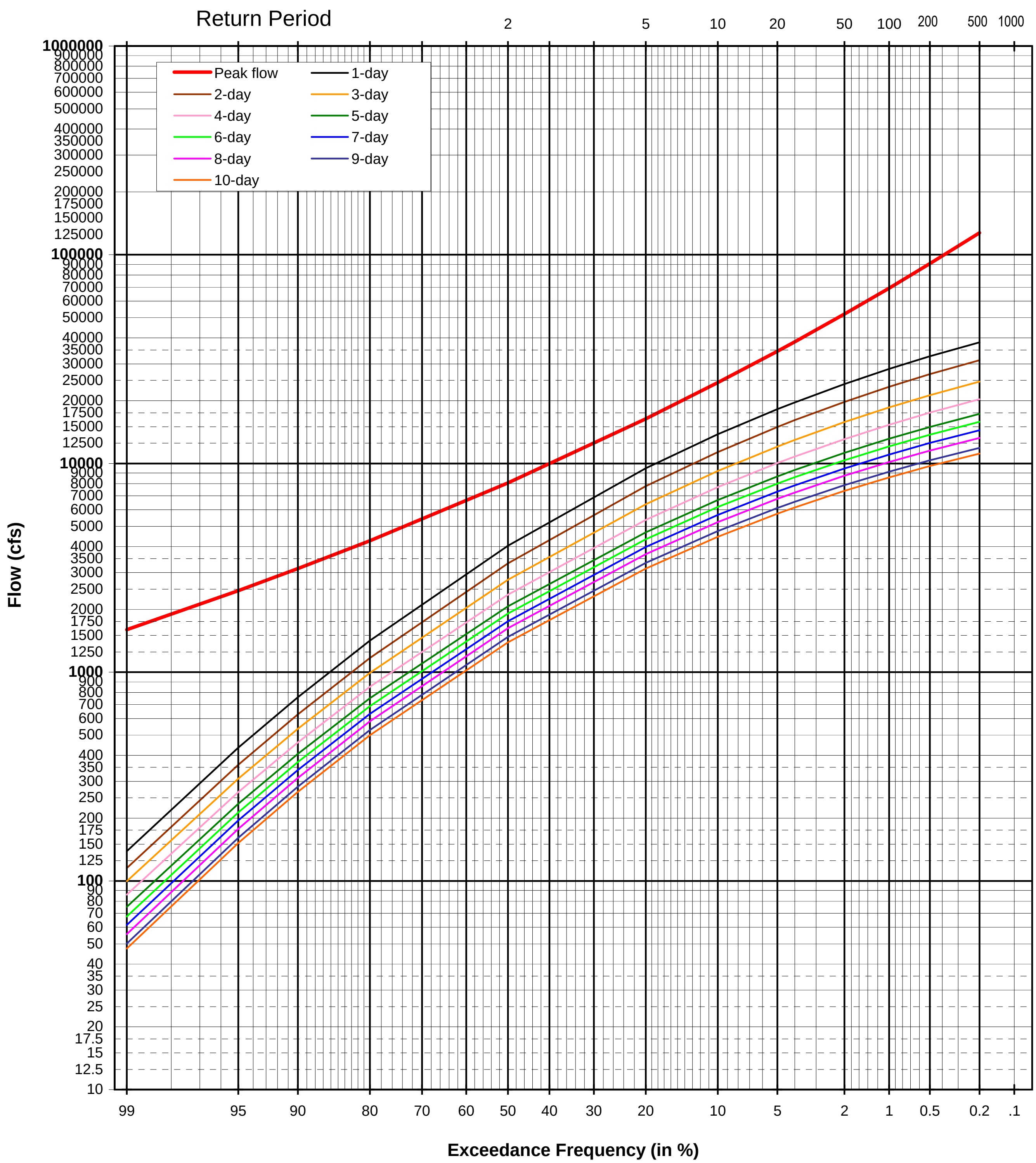

Volume-Duration Frequency Plot for Clear Creek near Winslow - 09398500
Return Period
1.0
1.1
2
5
10
50
100
200
500
1000
10000
100000.0
10000.0
1000.0
100.0
10.0
1.0
Gage ID = 09398500
Drainage area (sq. miles) = 317
Number of record year = 46
1-Day Curve
3-Day Curve
5-Day Curve
7-Day Curve
2-Day Curve
4-Day Curve
6-Day Curve
FLOW in cfs
0.9999
0.999
0.99
0.9
0.5
0.2
0.1
0.02
0.01
0.005
0.002
0.0001
Probability
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 8f
FLOW VOLUME-DURATION FREQUENCY ANALYSIS
OF CLEAR CREEK NEAR WINSLOW - 09398500
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT


Volume-Duration Frequency Plot for Clear Creek near Winslow - 09399000
Return Period
1.0
1.1
2
5
10
50
100
200
500
1000
10000
Gage ID = 09399000
Drainage area (sq. miles) = 621
Number of record year = 57
FLOW in cfs
1000000.0
100000.0
10000.0
1000.0
100.0
10.0
1.0
1-Day Curve
3-Day Curve
5-Day Curve
7-Day Curve
2-Day Curve
4-Day Curve
6-Day Curve
Probability
0.9999
0.999
0.99
0.9
0.5
0.2
0.1
0.02
0.01
0.005
0.002
0.0001
LITTLE COLORADO RIVER
FEASIBILITY STUDY
FIGURE 8g
FLOW VOLUME-DURATION FREQUENCY ANALYSIS
OF CLEAR CREEK NEAR WINSLOW - 09399000
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

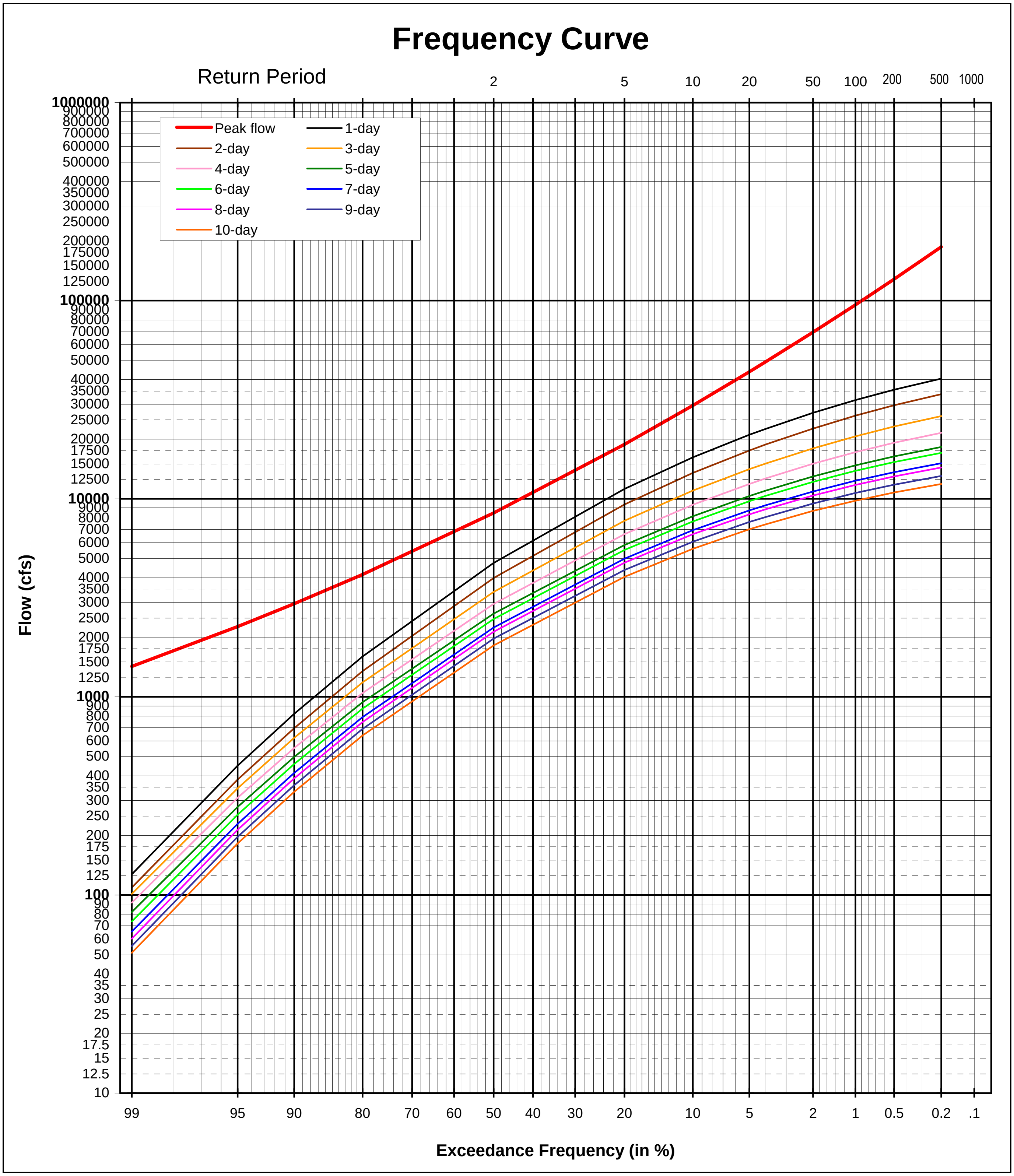


Drainage area (sq. miles) = 11,462 Streamgage number = USGS-09397000 Number of record year for peak flow = 31 Number of record year for volume duration = 35	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 9a LCR AT HOLBROOK - 09397000 PEAK AND VOLUME-DURATION FREQUENCY CURVES
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

Frequency Curve



Drainage area (sq. miles) = 16,192 Streamgage number = USGS-09400350 *Number of record year for peak flow = 7 *Number of record year for volume duration = 8 *Due to short record of period results are interpolated from frequency results at Grand Falls and Holbrook based on drainage area	LITTLE COLORADO RIVER FEASIBILITY STUDY FIGURE 9b LCR NEAR WINSLOW - 09400350 PEAK AND VOLUME-DURATION FREQUENCY CURVES US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



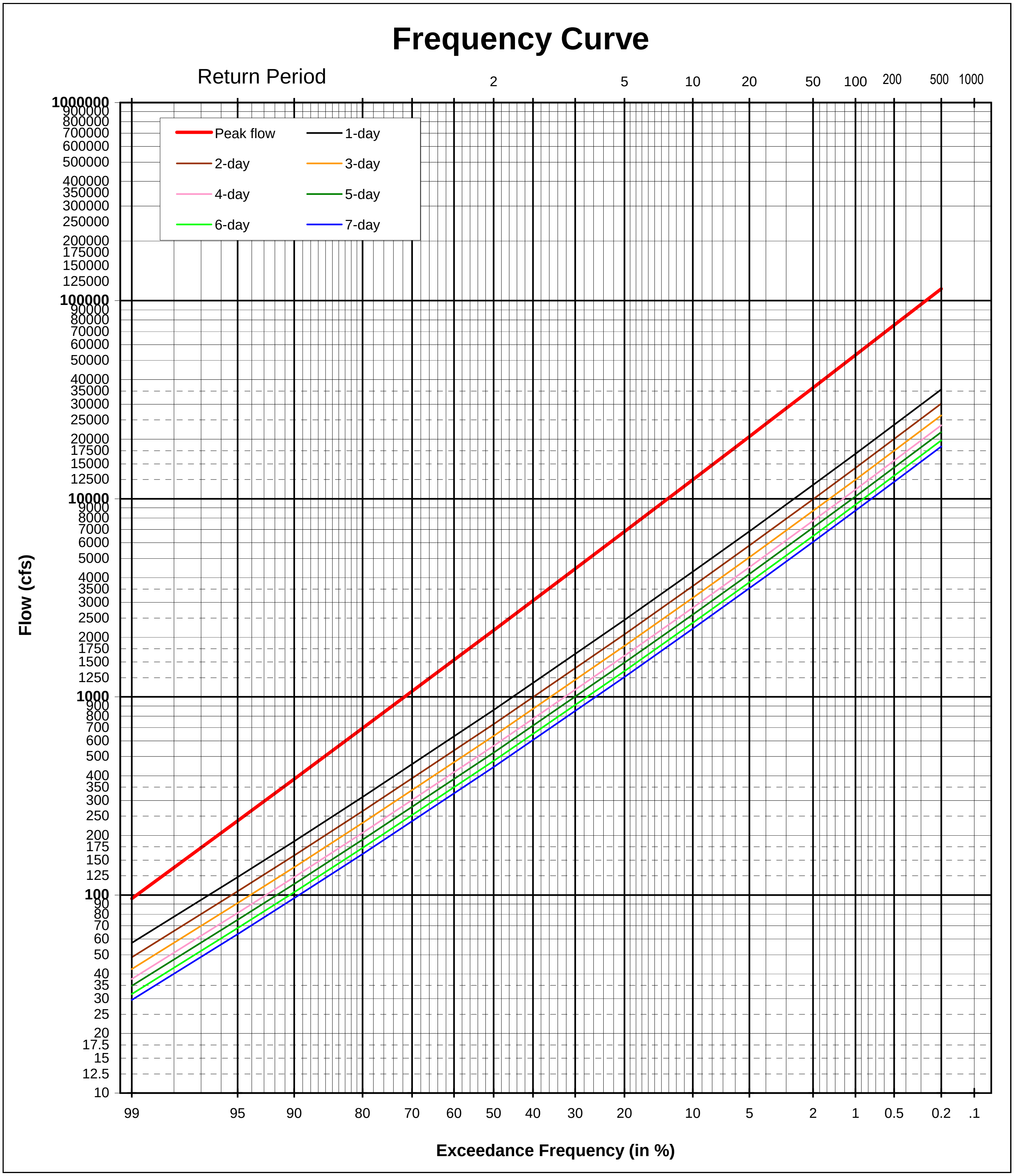
Drainage area (sq. miles) = 21,068
Streamgage number = USGS-09401000
Number of record year for peak flow = 43
Number of record year for volume duration = 41

LITTLE COLORADO RIVER FEASIBILITY STUDY

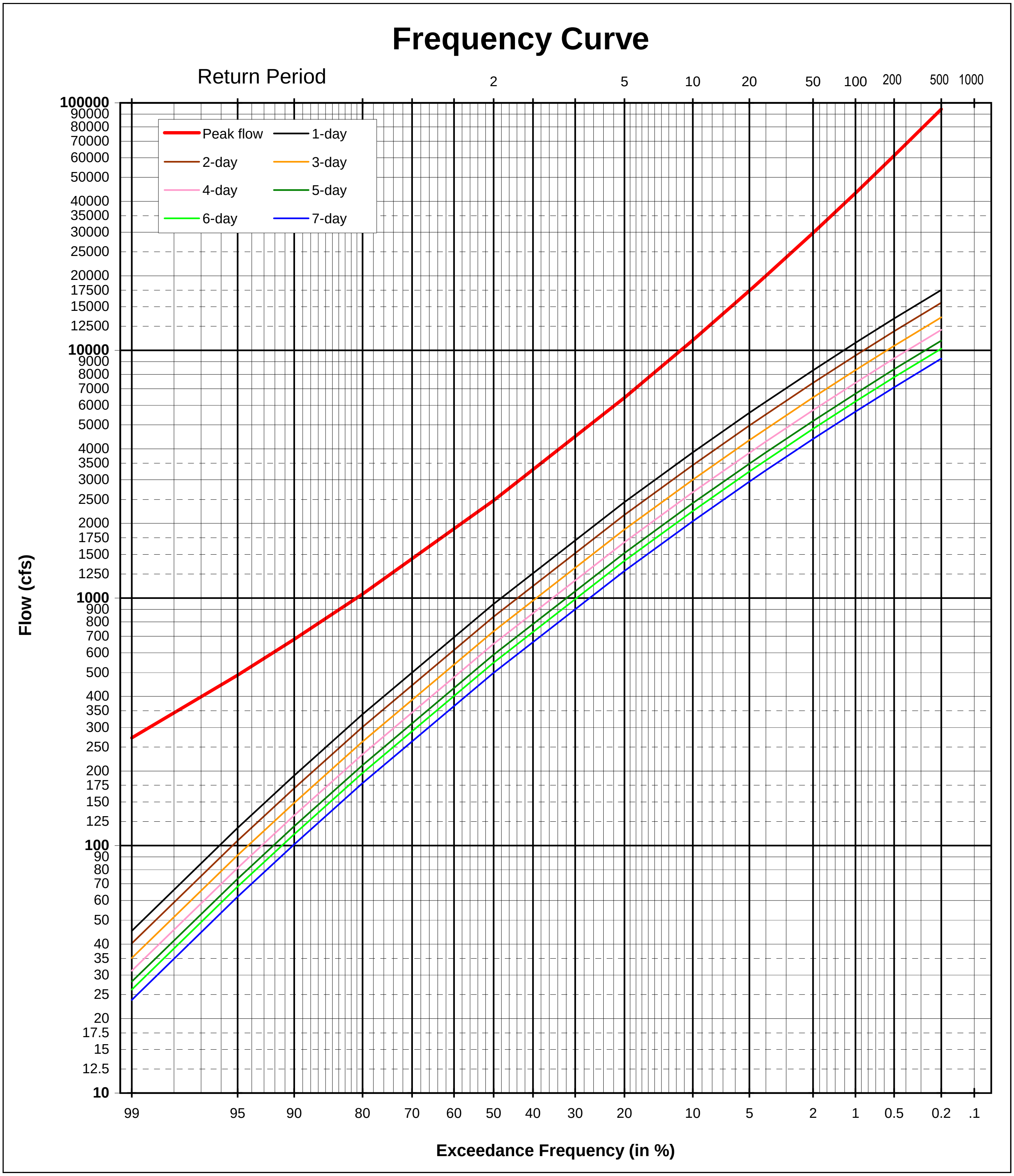
FIGURE 9c

LCR AT GRAND FALLS - 09401000
PEAK AND VOLUME-DURATION FREQUENCY CURVES

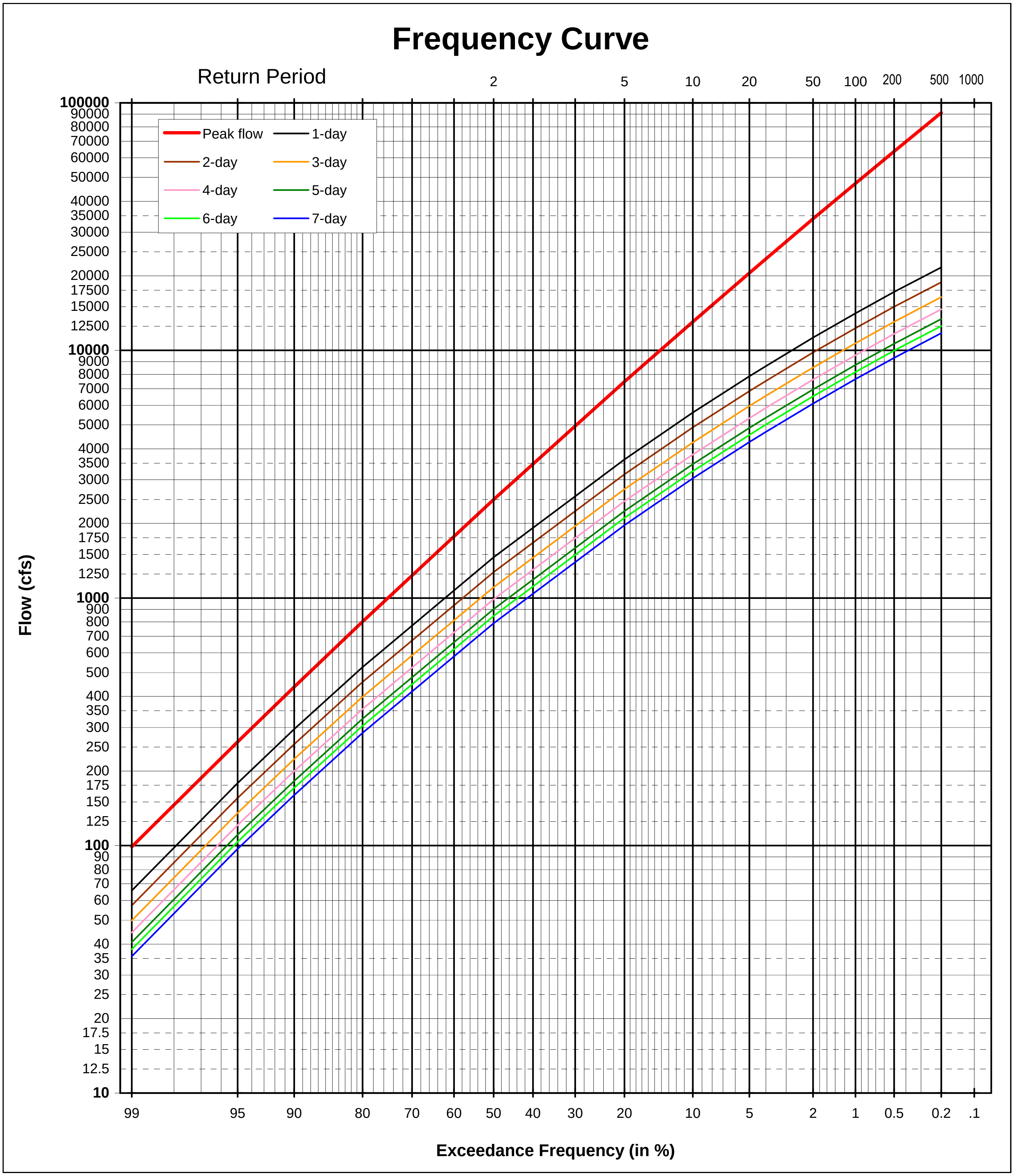
US ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



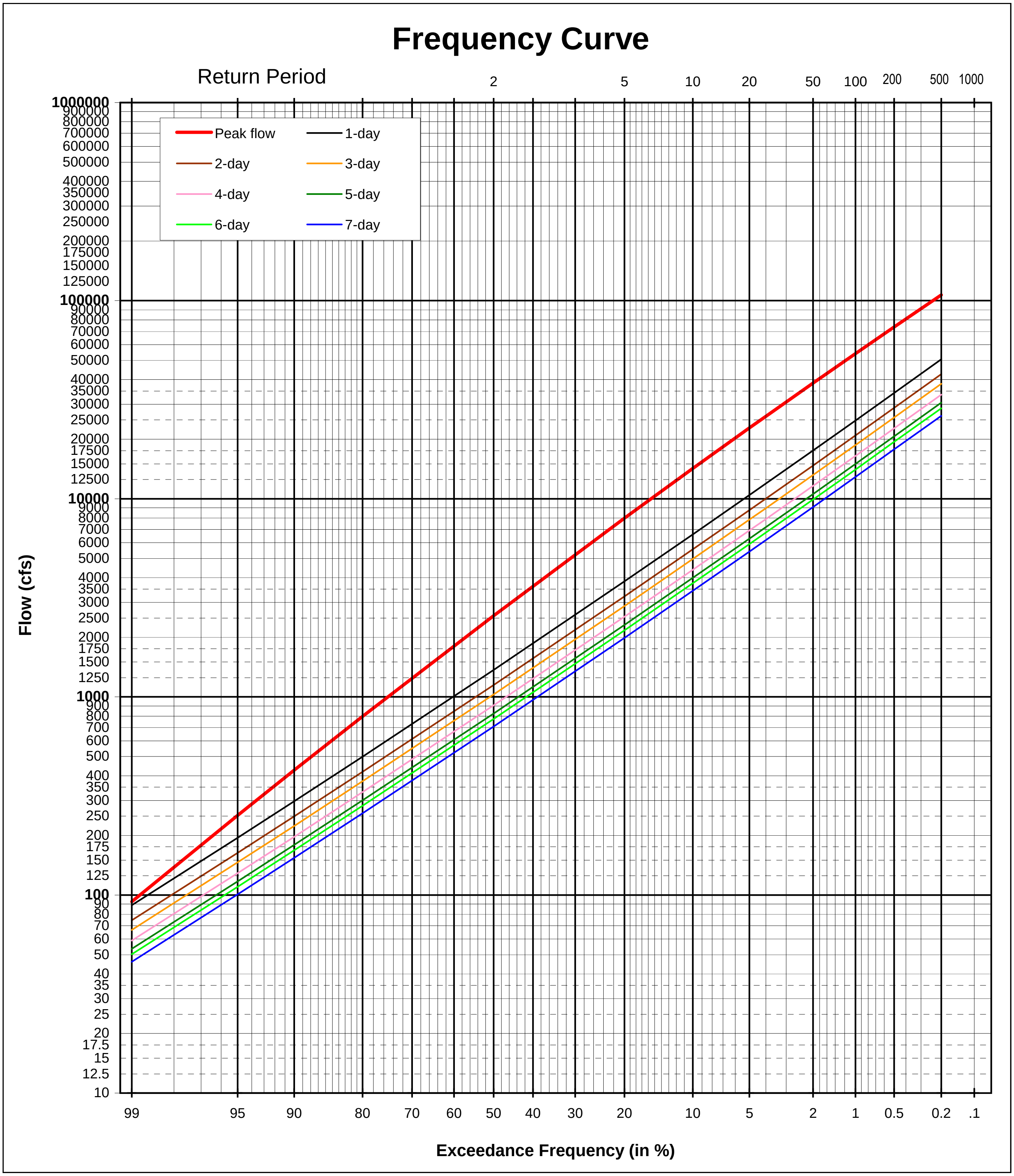
Drainage area (sq. miles) = 271 Streamgage number = USGS-09397500 Number of record year for peak flow = 48 Number of record year for volume duration = 39	LITTLE COLORADO RIVER FEASIBILITY STUDY FIGURE 9d CHEVELON CREEK NEAR WINSLOW - 09397500 PEAK AND VOLUME-DURATION FREQUENCY CURVES US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



Drainage area (sq. miles) = 785 Streamgage number = USGS-09398000 Number of record year for peak flow = 50 Number of record year for volume duration = 51	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 9e CHEVELON CREEK NEAR WINSLOW - 09398000 PEAK AND VOLUME-DURATION FREQUENCY CURVES
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



Drainage area (sq. miles) = 317 Streamgage number = USGS-09398500 Number of record year for peak flow = 45 Number of record year for volume duration = 46	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 9f CLEAR CREEK NEAR WINSLOW - 09398500 PEAK AND VOLUME-DURATION FREQUENCY CURVES
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



Drainage area (sq. miles) = 621 Streamgage number = USGS-09399000 Number of record year for peak flow = 54 Number of record year for volume duration = 57	LITTLE COLORADO RIVER FEASIBILITY STUDY FIGURE 9g CLEAR CREEK NEAR WINSLOW - 09399000 PEAK AND VOLUME-DURATION FREQUENCY CURVES US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

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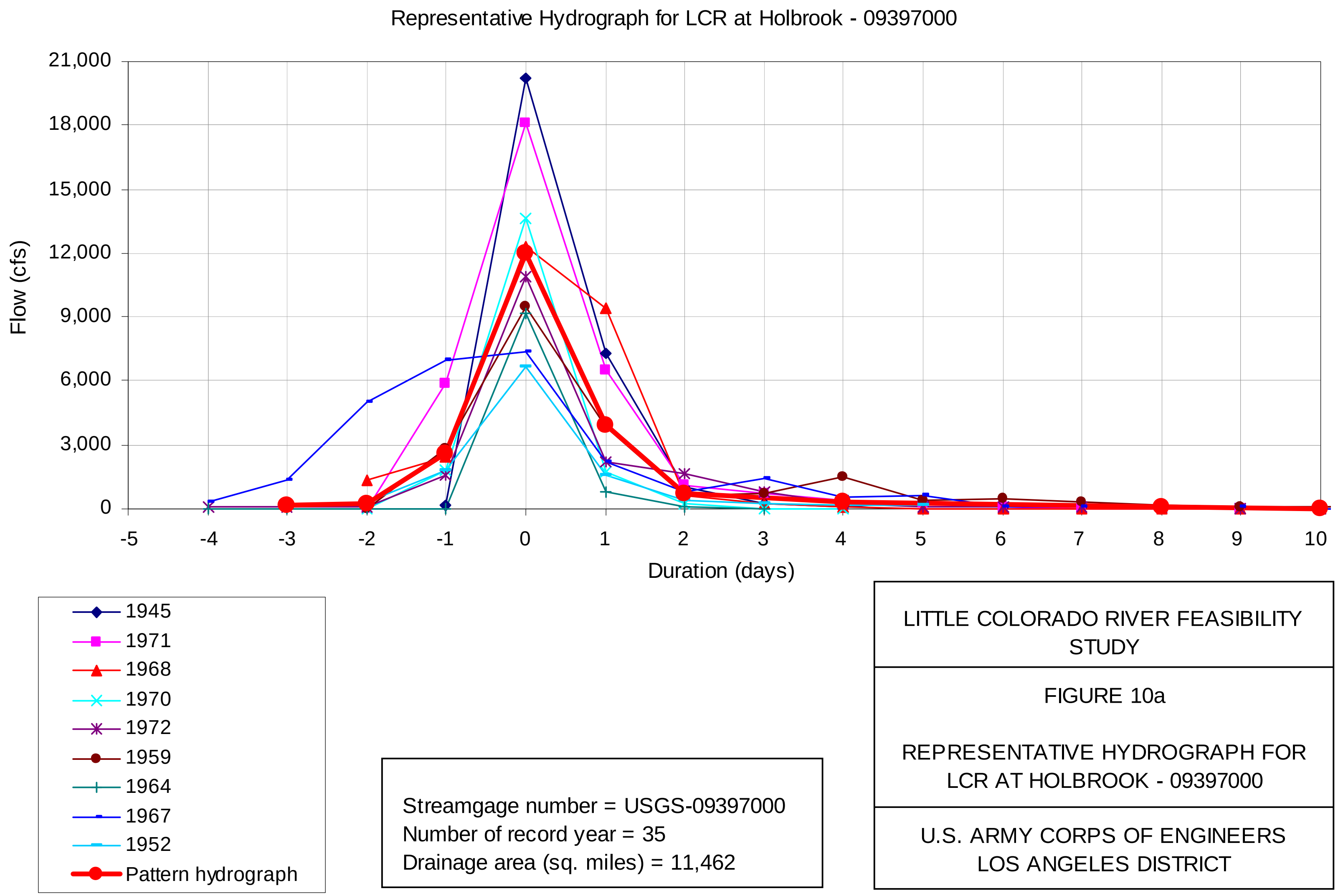


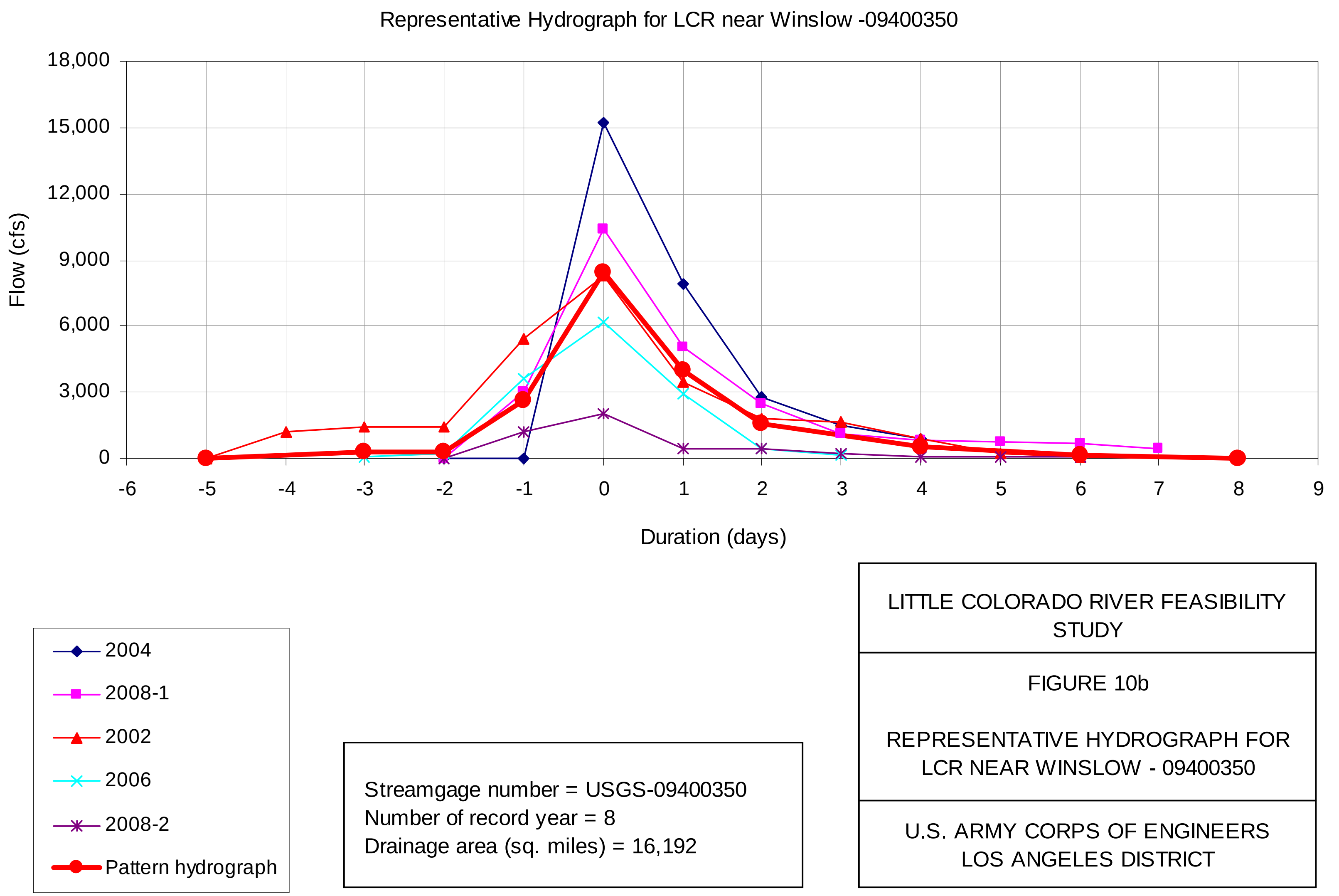
Streamgage number = USGS-09397000
Number of record year = 35
Drainage area (sq. miles) = 11,462

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 10a

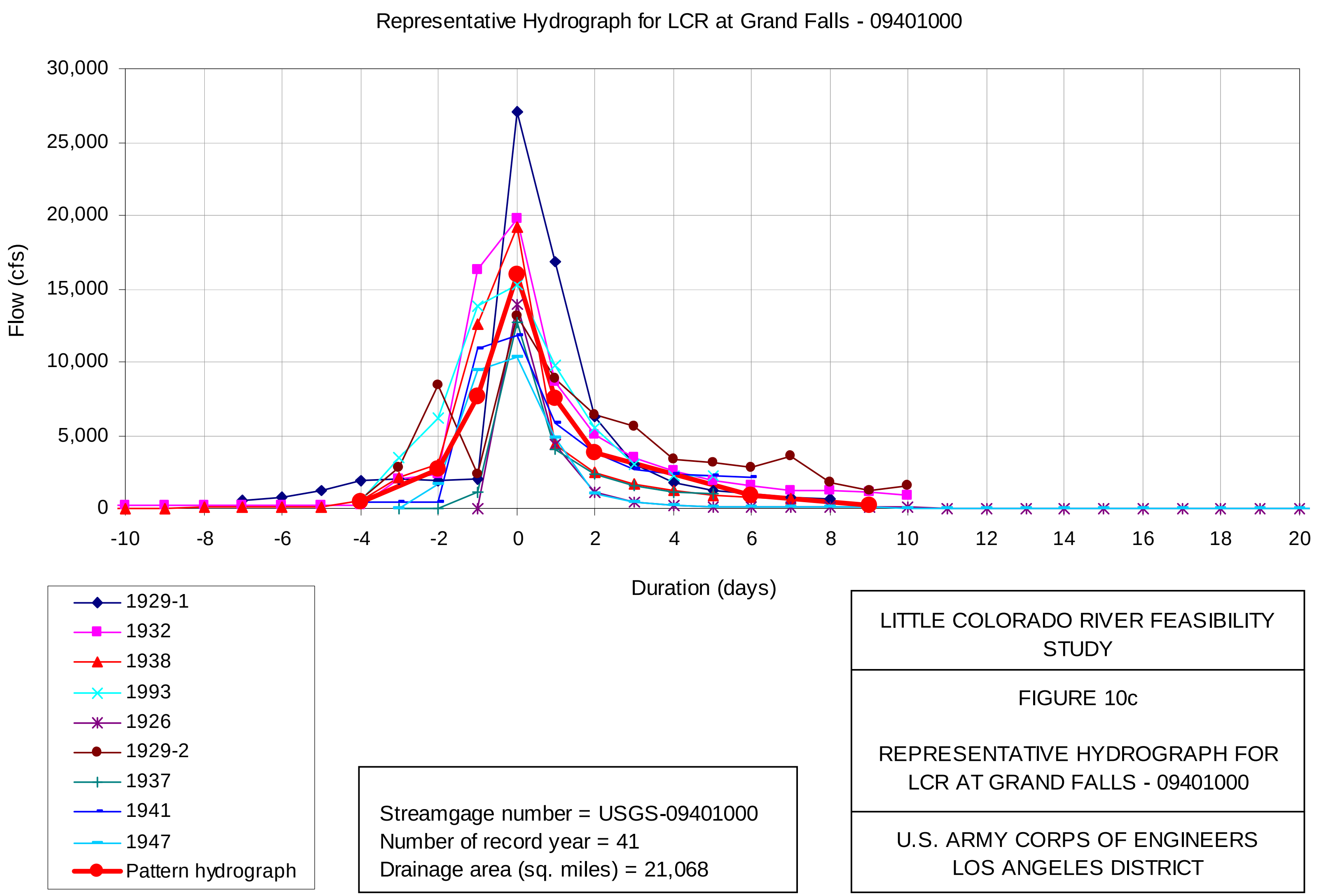
REPRESENTATIVE HYDROGRAPH FOR LCR AT HOLBROOK - 09397000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



Streamgage number = USGS-09400350
Number of record year = 8
Drainage area (sq. miles) = 16,192

LITTLE COLORADO RIVER FEASIBILITY STUDY
FIGURE 10b REPRESENTATIVE HYDROGRAPH FOR LCR NEAR WINSLOW - 09400350
U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

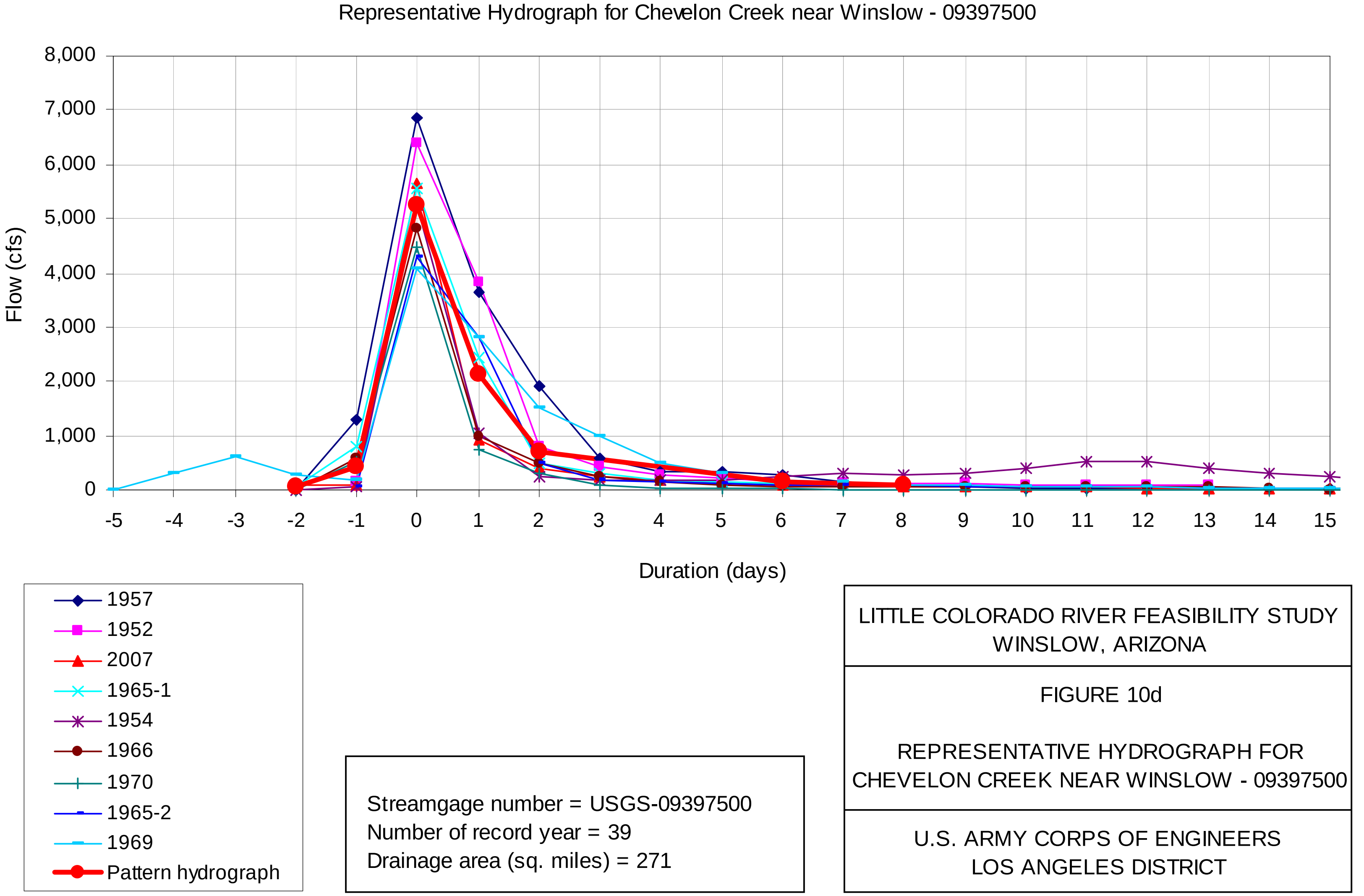


LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 10c

REPRESENTATIVE HYDROGRAPH FOR LCR AT GRAND FALLS - 09401000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



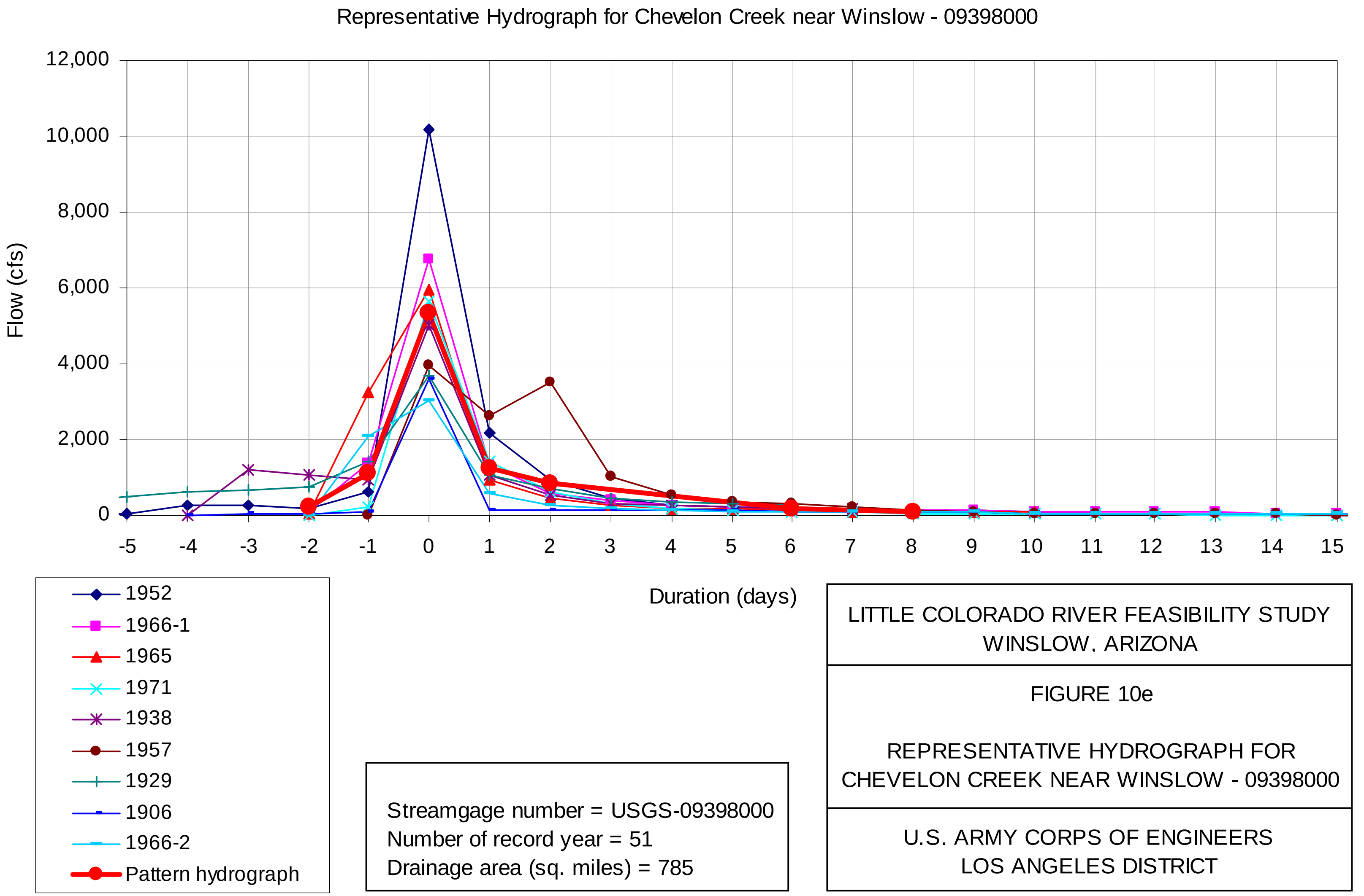
Streamgage number = USGS-09397500
Number of record year = 39
Drainage area (sq. miles) = 271

LITTLE COLORADO RIVER FEASIBILITY STUDY
WINSLOW, ARIZONA

FIGURE 10d

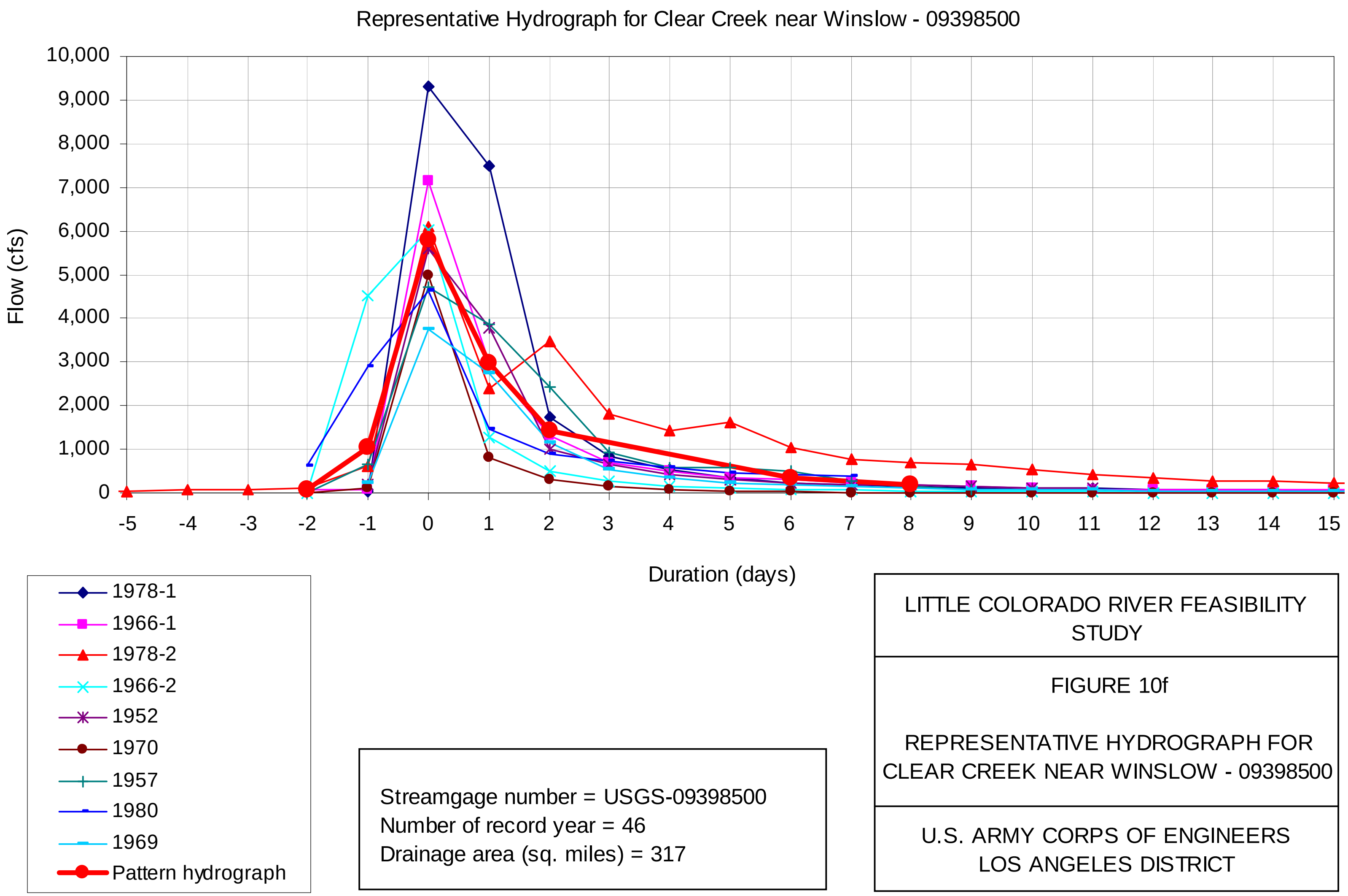
REPRESENTATIVE HYDROGRAPH FOR
CHEVELON CREEK NEAR WINSLOW - 09397500

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



Streamgage number = USGS-09398000
Number of record year = 51
Drainage area (sq. miles) = 785

LITTLE COLORADO RIVER FEASIBILITY STUDY WINSLOW, ARIZONA
FIGURE 10e REPRESENTATIVE HYDROGRAPH FOR CHEVELON CREEK NEAR WINSLOW - 09398000
U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



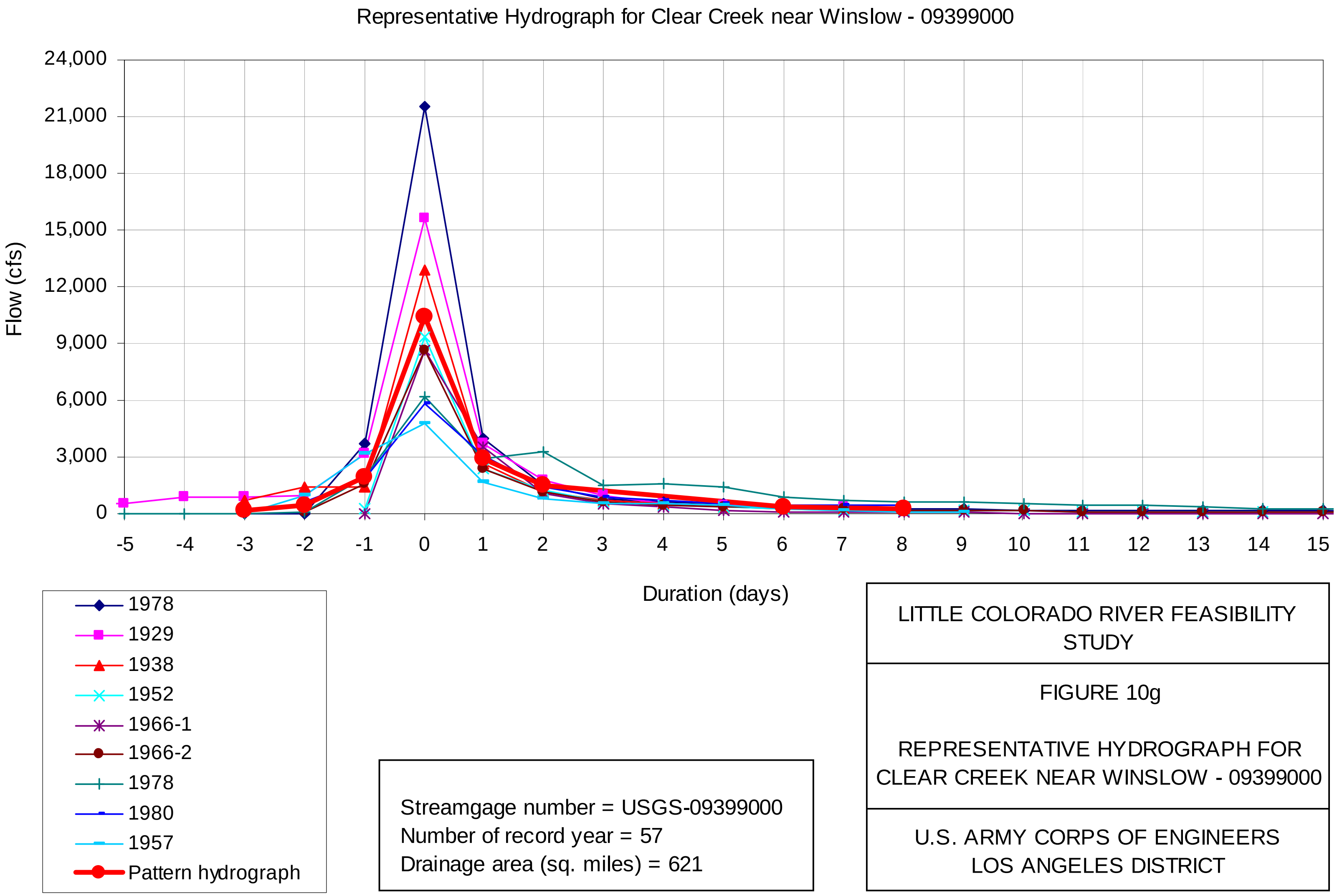
Streamgage number = USGS-09398500
Number of record year = 46
Drainage area (sq. miles) = 317

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 10f

REPRESENTATIVE HYDROGRAPH FOR CLEAR CREEK NEAR WINSLOW - 09398500

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



Streamgage number = USGS-09399000
Number of record year = 57
Drainage area (sq. miles) = 621

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 10g

REPRESENTATIVE HYDROGRAPH FOR CLEAR CREEK NEAR WINSLOW - 09399000

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

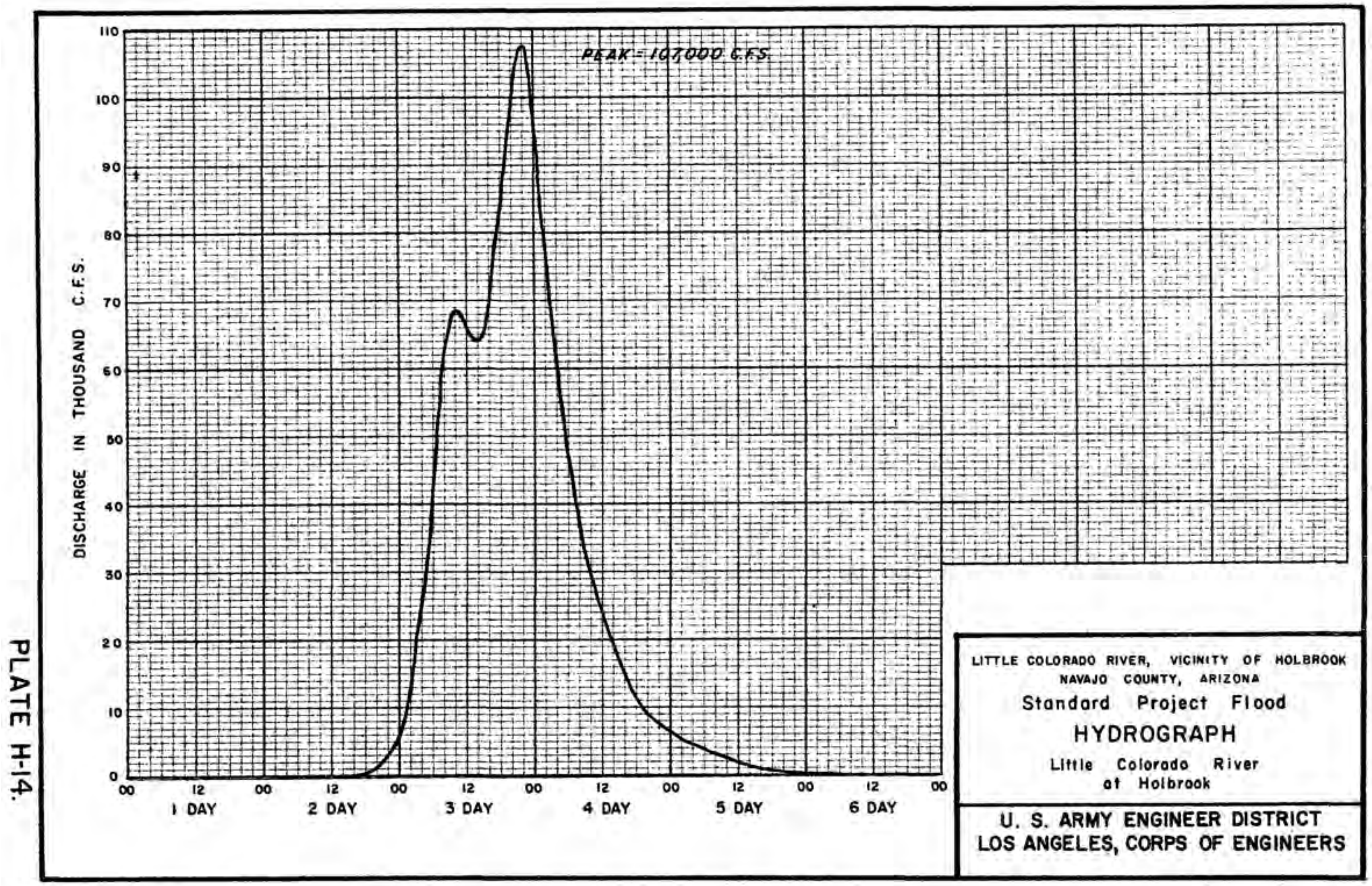
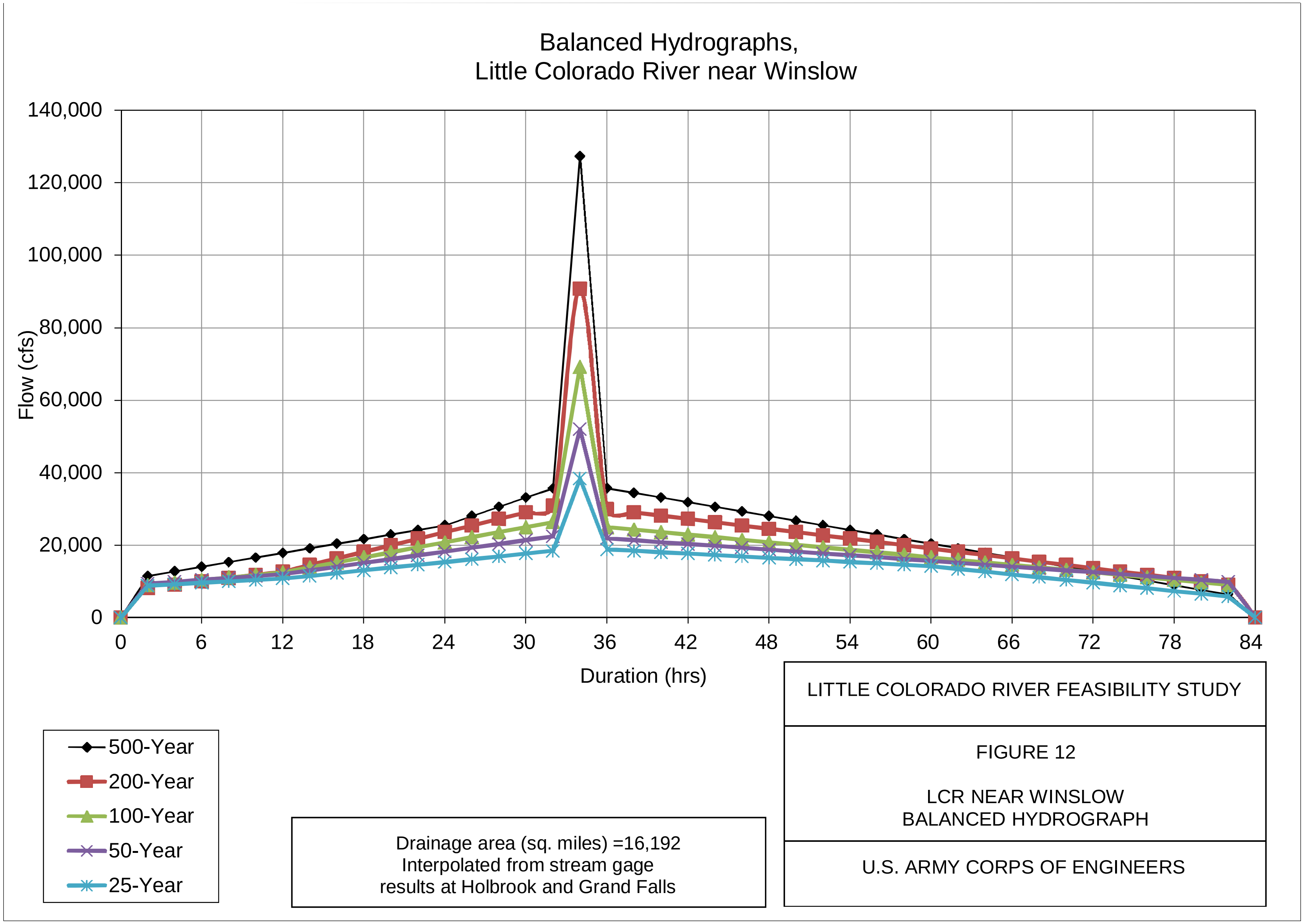
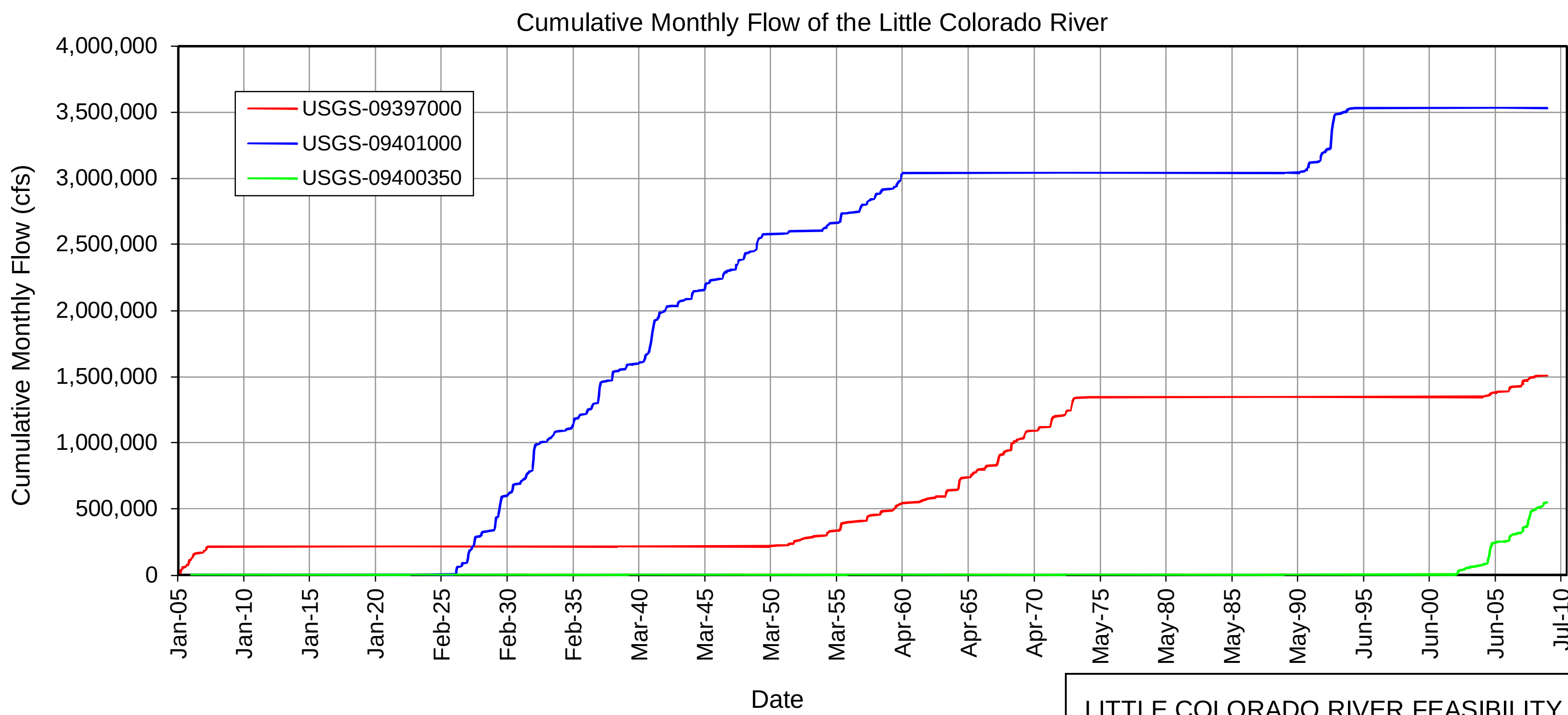


Figure 11 – Standard Project Flood Hydrograph, LCR at Holbrook


Balanced Hydrographs,
Little Colorado River near Winslow
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Flow (cfs)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
Duration (hrs)
500-Year
200-Year
100-Year
50-Year
25-Year
Drainage area (sq. miles) =16,192
Interpolated from stream gage
results at Holbrook and Grand Falls
LITTLE COLORADO RIVER FEASIBILITY STUDY
FIGURE 12
LCR NEAR WINSLOW
BALANCED HYDROGRAPH
U.S. ARMY CORPS OF ENGINEERS



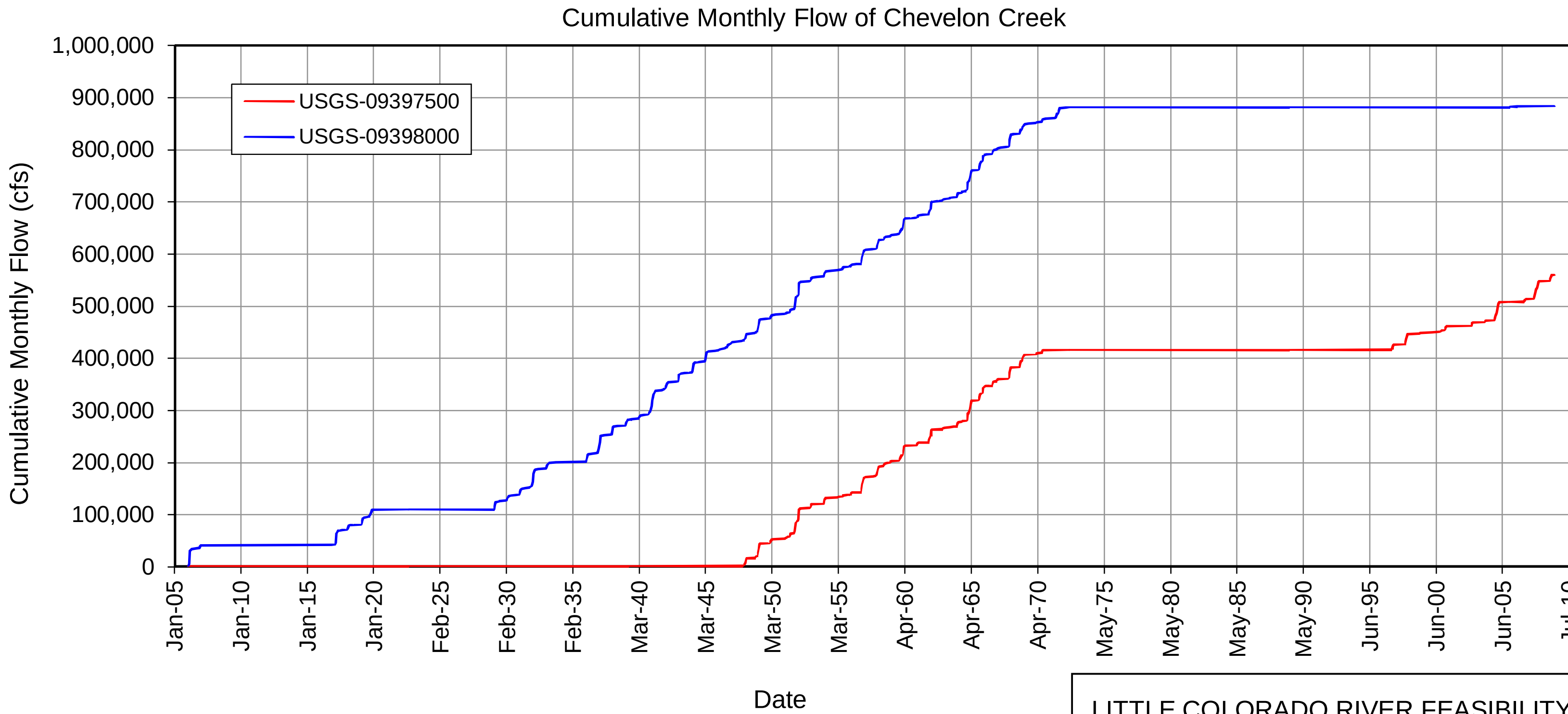
Number of record year	Drainage area (sq. miles)
USGS-09397000 => 35	USGS-09397000 => 11,462
USGS-09400350 => 8	USGS-09400350 => 16,192
USGS-09401000 => 41	USGS-09401000 => 21,068

LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 13a

CUMULATIVE MONTHLY FLOW OF THE LITTLE COLORADO RIVER

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 13b

CUMULATIVE MONTHLY FLOW OF CHEVELON CREEK

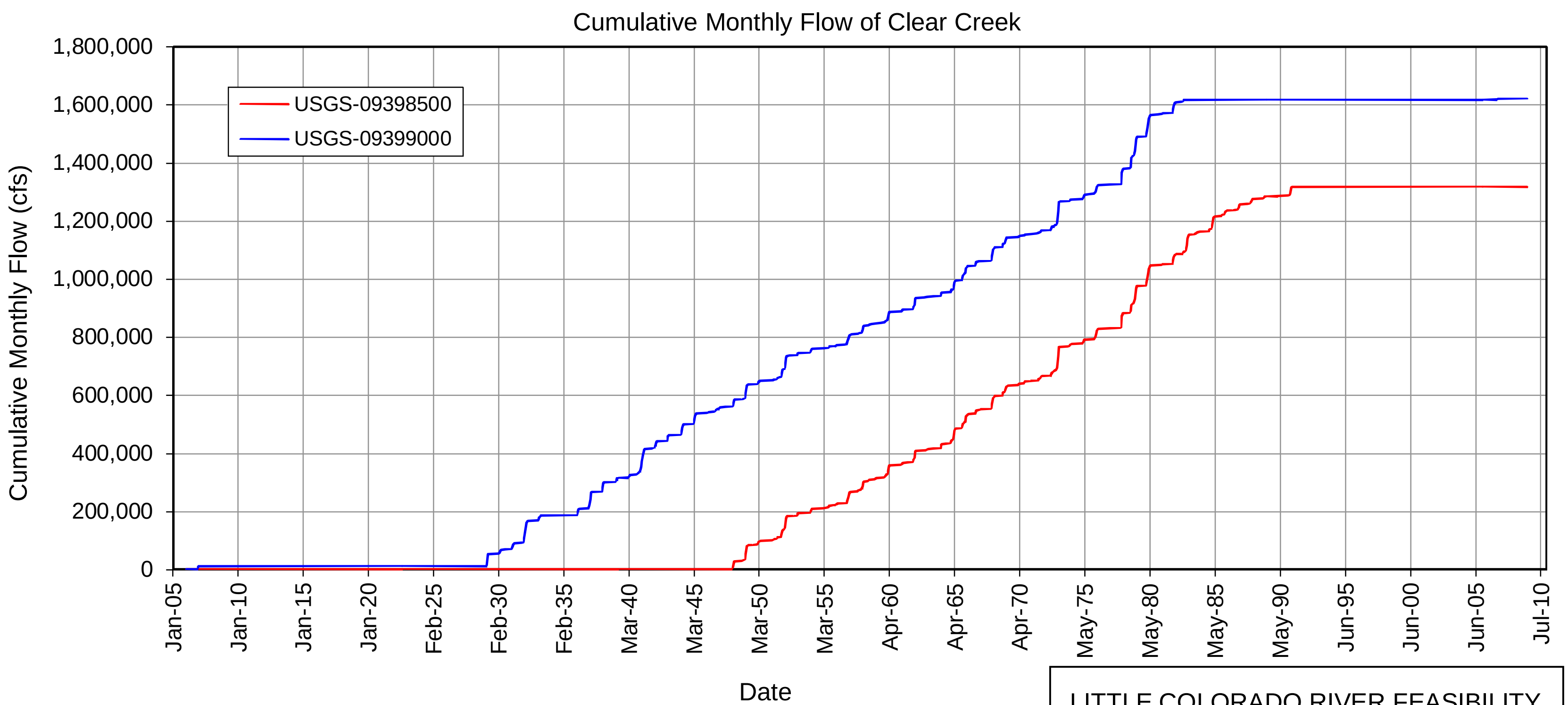
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

Number of record year

USGS-09397500 => 39
USGS-09398000 => 51

Drainage area (sq. miles)

USGS-09397500 => 271
USGS-09398000 => 785



LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 13c

CUMULATIVE MONTHLY FLOW OF CLEAR CREEK

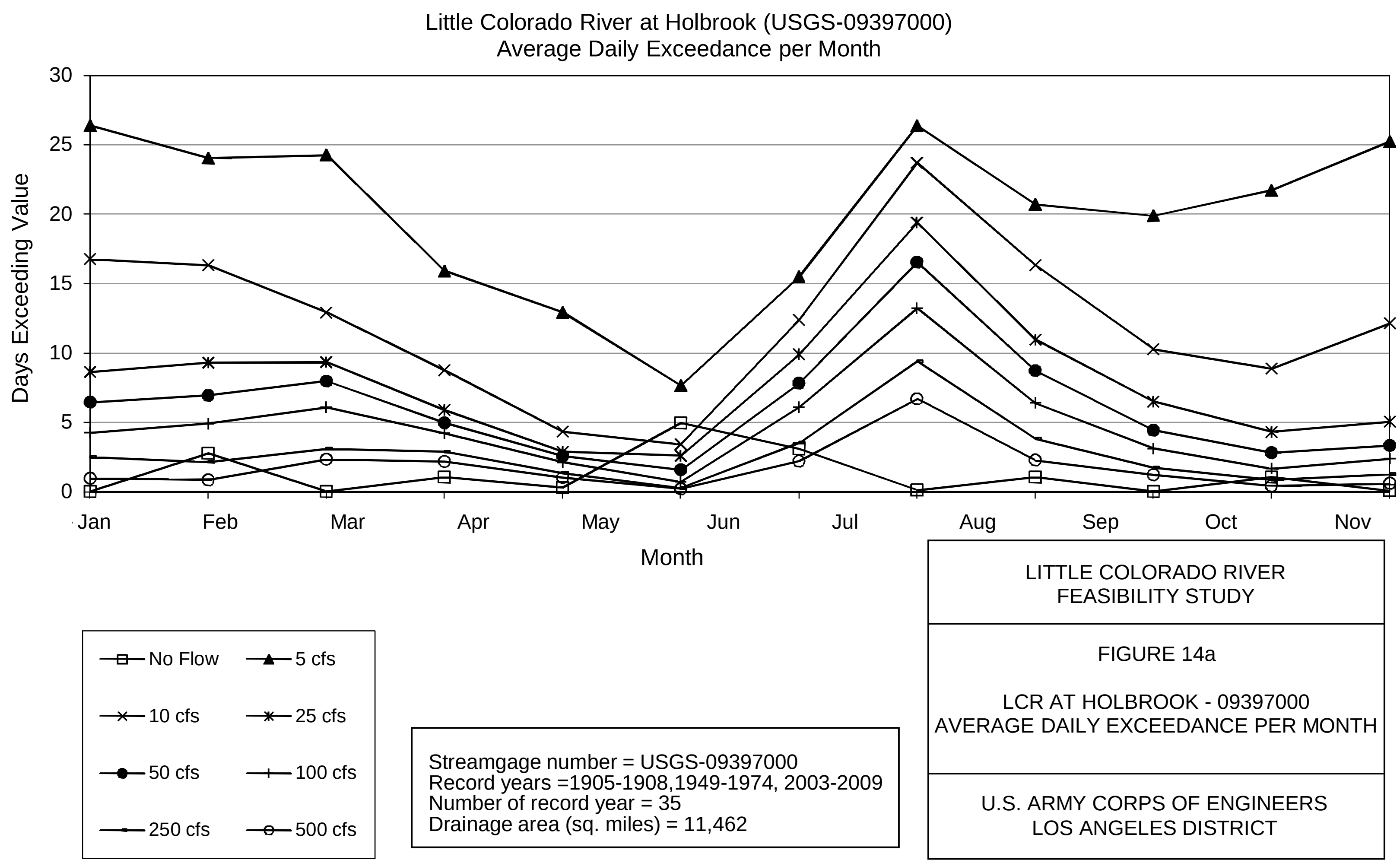
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

<u>Number of record year</u>

USGS-09398500 => 46
USGS-09399000 => 57

<u>Drainage area (sq. miles)</u>

USGS-09398500 => 317
USGS-09399000 => 621



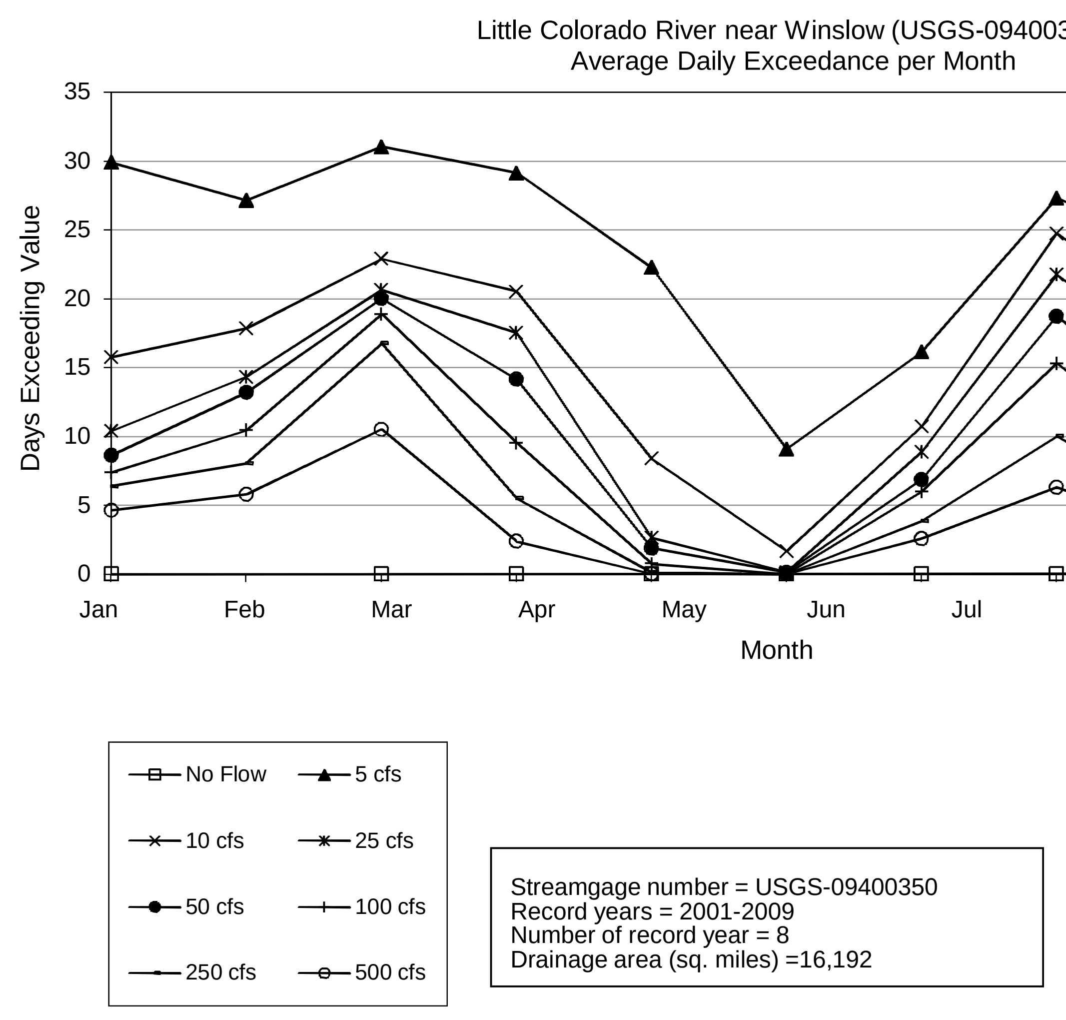
Streamgage number = USGS-09397000
Record years =1905-1908,1949-1974, 2003-2009
Number of record year = 35
Drainage area (sq. miles) = 11,462

LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14a

LCR AT HOLBROOK - 09397000
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



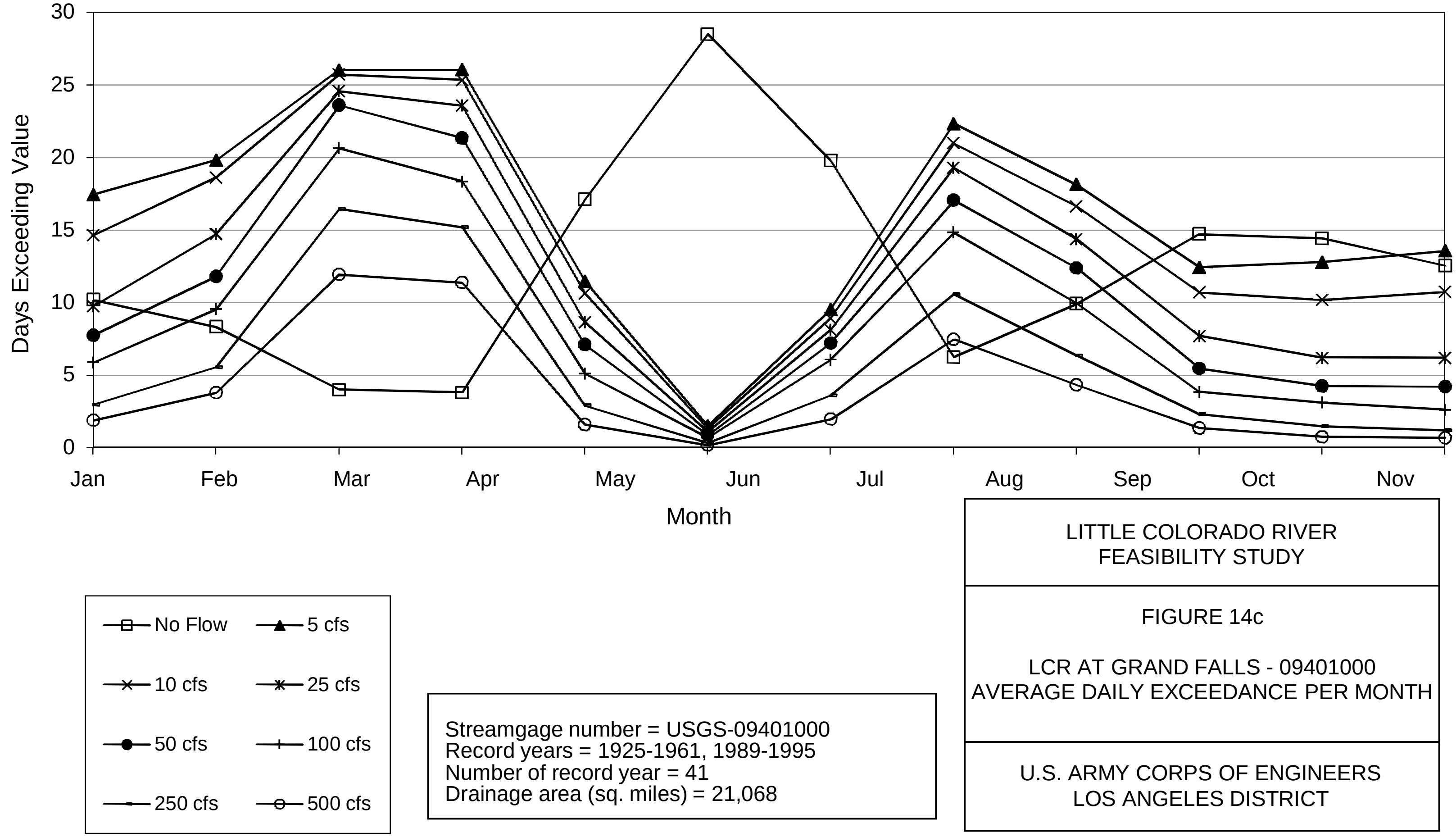
LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 14b

LCR NEAR WINSLOW - 09400350
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

Little Colorado River at Grand Falls (USGS-09401000)
Average Daily Exceedance per Month



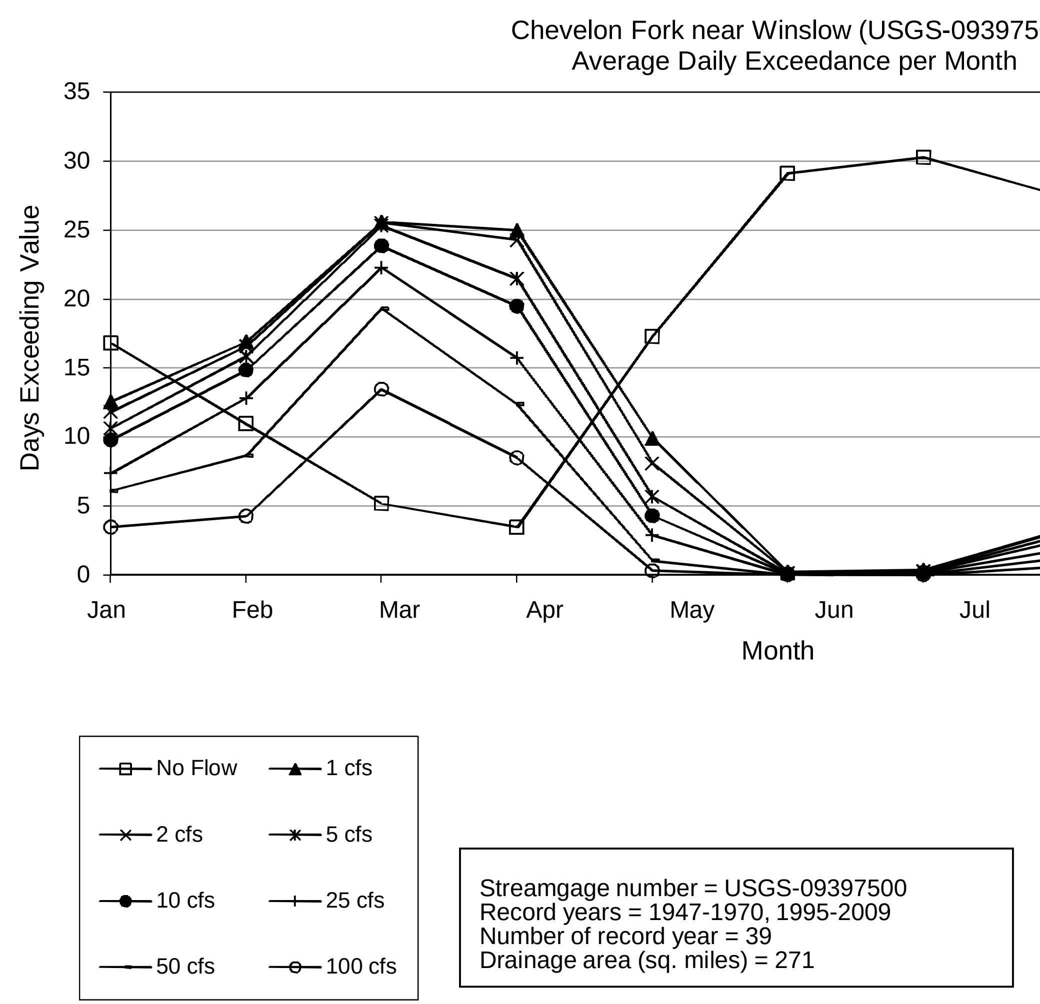
Streamgage number = USGS-09401000
Record years = 1925-1961, 1989-1995
Number of record year = 41
Drainage area (sq. miles) = 21,068

LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14c

LCR AT GRAND FALLS - 09401000
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

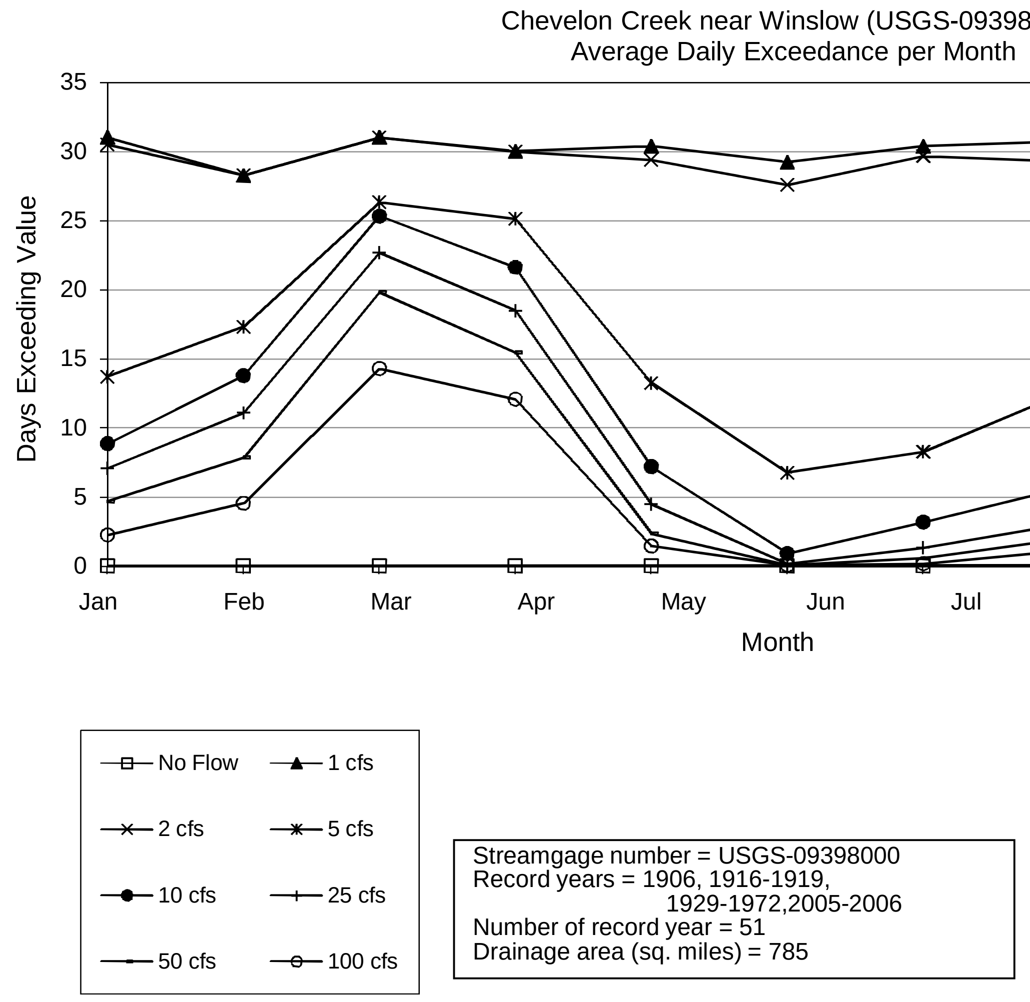


LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14d

CHEVELON CREEK NEAR WINSLOW - 09397500
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

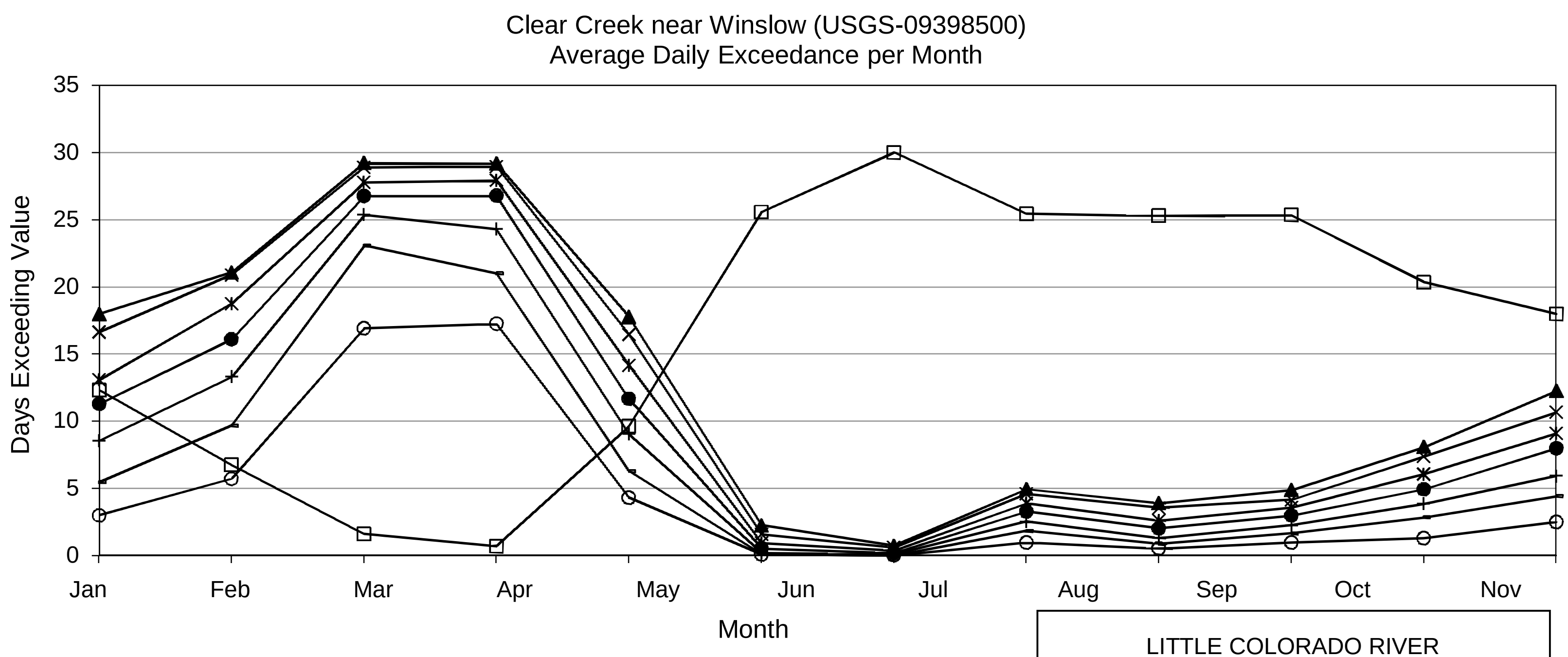


LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14e

CHEVELON CREEK NEAR WINSLOW - 09398000
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



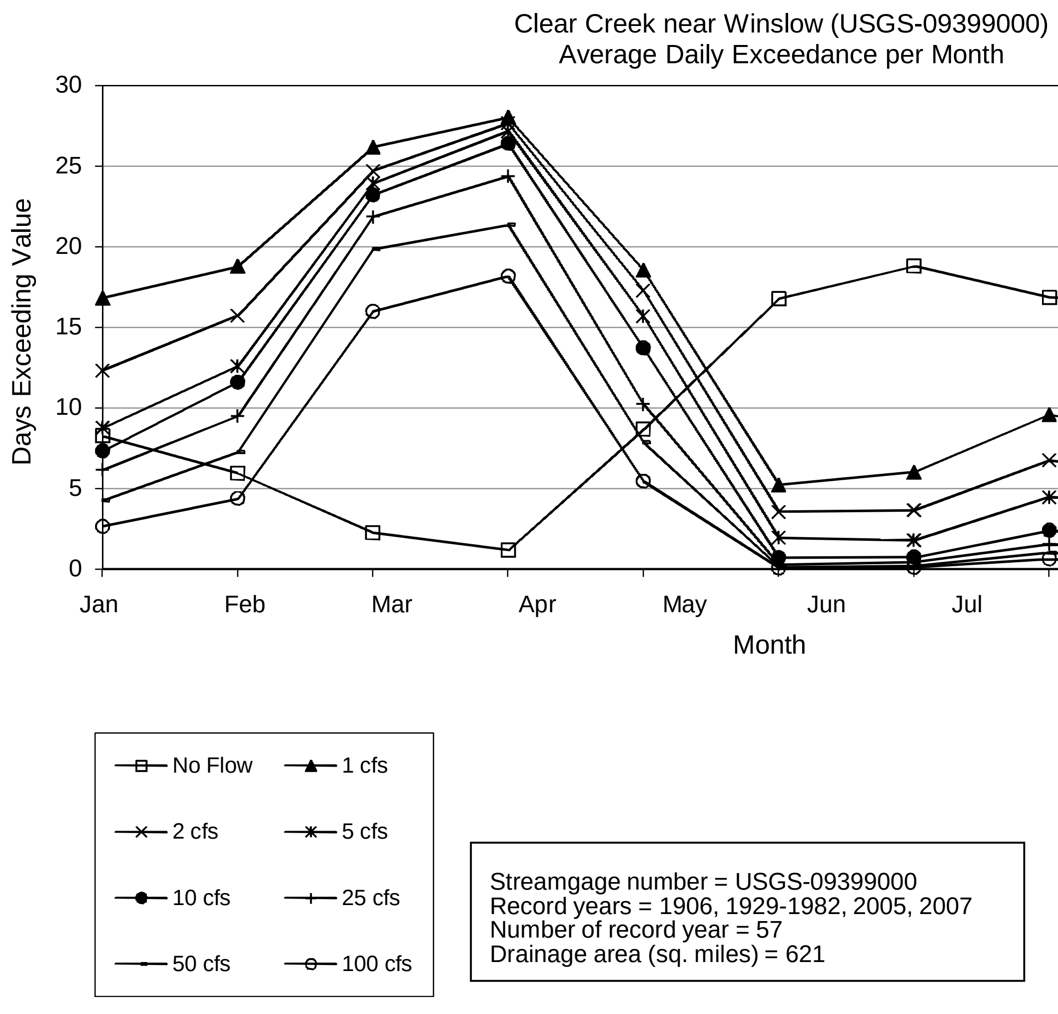
Streamgage number = USGS-09398500
Record years = 1947-1991, 1993
Number of record year = 46
Drainage area (sq. miles) = 317

LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14f

CLEAR CREEK NEAR WINSLOW - 09398500
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



LITTLE COLORADO RIVER
FEASIBILITY STUDY

FIGURE 14g

CLEAR CREEK NEAR WINSLOW - 09399000
AVERAGE DAILY EXCEEDANCE PER MONTH

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

Appendix A

Peak-Flow-Frequency Analysis Using Bulletin 17B

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Bulletin 17B Frequency Analysis
05 Nov 2009 11:01 AM

--- Input Data ---

Analysis Name: LCR at Holbrook 09397000
Description:

Data Set Name: LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /LITTLE COLORADO RIVER/HOLBROOK, AZ/FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Holbrook_09397000\LCR_at_Holbrook_09397000.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Holbrook_09397000\LCR_at_Holbrook_09397000.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 60000.0

Use Historic Data
Historic Period Start Year: 1906
Historic Period End Year: 2009
Year: 1923 Value: 60,000

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
27 Nov 1905	20,200.0	1	1923	60,000.0*	3.12
19 Sep 1923	60,000.0	2	1969	24,200.0	6.25
19 Jul 1950	2,960.0	3	1957	21,800.0	9.38
28 Aug 1951	8,700.0	4	1968	21,000.0	12.50
19 Jan 1952	8,400.0	5	1972	20,300.0	15.62
29 Jul 1953	6,030.0	6	1906	20,200.0	18.75
22 Jul 1954	10,800.0	7	1970	19,700.0	21.88
17 Aug 1955	10,500.0	8	1964	15,100.0	25.00
30 Jun 1956	4,210.0	9	1973	15,000.0	28.12
05 Aug 1957	21,800.0	10	1965	14,800.0	31.25
14 Sep 1958	7,000.0	11	1967	14,100.0	34.38
06 Aug 1959	6,300.0	12	1971	13,200.0	37.50
29 Oct 1959	11,400.0	13	1960	11,400.0	40.62
16 Aug 1961	4,160.0	14	1954	10,800.0	43.75

31 Oct 1961	4,010.0	15	1955	10,500.0	46.88
31 Aug 1963	9,370.0	16	1966	10,400.0	50.00
09 Sep 1964	15,100.0	17	2006	9,440.0	53.12
25 Jul 1965	14,800.0	18	1963	9,370.0	56.25
13 Aug 1966	10,400.0	19	1951	8,700.0	59.38
12 Aug 1967	14,100.0	20	1952	8,400.0	62.50
12 Aug 1968	21,000.0	21	1958	7,000.0	65.62
04 Oct 1968	24,200.0	22	2008	6,920.0	68.75
06 Sep 1970	19,700.0	23	2007	6,510.0	71.88
21 Aug 1971	13,200.0	24	1959	6,300.0	75.00
01 Oct 1971	20,300.0	25	1953	6,030.0	78.12
20 Oct 1972	15,000.0	26	1956	4,210.0	81.25
29 Sep 2004	3,690.0	27	1961	4,160.0	84.38
12 Aug 2005	3,560.0	28	1962	4,010.0	87.50
31 Jul 2006	9,440.0	29	2004	3,690.0	90.62
29 Jul 2007	6,510.0	30	2005	3,560.0	93.75
28 Jan 2008	6,920.0	31	1950	2,960.0	96.88

* Outlier

<< Skew Weighting >>

Based on 31 events, mean-square error of station skew = 0.182
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
79,735.2	99,673.4	0.2	145,979.3	52,994.2
63,320.7	74,779.6	0.5	109,488.4	43,600.3
52,454.8	59,645.0	1.0	86,637.7	37,145.6
42,786.9	47,066.8	2.0	67,327.6	31,197.2
34,198.5	36,556.7	4.0	51,115.0	25,701.8
31,644.1	33,545.9	5.0	46,488.1	24,019.1
24,297.9	25,194.4	10.0	33,761.2	19,019.4
17,732.2	18,062.9	20.0	23,254.2	14,275.2
9,850.6	9,850.6	50.0	12,119.2	7,996.5
5,577.6	5,483.6	80.0	6,932.2	4,247.7
4,174.5	4,041.9	90.0	5,323.4	3,014.8
3,298.9	3,134.6	95.0	4,321.3	2,268.3
2,141.1	1,925.9	99.0	2,971.8	1,333.8

<< Systematic Statistics >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.999	Historic Events	0
Standard Dev	0.299	High Outliers	0
Station Skew	0.249	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.118	Missing Events	0
Adopted Skew	0.118	Systematic Events	31

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 31 events, 10 percent outlier test deviate K(N) = 2.577
Computed low outlier test value = 1,697.36

0 low outlier(s) identified below test value of 1,697.36

<< High Outlier Test >>

Based on 31 events, 10 percent outlier test deviate K(N) = 2.577

Computed high outlier test value = 58,730.5

1 high outlier(s) identified above input threshold of 60,000

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and             *
*        comparison with similar data should be explored,     *
*        if not incorporated in this analysis.                *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Systematic Statistics >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.989	Historic Events	1
Standard Dev	0.283	High Outliers	1
Station Skew	0.101	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.118	Missing Events	0
Adopted Skew	0.118	Systematic Events	31
		Historic Period	104

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
31 Dec 1969	60,000.0	1	1923	60,000.0*	0.95
27 Nov 1905	20,200.0	2	1923	60,000.0	1.90
19 Sep 1923	60,000.0	3	1969	24,200.0	4.00
19 Jul 1950	2,960.0	4	1957	21,800.0	7.24
28 Aug 1951	8,700.0	5	1968	21,000.0	10.48
19 Jan 1952	8,400.0	6	1972	20,300.0	13.71
29 Jul 1953	6,030.0	7	1906	20,200.0	16.95
22 Jul 1954	10,800.0	8	1970	19,700.0	20.19
17 Aug 1955	10,500.0	9	1964	15,100.0	23.43
30 Jun 1956	4,210.0	10	1973	15,000.0	26.67
05 Aug 1957	21,800.0	11	1965	14,800.0	29.90
14 Sep 1958	7,000.0	12	1967	14,100.0	33.14
06 Aug 1959	6,300.0	13	1971	13,200.0	36.38
29 Oct 1959	11,400.0	14	1960	11,400.0	39.62
16 Aug 1961	4,160.0	15	1954	10,800.0	42.86
31 Oct 1961	4,010.0	16	1955	10,500.0	46.10
31 Aug 1963	9,370.0	17	1966	10,400.0	49.33
09 Sep 1964	15,100.0	18	2006	9,440.0	52.57
25 Jul 1965	14,800.0	19	1963	9,370.0	55.81
13 Aug 1966	10,400.0	20	1951	8,700.0	59.05
12 Aug 1967	14,100.0	21	1952	8,400.0	62.29
12 Aug 1968	21,000.0	22	1958	7,000.0	65.52
04 Oct 1968	24,200.0	23	2008	6,920.0	68.76
06 Sep 1970	19,700.0	24	2007	6,510.0	72.00
21 Aug 1971	13,200.0	25	1959	6,300.0	75.24
01 Oct 1971	20,300.0	26	1953	6,030.0	78.48
20 Oct 1972	15,000.0	27	1956	4,210.0	81.71
29 Sep 2004	3,690.0	28	1961	4,160.0	84.95
12 Aug 2005	3,560.0	29	1962	4,010.0	88.19
31 Jul 2006	9,440.0	30	2004	3,690.0	91.43
29 Jul 2007	6,510.0	31	2005	3,560.0	94.67
28 Jan 2008	6,920.0	32	1950	2,960.0	97.90

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.4

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.056

Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
67,084.1	82,092.8	0.2	117,804.2	45,835.4
54,407.1	63,284.4	0.5	90,720.8	38,382.8
45,820.7	51,518.2	1.0	73,284.1	33,159.1
38,022.0	41,491.0	2.0	58,179.4	28,257.6
30,941.4	32,899.9	4.0	45,163.1	23,641.8
28,802.9	30,396.3	5.0	41,379.5	22,209.1
22,553.8	23,323.2	10.0	30,776.0	17,891.3
16,818.2	17,110.2	20.0	21,746.4	13,694.6
9,673.0	9,673.0	50.0	11,773.1	7,941.8
5,623.1	5,531.7	80.0	6,907.7	4,345.6
4,252.7	4,121.5	90.0	5,355.5	3,122.6
3,384.0	3,219.7	95.0	4,374.7	2,368.8
2,216.0	1,996.0	99.0	3,032.8	1,407.8

<< Adjusted Statistics >>
LCR at Holbrook 09397000-HOLBROOK, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.989	Historic Events	1
Standard Dev	0.283	High Outliers	1
Station Skew	0.101	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.070	Missing Events	0
Adopted Skew	0.070	Systematic Events	31
		Historic Period	104

```
-------------------------------
Bulletin 17B Frequency Analysis
    05 Nov 2009   11:04 AM
-------------------------------


--- Input Data ---

Analysis Name: LCR near Joseph City 09397300
Description:

Data Set Name: LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /LITTLE COLORADO RIVER/JOSEPH CITY, AZ/FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_near_Joseph_City_09397300\LCR_near_Joseph
_City_09397300.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_near_Joseph_City_09397300\LCR_near_Joseph
_City_09397300.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 25400.0

Use Historic Data
Historic Period Start Year: 1971
Historic Period End Year: 2009
Year: 1978   Value: 25,400

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---


--- Preliminary Results ---

<< Plotting Positions >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK
-------------------------------------------------------------------
|     Events Analyzed        |            Ordered Events            |
|                      FLOW  |          Water         FLOW  Weibull |
| Day Mon Year          CFS  |  Rank     Year          CFS  Plot Pos |
|----------------------------|--------------------------------------|
|  01 Oct 1971    20,300.0   |    1       1979    25,400.0*   2.70   |
|  22 Jul 1974     3,880.0   |    2       1975    20,600.0    5.41   |
|  29 Oct 1974    20,600.0   |    3       1972    20,300.0    8.11   |
|  30 Jul 1976     3,880.0   |    4       1980    12,600.0   10.81   |
|  18 Aug 1977    12,000.0   |    5       1993    12,400.0   13.51   |
|  01 Mar 1978     5,200.0   |    6       1984    12,000.0   16.22   |
|  19 Dec 1978    25,400.0   |    7       1977    12,000.0   18.92   |
|  20 Feb 1980    12,600.0   |    8       1992    10,100.0   21.62   |
|  10 Aug 1981     6,230.0   |    9       1985     9,110.0   24.32   |
|  28 Jul 1982     6,590.0   |   10       2002     9,000.0   27.03   |
|  10 Dec 1982     8,540.0   |   11       1987     8,590.0   29.73   |
|  26 Sep 1984    12,000.0   |   12       1983     8,540.0   32.43   |
|  29 Apr 1985     9,110.0   |   13       1988     7,870.0   35.14   |
|  24 Sep 1986     5,590.0   |   14       2006     7,120.0   37.84   |
```

12 Oct 1986	8,590.0	15	1982	6,590.0	40.54
01 Nov 1987	7,870.0	16	1999	6,300.0	43.24
18 Aug 1989	6,100.0	17	1981	6,230.0	45.95
14 Jul 1990	3,560.0	18	2001	6,200.0	48.65
06 Jan 1991	5,960.0	19	1989	6,100.0	51.35
24 Aug 1992	10,100.0	20	2008	6,070.0	54.05
09 Jan 1993	12,400.0	21	1991	5,960.0	56.76
07 Oct 1993	3,890.0	22	2005	5,770.0	59.46
15 Feb 1995	5,690.0	23	1995	5,690.0	62.16
14 Sep 1996	4,270.0	24	1986	5,590.0	64.86
10 Aug 1997	4,570.0	25	2007	5,290.0	67.57
21 Jul 1998	4,180.0	26	1978	5,200.0	70.27
28 Aug 1999	6,300.0	27	2004	5,090.0	72.97
20 Aug 2000	1,430.0	28	1997	4,570.0	75.68
23 Oct 2000	6,200.0	29	1996	4,270.0	78.38
11 Sep 2002	9,000.0	30	1998	4,180.0	81.08
11 Sep 2003	2,630.0	31	1994	3,890.0	83.78
20 Sep 2004	5,090.0	32	1976	3,880.0	86.49
19 Feb 2005	5,770.0	33	1974	3,880.0	89.19
31 Jul 2006	7,120.0	34	1990	3,560.0	91.89
05 Aug 2007	5,290.0	35	2003	2,630.0	94.59
28 Jan 2008	6,070.0	36	2000	1,430.0*	97.30

* Outlier

<< Skew Weighting >>

Based on 36 events, mean-square error of station skew = 0.149
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
36,357.4	42,186.1	0.2	57,055.2	26,551.9
30,301.6	33,886.6	0.5	45,653.2	22,714.4
26,088.7	28,460.2	1.0	38,035.8	19,967.6
22,166.9	23,656.4	2.0	31,209.4	17,340.0
18,509.9	19,379.3	4.0	25,107.1	14,812.9
17,384.0	18,099.6	5.0	23,285.9	14,016.7
14,025.9	14,384.0	10.0	18,037.8	11,577.6
10,833.3	10,975.0	20.0	13,350.5	9,140.0
6,642.5	6,642.5	50.0	7,805.0	5,651.0
4,099.2	4,047.9	80.0	4,859.5	3,325.0
3,193.2	3,117.2	90.0	3,866.2	2,485.6
2,601.4	2,503.9	95.0	3,220.5	1,948.1
1,776.8	1,639.3	99.0	2,308.7	1,229.3

<< Systematic Statistics >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.824	Historic Events	0
Standard Dev	0.251	High Outliers	0
Station Skew	0.120	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.047	Missing Events	0
Adopted Skew	0.047	Systematic Events	36

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 36 events, 10 percent outlier test deviate K(N) = 2.639
Computed low outlier test value = 1,453.62

1 low outlier(s) identified below test value of 1,453.62

```
     Statistics and frequency curve adjusted for 1 low outlier(s)


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 36 events, 10 percent outlier test deviate K(N) = 2.639
                     Computed high outlier test value = 30,630.88

     1 high outlier(s) identified above input threshold of 25,400

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and            *
   *        comparison with similar data should be explored,    *
   *        if not incorporated in this analysis.               *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                               and 1 historic event(s)


<< Systematic Statistics >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK
---------------------------------------------------------------
|        Log Transform:         |                              |
|          FLOW, CFS            |       Number of Events       |
|-------------------------------|------------------------------|
|  Mean                  3.859  |  Historic Events          1  |
|  Standard Dev          0.242  |  High Outliers         1     |
|  Station Skew          0.733  |  Low Outliers          1     |
|  Regional Skew        -0.100  |  Zero Events           0     |
|  Weighted Skew         0.047  |  Missing Events        0     |
|  Adopted Skew          0.047  |  Systematic Events       36  |
|                               |  Historic Period         39  |
|-------------------------------|------------------------------|

<< Systematic Statistics >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK
---------------------------------------------------------------
|        Log Transform:         |                              |
|          FLOW, CFS            |       Number of Events       |
|-------------------------------|------------------------------|
|  Mean                  3.857  |  Historic Events          1  |
|  Standard Dev          0.240  |  High Outliers         1     |
|  Station Skew          0.732  |  Low Outliers          1     |
|  Regional Skew        -0.100  |  Zero Events           0     |
|  Weighted Skew         0.047  |  Missing Events        0     |
|  Adopted Skew          0.047  |  Systematic Events       36  |
|                               |  Historic Period         39  |
|-------------------------------|------------------------------|

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK
-------------------------------------------------------------------
|     Events Analyzed        |           Ordered Events              |
|                   FLOW     |           Water         FLOW  Weibull |
| Day Mon Year       CFS     |  Rank     Year           CFS  Plot Pos |
|----------------------------|---------------------------------------|
|  31 Dec 1969    25,400.0   |    1      1979      25,400.0*   2.50   |
|  01 Oct 1971    20,300.0   |    2      1978      25,400.0    5.00   |
|  22 Jul 1974     3,880.0   |    3      1975      20,600.0    7.57   |
|  29 Oct 1974    20,600.0   |    4      1972      20,300.0   10.21   |
|  30 Jul 1976     3,880.0   |    5      1980      12,600.0   12.86   |
|  18 Aug 1977    12,000.0   |    6      1993      12,400.0   15.50   |
|  01 Mar 1978     5,200.0   |    7      1984      12,000.0   18.14   |
|  19 Dec 1978    25,400.0   |    8      1977      12,000.0   20.79   |
|  20 Feb 1980    12,600.0   |    9      1992      10,100.0   23.43   |
|  10 Aug 1981     6,230.0   |   10      1985       9,110.0   26.07   |
|  28 Jul 1982     6,590.0   |   11      2002       9,000.0   28.71   |
|  10 Dec 1982     8,540.0   |   12      1987       8,590.0   31.36   |
|  26 Sep 1984    12,000.0   |   13      1983       8,540.0   34.00   |
|  29 Apr 1985     9,110.0   |   14      1988       7,870.0   36.64   |
|  24 Sep 1986     5,590.0   |   15      2006       7,120.0   39.29   |
|  12 Oct 1986     8,590.0   |   16      1982       6,590.0   41.93   |
```

01 Nov 1987	7,870.0	17	1999	6,300.0	44.57
18 Aug 1989	6,100.0	18	1981	6,230.0	47.21
14 Jul 1990	3,560.0	19	2001	6,200.0	49.86
06 Jan 1991	5,960.0	20	1989	6,100.0	52.50
24 Aug 1992	10,100.0	21	2008	6,070.0	55.14
09 Jan 1993	12,400.0	22	1991	5,960.0	57.79
07 Oct 1993	3,890.0	23	2005	5,770.0	60.43
15 Feb 1995	5,690.0	24	1995	5,690.0	63.07
14 Sep 1996	4,270.0	25	1986	5,590.0	65.71
10 Aug 1997	4,570.0	26	2007	5,290.0	68.36
21 Jul 1998	4,180.0	27	1978	5,200.0	71.00
28 Aug 1999	6,300.0	28	2004	5,090.0	73.64
20 Aug 2000	1,430.0	29	1997	4,570.0	76.29
23 Oct 2000	6,200.0	30	1996	4,270.0	78.93
11 Sep 2002	9,000.0	31	1998	4,180.0	81.57
11 Sep 2003	2,630.0	32	1994	3,890.0	84.21
20 Sep 2004	5,090.0	33	1976	3,880.0	86.86
19 Feb 2005	5,770.0	34	1974	3,880.0	89.50
31 Jul 2006	7,120.0	35	1990	3,560.0	92.14
05 Aug 2007	5,290.0	36	2003	2,630.0	94.79
28 Jan 2008	6,070.0	37	2000	1,430.0*	97.43

Note: Plotting positions based on historic period (H) = 39
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.0571

* Outlier

<< Skew Weighting >>

Based on 39 events, mean-square error of station skew =	0.191
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
46,280.1	56,240.3	0.2	75,577.5	32,963.4
36,672.0	42,301.6	0.5	56,795.1	27,031.5
30,438.3	33,919.4	1.0	45,216.4	23,043.5
24,977.4	27,029.0	2.0	35,535.3	19,432.7
20,190.8	21,309.1	4.0	27,466.1	16,150.2
18,777.9	19,674.2	5.0	25,169.8	15,154.9
14,738.1	15,163.5	10.0	18,854.9	12,221.9
11,145.4	11,303.2	20.0	13,615.5	9,464.0
6,807.2	6,807.2	50.0	7,947.1	5,813.4
4,382.5	4,336.4	80.0	5,168.5	3,576.1
3,552.4	3,484.9	90.0	4,263.5	2,800.7
3,017.2	2,929.5	95.0	3,683.6	2,307.9
2,274.9	2,151.6	99.0	2,874.3	1,643.7

<< Synthetic Statistics >>
LCR near Joseph City 09397300-JOSEPH CITY, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.849	Historic Events	1
Standard Dev	0.243	High Outliers	1
Station Skew	0.717	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.400	Missing Events	0
Adopted Skew	0.400	Systematic Events	36
		Historic Period	39

Bulletin 17B Frequency Analysis
05 Nov 2009 11:05 AM

--- Input Data ---

Analysis Name: LCR at Holbrook Combined Gage
Description:

Data Set Name: LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR WINSLOW\ANALYSIS\ANALYSIS-FINAL/COMBINED/FLOW-PEAK/01jan1900/IR-CENTURY/09397000-COMBINED/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Holbrook_Combined_Gage\LCR_at_Holbrook_Combined_Gage.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Holbrook_Combined_Gage\LCR_at_Holbrook_Combined_Gage.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 60000.0

Use Historic Data
Historic Period Start Year: 1906
Historic Period End Year: 2009
Year: 1923 Value: 60,000

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Water Year	FLOW cfs	Weibull Plot Pos
27 Nov 1905	20,200.0	1	1923	60,000.0*	1.61
19 Sep 1923	60,000.0	2	1969	24,200.0	3.23
19 Jul 1950	2,960.0	3	1979	23,509.0	4.84
28 Aug 1951	8,700.0	4	1957	21,800.0	6.45
19 Jan 1952	8,400.0	5	1968	21,000.0	8.06
29 Jul 1953	6,030.0	6	1972	20,300.0	9.68
22 Jul 1954	10,800.0	7	1906	20,200.0	11.29
17 Aug 1955	10,500.0	8	1970	19,700.0	12.90
30 Jun 1956	4,210.0	9	1975	19,066.0	14.52
05 Aug 1957	21,800.0	10	1964	15,100.0	16.13
14 Sep 1958	7,000.0	11	1973	15,000.0	17.74
06 Aug 1959	6,300.0	12	1965	14,800.0	19.35
29 Oct 1959	11,400.0	13	1967	14,100.0	20.97

16 Aug 1961	4,160.0	14	1971	13,200.0	22.58
31 Oct 1961	4,010.0	15	1980	11,662.0	24.19
31 Aug 1963	9,370.0	16	1993	11,477.0	25.81
09 Sep 1964	15,100.0	17	1960	11,400.0	27.42
25 Jul 1965	14,800.0	18	1984	11,107.0	29.03
13 Aug 1966	10,400.0	19	1977	11,107.0	30.65
12 Aug 1967	14,100.0	20	1954	10,800.0	32.26
12 Aug 1968	21,000.0	21	1955	10,500.0	33.87
04 Oct 1968	24,200.0	22	1966	10,400.0	35.48
06 Sep 1970	19,700.0	23	2006	9,440.0	37.10
21 Aug 1971	13,200.0	24	1963	9,370.0	38.71
01 Oct 1971	20,300.0	25	1992	9,348.0	40.32
20 Oct 1972	15,000.0	26	1951	8,700.0	41.94
22 Jul 1974	3,591.0	27	1985	8,432.0	43.55
29 Oct 1974	19,066.0	28	1952	8,400.0	45.16
30 Jul 1976	3,591.0	29	2002	8,330.0	46.77
18 Aug 1977	11,107.0	30	1987	7,950.0	48.39
01 Mar 1978	4,813.0	31	1983	7,904.0	50.00
19 Dec 1978	23,509.0	32	1988	7,284.0	51.61
20 Feb 1980	11,662.0	33	1958	7,000.0	53.23
10 Aug 1981	5,766.0	34	2008	6,920.0	54.84
28 Jul 1982	6,099.0	35	2007	6,510.0	56.45
10 Dec 1982	7,904.0	36	1959	6,300.0	58.06
26 Sep 1984	11,107.0	37	1982	6,099.0	59.68
29 Apr 1985	8,432.0	38	1953	6,030.0	61.29
24 Sep 1986	5,174.0	39	1999	5,831.0	62.90
12 Oct 1986	7,950.0	40	1981	5,766.0	64.52
01 Nov 1987	7,284.0	41	2001	5,738.0	66.13
18 Aug 1989	5,646.0	42	1989	5,646.0	67.74
14 Jul 1990	3,295.0	43	1991	5,516.0	69.35
06 Jan 1991	5,516.0	44	1995	5,266.0	70.97
24 Aug 1992	9,348.0	45	1986	5,174.0	72.58
09 Jan 1993	11,477.0	46	1978	4,813.0	74.19
07 Oct 1993	3,600.0	47	1997	4,230.0	75.81
15 Feb 1995	5,266.0	48	1956	4,210.0	77.42
14 Sep 1996	3,952.0	49	1961	4,160.0	79.03
11 Aug 1997	4,230.0	50	1962	4,010.0	80.65
22 Jul 1998	3,869.0	51	1996	3,952.0	82.26
28 Aug 1999	5,831.0	52	1998	3,869.0	83.87
21 Aug 2000	1,324.0	53	2004	3,690.0	85.48
23 Oct 2000	5,738.0	54	1994	3,600.0	87.10
11 Sep 2002	8,330.0	55	1976	3,591.0	88.71
11 Sep 2003	2,434.0	56	1974	3,591.0	90.32
29 Sep 2004	3,690.0	57	2005	3,560.0	91.94
12 Aug 2005	3,560.0	58	1990	3,295.0	93.55
31 Jul 2006	9,440.0	59	1950	2,960.0	95.16
29 Jul 2007	6,510.0	60	2003	2,434.0	96.77
29 Jan 2008	6,920.0	61	2000	1,324.0	98.39

* Outlier

<< Skew Weighting >>

Based on 61 events, mean-square error of station skew = 0.101
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
64,559.1	72,204.4	0.2	96,711.5	47,501.7
50,844.0	55,292.0	0.5	73,281.4	38,456.8
41,863.9	44,669.8	1.0	58,508.8	32,363.2
33,949.7	35,627.5	2.0	45,936.8	26,847.7
26,986.6	27,913.6	4.0	35,290.2	21,849.4
24,929.1	25,676.7	5.0	32,231.0	20,339.9
19,050.4	19,404.1	10.0	23,749.5	15,921.2
13,849.4	13,980.0	20.0	16,638.0	11,835.7
7,682.1	7,682.1	50.0	8,886.1	6,635.6
4,375.9	4,339.5	80.0	5,123.6	3,638.4
3,294.9	3,243.7	90.0	3,934.8	2,651.1
2,620.6	2,557.1	95.0	3,192.5	2,045.2
1,727.6	1,644.1	99.0	2,194.7	1,268.3

<< Systematic Statistics >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	3.894	Historic Events	0
Standard Dev	0.298	High Outliers	0
Station Skew	0.253	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.165	Missing Events	0
Adopted Skew	0.165	Systematic Events	61

--- End of Preliminary Results ---

<< Low Outlier Test >>

```
 Based on 61 events, 10 percent outlier test deviate K(N) = 2.842
                      Computed low outlier test value = 1,116.15

         0 low outlier(s) identified below test value of 1,116.15
```

<< High Outlier Test >>

```
 Based on 61 events, 10 percent outlier test deviate K(N) = 2.842
                    Computed high outlier test value = 54,895.28

     1 high outlier(s) identified above input threshold of 60,000

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and         *
   *        comparison with similar data should be explored, *
   *        if not incorporated in this analysis.            *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                          and 1 historic event(s)
```

<< Systematic Statistics >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	3.896	Historic Events	1
Standard Dev	0.300	High Outliers	1
Station Skew	0.291	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.165	Missing Events	0
Adopted Skew	0.165	Systematic Events	61
		Historic Period	104

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Water Year	FLOW cfs	Weibull Plot Pos
31 Dec 1969	60,000.0	1	1923	60,000.0*	0.95
27 Nov 1905	20,200.0	2	1923	60,000.0	1.90
19 Sep 1923	60,000.0	3	1969	24,200.0	3.19
19 Jul 1950	2,960.0	4	1979	23,509.0	4.81
28 Aug 1951	8,700.0	5	1957	21,800.0	6.43
19 Jan 1952	8,400.0	6	1968	21,000.0	8.05
29 Jul 1953	6,030.0	7	1972	20,300.0	9.67
22 Jul 1954	10,800.0	8	1906	20,200.0	11.29
17 Aug 1955	10,500.0	9	1970	19,700.0	12.90
30 Jun 1956	4,210.0	10	1975	19,066.0	14.52
05 Aug 1957	21,800.0	11	1964	15,100.0	16.14
14 Sep 1958	7,000.0	12	1973	15,000.0	17.76
06 Aug 1959	6,300.0	13	1965	14,800.0	19.38

29 Oct 1959	11,400.0	14	1967	14,100.0	21.00
16 Aug 1961	4,160.0	15	1971	13,200.0	22.62
31 Oct 1961	4,010.0	16	1980	11,662.0	24.24
31 Aug 1963	9,370.0	17	1993	11,477.0	25.86
09 Sep 1964	15,100.0	18	1960	11,400.0	27.48
25 Jul 1965	14,800.0	19	1984	11,107.0	29.10
13 Aug 1966	10,400.0	20	1977	11,107.0	30.71
12 Aug 1967	14,100.0	21	1954	10,800.0	32.33
12 Aug 1968	21,000.0	22	1955	10,500.0	33.95
04 Oct 1968	24,200.0	23	1966	10,400.0	35.57
06 Sep 1970	19,700.0	24	2006	9,440.0	37.19
21 Aug 1971	13,200.0	25	1963	9,370.0	38.81
01 Oct 1971	20,300.0	26	1992	9,348.0	40.43
20 Oct 1972	15,000.0	27	1951	8,700.0	42.05
22 Jul 1974	3,591.0	28	1985	8,432.0	43.67
29 Oct 1974	19,066.0	29	1952	8,400.0	45.29
30 Jul 1976	3,591.0	30	2002	8,330.0	46.90
18 Aug 1977	11,107.0	31	1987	7,950.0	48.52
01 Mar 1978	4,813.0	32	1983	7,904.0	50.14
19 Dec 1978	23,509.0	33	1988	7,284.0	51.76
20 Feb 1980	11,662.0	34	1958	7,000.0	53.38
10 Aug 1981	5,766.0	35	2008	6,920.0	55.00
28 Jul 1982	6,099.0	36	2007	6,510.0	56.62
10 Dec 1982	7,904.0	37	1959	6,300.0	58.24
26 Sep 1984	11,107.0	38	1982	6,099.0	59.86
29 Apr 1985	8,432.0	39	1953	6,030.0	61.48
24 Sep 1986	5,174.0	40	1999	5,831.0	63.10
12 Oct 1986	7,950.0	41	1981	5,766.0	64.71
01 Nov 1987	7,284.0	42	2001	5,738.0	66.33
18 Aug 1989	5,646.0	43	1989	5,646.0	67.95
14 Jul 1990	3,295.0	44	1991	5,516.0	69.57
06 Jan 1991	5,516.0	45	1995	5,266.0	71.19
24 Aug 1992	9,348.0	46	1986	5,174.0	72.81
09 Jan 1993	11,477.0	47	1978	4,813.0	74.43
07 Oct 1993	3,600.0	48	1997	4,230.0	76.05
15 Feb 1995	5,266.0	49	1956	4,210.0	77.67
14 Sep 1996	3,952.0	50	1961	4,160.0	79.29
11 Aug 1997	4,230.0	51	1962	4,010.0	80.90
22 Jul 1998	3,869.0	52	1996	3,952.0	82.52
28 Aug 1999	5,831.0	53	1998	3,869.0	84.14
21 Aug 2000	1,324.0	54	2004	3,690.0	85.76
23 Oct 2000	5,738.0	55	1994	3,600.0	87.38
11 Sep 2002	8,330.0	56	1976	3,591.0	89.00
11 Sep 2003	2,434.0	57	1974	3,591.0	90.62
29 Sep 2004	3,690.0	58	2005	3,560.0	92.24
12 Aug 2005	3,560.0	59	1990	3,295.0	93.86
31 Jul 2006	9,440.0	60	1950	2,960.0	95.48
29 Jul 2007	6,510.0	61	2003	2,434.0	97.10
29 Jan 2008	6,920.0	62	2000	1,324.0	98.71

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.7

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.065
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
69,299.3	78,022.6	0.2	104,970.0	50,578.6
53,862.2	58,846.1	0.5	78,319.5	40,478.4
43,914.0	47,011.8	1.0	61,814.5	33,771.5
35,268.1	37,093.8	2.0	47,985.4	27,777.7
27,768.9	28,762.2	4.0	36,458.6	22,416.5
25,574.6	26,371.2	5.0	33,182.5	20,811.9
19,366.5	19,738.3	10.0	24,196.7	16,157.6
13,959.8	14,095.0	20.0	16,790.8	11,916.8
7,675.5	7,675.5	50.0	8,887.6	6,621.0
4,375.4	4,339.5	80.0	5,129.8	3,632.1
3,307.9	3,257.7	90.0	3,954.4	2,658.7
2,644.7	2,582.4	95.0	3,223.3	2,063.4
1,768.2	1,686.4	99.0	2,243.6	1,300.8

<< Adjusted Statistics >>
LCR at Holbrook Combined Gage-COMBINED-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	3.896	Historic Events	1
Standard Dev	0.300	High Outliers	1
Station Skew	0.291	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.222	Missing Events	0
Adopted Skew	0.222	Systematic Events	61
		Historic Period	104

```
------------------------------
Bulletin 17B Frequency Analysis
    05 Nov 2009   11:06 AM
------------------------------


--- Input Data ---

Analysis Name: LCR at Grand Falls  09401000
Description:

Data Set Name: LCR at Grand Falls  09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /LITTLE COLO. RIVER/GRAND FALLS, ARIZ./FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Grand_Falls__09401000\LCR_at_Grand_Fal
ls__09401000.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\LCR_at_Grand_Falls__09401000\LCR_at_Grand_Fal
ls__09401000.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 120000.0

Use Historic Data
Historic Period Start Year: 1923
Historic Period End Year: 2009
Year: 1923   Value: 120,000

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---


--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls  09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK
--------------------------------------------------------------------
|     Events Analyzed        |            Ordered Events              |
|                     FLOW   |           Water        FLOW  Weibull   |
| Day Mon Year         CFS   |  Rank     Year          CFS  Plot Pos  |
|----------------------------|----------------------------------------|
|  19 Sep 1923   120,000.0   |    1       1923   120,000.0*   2.27    |
|  27 Sep 1926    27,800.0   |    2       1929    50,500.0    4.55    |
|  28 Jun 1927    28,800.0   |    3       1938    38,000.0    6.82    |
|  07 Feb 1928     2,140.0   |    4       1932    31,000.0    9.09    |
|  05 Apr 1929    50,500.0   |    5       1927    28,800.0   11.36    |
|  19 Jul 1930    13,700.0   |    6       1926    27,800.0   13.64    |
|  01 Aug 1931     6,530.0   |    7       1952    26,100.0   15.91    |
|  10 Feb 1932    31,000.0   |    8       1937    21,800.0   18.18    |
|  12 Sep 1933     7,500.0   |    9       1940    20,100.0   20.45    |
|  07 Oct 1933     4,920.0   |   10       1941    17,000.0   22.73    |
|  10 Apr 1935     7,350.0   |   11       1993    16,600.0   25.00    |
|  06 Aug 1936     5,430.0   |   12       1930    13,700.0   27.27    |
|  09 Feb 1937    21,800.0   |   13       1972    13,200.0   29.55    |
|  05 Mar 1938    38,000.0   |   14       1946    12,900.0   31.82    |
```

05 Apr 1939	6,680.0	15	1948	12,400.0	34.09
27 Jul 1940	20,100.0	16	1970	11,400.0	36.36
15 Mar 1941	17,000.0	17	1947	10,600.0	38.64
04 Oct 1941	8,760.0	18	1949	10,400.0	40.91
28 Sep 1943	3,900.0	19	1951	10,200.0	43.18
29 Sep 1944	5,320.0	20	1955	9,020.0	45.45
12 Aug 1945	4,650.0	21	1942	8,760.0	47.73
19 Sep 1946	12,900.0	22	1957	8,390.0	50.00
24 Aug 1947	10,600.0	23	1960	7,960.0	52.27
16 Oct 1947	12,400.0	24	1933	7,500.0	54.55
09 Aug 1949	10,400.0	25	1954	7,450.0	56.82
18 Jul 1950	3,500.0	26	1935	7,350.0	59.09
30 Aug 1951	10,200.0	27	1939	6,680.0	61.36
20 Jan 1952	26,100.0	28	1931	6,530.0	63.64
31 Jul 1953	4,140.0	29	1936	5,430.0	65.91
25 Mar 1954	7,450.0	30	1944	5,320.0	68.18
15 Jun 1955	9,020.0	31	1934	4,920.0	70.45
17 Aug 1956	2,320.0	32	1945	4,650.0	72.73
12 Jan 1957	8,390.0	33	1958	4,560.0	75.00
23 Aug 1958	4,560.0	34	1953	4,140.0	77.27
07 Aug 1959	3,080.0	35	1943	3,900.0	79.55
01 Nov 1959	7,960.0	36	1992	3,716.0	81.82
06 Sep 1970	11,400.0	37	1950	3,500.0	84.09
03 Oct 1971	13,200.0	38	1991	3,320.0	86.36
17 Aug 1990	1,920.0	39	1959	3,080.0	88.64
11 Apr 1991	3,320.0	40	1994	2,760.0	90.91
29 Aug 1992	3,716.0	41	1956	2,320.0	93.18
11 Jan 1993	16,600.0	42	1928	2,140.0	95.45
23 Mar 1994	2,760.0	43	1990	1,920.0	97.73

* Outlier

<< Skew Weighting >>

Based on 43 events, mean-square error of station skew = 0.162
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
177,564.0	227,216.4	0.2	357,194.2	107,645.4
123,970.2	148,766.2	0.5	231,880.9	78,917.6
92,849.4	106,709.8	1.0	163,975.2	61,408.5
68,219.9	75,551.2	2.0	113,486.1	46,926.5
48,876.0	52,433.4	4.0	76,393.7	34,997.1
43,603.2	46,345.3	5.0	66,762.7	31,630.1
29,728.1	30,863.1	10.0	42,639.8	22,441.2
19,039.4	19,399.0	20.0	25,586.0	14,892.0
8,572.9	8,572.9	50.0	10,798.6	6,783.7
4,138.5	4,077.5	80.0	5,300.7	3,068.2
2,905.3	2,827.2	90.0	3,826.1	2,046.0
2,198.8	2,108.0	95.0	2,976.4	1,478.9
1,346.5	1,241.2	99.0	1,927.7	828.8

<< Systematic Statistics >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.954	Historic Events	0
Standard Dev	0.396	High Outliers	0
Station Skew	0.552	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.324	Missing Events	0
Adopted Skew	0.324	Systematic Events	43

--- End of Preliminary Results ---

<< High Outlier Test >>

Based on 43 events, 10 percent outlier test deviate K(N) = 2.71
Computed high outlier test value = 106,313.01

1 high outlier(s) identified above input threshold of 120,000

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Systematic Statistics >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.954	Historic Events	1
Standard Dev	0.393	High Outliers	1
Station Skew	0.539	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.324	Missing Events	0
Adopted Skew	0.324	Systematic Events	43
		Historic Period	87

<< Low Outlier Test >>

Based on 87 events, 10 percent outlier test deviate K(N) = 2.97
Computed low outlier test value = 612.83

0 low outlier(s) identified below test value of 612.83

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Events Analyzed Day Mon Year	FLOW CFS	Ordered Events Rank	Water Year	FLOW CFS	Weibull Plot Pos
31 Dec 1969	120,000.0	1	1923	120,000.0*	1.14
19 Sep 1923	120,000.0	2	1923	120,000.0	2.27
27 Sep 1926	27,800.0	3	1929	50,500.0	3.99
28 Jun 1927	28,800.0	4	1938	38,000.0	6.29
07 Feb 1928	2,140.0	5	1932	31,000.0	8.59
05 Apr 1929	50,500.0	6	1927	28,800.0	10.89
19 Jul 1930	13,700.0	7	1926	27,800.0	13.19
01 Aug 1931	6,530.0	8	1952	26,100.0	15.49
10 Feb 1932	31,000.0	9	1937	21,800.0	17.79
12 Sep 1933	7,500.0	10	1940	20,100.0	20.09
07 Oct 1933	4,920.0	11	1941	17,000.0	22.39
10 Apr 1935	7,350.0	12	1993	16,600.0	24.69
06 Aug 1936	5,430.0	13	1930	13,700.0	26.99
09 Feb 1937	21,800.0	14	1972	13,200.0	29.29
05 Mar 1938	38,000.0	15	1946	12,900.0	31.59
05 Apr 1939	6,680.0	16	1948	12,400.0	33.89
27 Jul 1940	20,100.0	17	1970	11,400.0	36.19
15 Mar 1941	17,000.0	18	1947	10,600.0	38.49
04 Oct 1941	8,760.0	19	1949	10,400.0	40.79
28 Sep 1943	3,900.0	20	1951	10,200.0	43.09
29 Sep 1944	5,320.0	21	1955	9,020.0	45.39
12 Aug 1945	4,650.0	22	1942	8,760.0	47.69
19 Sep 1946	12,900.0	23	1957	8,390.0	49.99
24 Aug 1947	10,600.0	24	1960	7,960.0	52.29
16 Oct 1947	12,400.0	25	1933	7,500.0	54.59
09 Aug 1949	10,400.0	26	1954	7,450.0	56.89
18 Jul 1950	3,500.0	27	1935	7,350.0	59.19
30 Aug 1951	10,200.0	28	1939	6,680.0	61.49
20 Jan 1952	26,100.0	29	1931	6,530.0	63.79
31 Jul 1953	4,140.0	30	1936	5,430.0	66.08
25 Mar 1954	7,450.0	31	1944	5,320.0	68.38
15 Jun 1955	9,020.0	32	1934	4,920.0	70.68

17 Aug 1956	2,320.0	33	1945	4,650.0	72.98
12 Jan 1957	8,390.0	34	1958	4,560.0	75.28
23 Aug 1958	4,560.0	35	1953	4,140.0	77.58
07 Aug 1959	3,080.0	36	1943	3,900.0	79.88
01 Nov 1959	7,960.0	37	1992	3,716.0	82.18
06 Sep 1970	11,400.0	38	1950	3,500.0	84.48
03 Oct 1971	13,200.0	39	1991	3,320.0	86.78
17 Aug 1990	1,920.0	40	1959	3,080.0	89.08
11 Apr 1991	3,320.0	41	1994	2,760.0	91.38
29 Aug 1992	3,716.0	42	1956	2,320.0	93.68
11 Jan 1993	16,600.0	43	1928	2,140.0	95.98
23 Mar 1994	2,760.0	44	1990	1,920.0	98.28

Note: Plotting positions based on historic period (H) = 87
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.0238

* Outlier

<< Skew Weighting >>

Based on 87 events, mean-square error of station skew = 0.092
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
186,984.8	241,996.3	0.2	379,963.9	112,609.6
128,593.5	155,499.8	0.5	242,171.9	81,507.5
95,271.7	110,067.6	1.0	169,004.1	62,841.1
69,286.0	76,992.6	2.0	115,519.9	47,603.7
49,172.9	52,854.0	4.0	76,879.1	35,215.8
43,744.2	46,565.5	5.0	66,958.6	31,750.2
29,591.4	30,744.7	10.0	42,367.5	22,372.4
18,843.4	19,203.9	20.0	25,256.2	14,767.9
8,484.9	8,484.9	50.0	10,668.0	6,722.3
4,152.4	4,093.3	80.0	5,309.8	3,084.4
2,950.9	2,875.0	90.0	3,875.8	2,086.0
2,261.5	2,172.9	95.0	3,048.7	1,530.2
1,425.9	1,322.2	99.0	2,025.2	888.1

<< Adjusted Statistics >>
LCR at Grand Falls 09401000-GRAND FALLS, ARIZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.954	Historic Events	1
Standard Dev	0.393	High Outliers	1
Station Skew	0.539	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.390	Missing Events	0
Adopted Skew	0.390	Systematic Events	43
		Historic Period	87

Bulletin 17B Frequency Analysis
05 Nov 2009 11:07 AM

--- Input Data ---

Analysis Name: Chevelon Creek near Winslow 09397500
Description:

Data Set Name: Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /CHEVELON FORK BELOW WILDCAT CANYON,/WINSLOW, AZ/FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Chevelon_Creek_near_Winslow_09397500\Chevelon_Creek_near_Winslow_09397500.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Chevelon_Creek_near_Winslow_09397500\Chevelon_Creek_near_Winslow_09397500.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 24700.0

Use Historic Data
Historic Period Start Year: 1948
Historic Period End Year: 2009
Year: 1993 Value: 24,700

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
12 Apr 1948	931.0	1	1993	24,700.0*	2.04
14 Apr 1949	1,290.0	2	1979	19,900.0	4.08
28 Feb 1950	726.0	3	1952	19,800.0	6.12
29 Aug 1951	8,940.0	4	1957	11,300.0	8.16
18 Jan 1952	19,800.0	5	1970	11,100.0	10.20
11 Mar 1953	653.0	6	2005	10,500.0	12.24
23 Mar 1954	7,500.0	7	1967	9,920.0	14.29
23 Aug 1955	631.0	8	1966	9,560.0	16.33
06 Mar 1956	227.0	9	1995	9,290.0	18.37
09 Jan 1957	11,300.0	10	1965	9,100.0	20.41
28 Sep 1958	4,080.0	11	2008	9,050.0	22.45
06 Oct 1958	479.0	12	1951	8,940.0	24.49
25 Dec 1959	2,630.0	13	1954	7,500.0	26.53

04 Apr 1961	476.0	14	1982	6,440.0	28.57
13 Feb 1962	1,920.0	15	1969	6,340.0	30.61
27 Aug 1963	950.0	16	1985	5,250.0	32.65
12 Apr 1964	1,240.0	17	1992	5,200.0	34.69
07 Jan 1965	9,100.0	18	1958	4,080.0	36.73
30 Dec 1965	9,560.0	19	1994	3,530.0	38.78
07 Dec 1966	9,920.0	20	1986	3,490.0	40.82
02 Apr 1968	1,600.0	21	1960	2,630.0	42.86
26 Jan 1969	6,340.0	22	1984	2,360.0	44.90
05 Sep 1970	11,100.0	23	1991	2,150.0	46.94
18 Dec 1978	19,900.0	24	1983	1,950.0	48.98
12 Mar 1982	6,440.0	25	1962	1,920.0	51.02
01 Apr 1983	1,950.0	26	1968	1,600.0	53.06
27 Dec 1983	2,360.0	27	1949	1,290.0	55.10
28 Dec 1984	5,250.0	28	1964	1,240.0	57.14
26 Nov 1985	3,490.0	29	1988	1,170.0	59.18
14 Mar 1987	417.0	30	1998	1,070.0	61.22
27 Feb 1988	1,170.0	31	1963	950.0	63.27
10 Mar 1989	525.0	32	1948	931.0	65.31
06 Apr 1990	249.0	33	2003	848.0	67.35
07 Apr 1991	2,150.0	34	1997	790.0	69.39
23 Aug 1992	5,200.0	35	2007	766.0	71.43
08 Jan 1993	24,700.0	36	1950	726.0	73.47
23 Nov 1993	3,530.0	37	1953	653.0	75.51
06 Mar 1995	9,290.0	38	1955	631.0	77.55
17 Mar 1997	790.0	39	2001	557.0	79.59
12 Apr 1998	1,070.0	40	1989	525.0	81.63
15 Apr 1999	511.0	41	1999	511.0	83.67
30 Mar 2000	170.0	42	1959	479.0	85.71
06 Nov 2000	557.0	43	1961	476.0	87.76
17 Mar 2003	848.0	44	2004	454.0	89.80
12 Mar 2004	454.0	45	1987	417.0	91.84
29 Dec 2004	10,500.0	46	1990	249.0	93.88
23 Mar 2007	766.0	47	1956	227.0	95.92
07 Dec 2007	9,050.0	48	2000	170.0	97.96

* Outlier

<< Skew Weighting >>

Based on 48 events, mean-square error of station skew = 0.112
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
105,134.1	134,702.4	0.2	251,034.4	55,492.1
69,432.6	83,741.5	0.5	153,490.1	38,622.9
49,341.8	57,123.3	1.0	102,497.3	28,623.5
33,998.5	37,949.7	2.0	66,102.3	20,612.1
22,493.0	24,317.2	4.0	40,746.0	14,282.2
19,476.0	20,860.4	5.0	34,450.0	12,557.0
11,890.1	12,414.0	10.0	19,466.8	8,043.6
6,554.0	6,702.2	20.0	9,897.3	4,640.2
2,109.5	2,109.5	50.0	2,914.6	1,526.3
684.2	669.3	80.0	966.5	452.9
380.9	365.2	90.0	562.7	232.9
235.2	220.0	95.0	364.2	133.4
95.6	83.0	99.0	163.8	46.4

<< Systematic Statistics >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.327	Historic Events	0
Standard Dev	0.583	High Outliers	0
Station Skew	0.070	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.024	Missing Events	0
Adopted Skew	0.024	Systematic Events	48

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed low outlier test value = 52.64

0 low outlier(s) identified below test value of 52.64

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 85,449.78

1 high outlier(s) identified above input threshold of 24,700

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* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Systematic Statistics >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.339	Historic Events	1
Standard Dev	0.590	High Outliers	1
Station Skew	0.073	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.024	Missing Events	0
Adopted Skew	0.024	Systematic Events	48
		Historic Period	62

--- Final Results ---

<< Plotting Positions >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
31 Dec 1969	24,700.0	1	1993	24,700.0*	1.59
12 Apr 1948	931.0	2	1993	24,700.0	3.17
14 Apr 1949	1,290.0	3	1979	19,900.0	4.98
28 Feb 1950	726.0	4	1952	19,800.0	7.01
29 Aug 1951	8,940.0	5	1957	11,300.0	9.03
18 Jan 1952	19,800.0	6	1970	11,100.0	11.06
11 Mar 1953	653.0	7	2005	10,500.0	13.09
23 Mar 1954	7,500.0	8	1967	9,920.0	15.11
23 Aug 1955	631.0	9	1966	9,560.0	17.14
06 Mar 1956	227.0	10	1995	9,290.0	19.17
09 Jan 1957	11,300.0	11	1965	9,100.0	21.19
28 Sep 1958	4,080.0	12	2008	9,050.0	23.22
06 Oct 1958	479.0	13	1951	8,940.0	25.24
25 Dec 1959	2,630.0	14	1954	7,500.0	27.27
04 Apr 1961	476.0	15	1982	6,440.0	29.30
13 Feb 1962	1,920.0	16	1969	6,340.0	31.32
27 Aug 1963	950.0	17	1985	5,250.0	33.35
12 Apr 1964	1,240.0	18	1992	5,200.0	35.38
07 Jan 1965	9,100.0	19	1958	4,080.0	37.40
30 Dec 1965	9,560.0	20	1994	3,530.0	39.43
07 Dec 1966	9,920.0	21	1986	3,490.0	41.46
02 Apr 1968	1,600.0	22	1960	2,630.0	43.48
26 Jan 1969	6,340.0	23	1984	2,360.0	45.51
05 Sep 1970	11,100.0	24	1991	2,150.0	47.53
18 Dec 1978	19,900.0	25	1983	1,950.0	49.56
12 Mar 1982	6,440.0	26	1962	1,920.0	51.59

01 Apr 1983	1,950.0	27	1968	1,600.0	53.61
27 Dec 1983	2,360.0	28	1949	1,290.0	55.64
28 Dec 1984	5,250.0	29	1964	1,240.0	57.67
26 Nov 1985	3,490.0	30	1988	1,170.0	59.69
14 Mar 1987	417.0	31	1998	1,070.0	61.72
27 Feb 1988	1,170.0	32	1963	950.0	63.75
10 Mar 1989	525.0	33	1948	931.0	65.77
06 Apr 1990	249.0	34	2003	848.0	67.80
07 Apr 1991	2,150.0	35	1997	790.0	69.82
23 Aug 1992	5,200.0	36	2007	766.0	71.85
08 Jan 1993	24,700.0	37	1950	726.0	73.88
23 Nov 1993	3,530.0	38	1953	653.0	75.90
06 Mar 1995	9,290.0	39	1955	631.0	77.93
17 Mar 1997	790.0	40	2001	557.0	79.96
12 Apr 1998	1,070.0	41	1989	525.0	81.98
15 Apr 1999	511.0	42	1999	511.0	84.01
30 Mar 2000	170.0	43	1959	479.0	86.04
06 Nov 2000	557.0	44	1961	476.0	88.06
17 Mar 2003	848.0	45	2004	454.0	90.09
12 Mar 2004	454.0	46	1987	417.0	92.11
29 Dec 2004	10,500.0	47	1990	249.0	94.14
23 Mar 2007	766.0	48	1956	227.0	96.17
07 Dec 2007	9,050.0	49	2000	170.0	98.19

Note: Plotting positions based on historic period (H) = 62
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.2766

* Outlier

<< Skew Weighting >>

Based on 62 events, mean-square error of station skew = 0.088
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
114,905.1	147,988.4	0.2	277,916.9	60,088.5
75,254.1	91,105.9	0.5	168,243.1	41,519.9
53,128.4	61,680.7	1.0	111,474.8	30,594.9
36,357.6	40,665.1	2.0	71,310.9	21,899.8
23,880.7	25,852.3	4.0	43,584.6	15,078.2
20,627.6	22,119.4	5.0	36,745.7	13,228.5
12,493.8	13,053.3	10.0	20,573.9	8,413.7
6,826.6	6,983.2	20.0	10,356.3	4,814.5
2,165.9	2,165.9	50.0	3,003.4	1,561.3
694.7	679.4	80.0	985.2	457.7
385.0	369.0	90.0	571.2	234.1
237.0	221.6	95.0	368.6	133.6
95.9	83.3	99.0	165.2	46.3

<< Adjusted Statistics >>
Chevelon Creek near Winslow 09397500-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.339	Historic Events	1
Standard Dev	0.590	High Outliers	1
Station Skew	0.073	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.034	Missing Events	0
Adopted Skew	0.034	Systematic Events	48
		Historic Period	62

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Bulletin 17B Frequency Analysis
    05 Nov 2009   11:07 AM
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--- Input Data ---

Analysis Name: Chevelon Creek near Winslow 09398000
Description:

Data Set Name: Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /CHEVELON CREEK/WINSLOW, AZ/FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Chevelon_Creek_near_Winslow_09398000\Chevelon
_Creek_near_Winslow_09398000.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Chevelon_Creek_near_Winslow_09398000\Chevelon
_Creek_near_Winslow_09398000.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 33600.0

Use Historic Data
Historic Period Start Year: 1916
Historic Period End Year: 2009
Year: 1978   Value: 33,600

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---


--- Preliminary Results ---

<< Plotting Positions >>
Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK
--------------------------------------------------------------------
|     Events Analyzed        |           Ordered Events             |
|                      FLOW  |          Water        FLOW  Weibull  |
| Day Mon Year          CFS  |  Rank     Year         CFS  Plot Pos |
|----------------------------|--------------------------------------|
|  19 Jan 1916     9,500.0   |    1      1979    33,600.0*   1.96   |
|  24 Apr 1917     1,300.0   |    2      1952    25,300.0    3.92   |
|  13 Mar 1918     6,200.0   |    3      1929    16,100.0    5.88   |
|  01 Apr 1919     1,110.0   |    4      1966    13,300.0    7.84   |
|  05 Dec 1919     9,000.0   |    5      1965    13,100.0    9.80   |
|  04 Apr 1929    16,100.0   |    6      1916     9,500.0   11.76   |
|  27 Mar 1930       519.0   |    7      1938     9,400.0   13.73   |
|  19 Mar 1931       548.0   |    8      1972     9,040.0   15.69   |
|  10 Feb 1932     3,100.0   |    9      1920     9,000.0   17.65   |
|  20 Sep 1933     1,060.0   |   10      1967     8,890.0   19.61   |
|  01 Jan 1934     2,700.0   |   11      1957     8,680.0   21.57   |
|  12 Apr 1936     1,350.0   |   12      1970     8,020.0   23.53   |
|  08 Feb 1937     1,820.0   |   13      1951     7,200.0   25.49   |
|  04 Mar 1938     9,400.0   |   14      1918     6,200.0   27.45   |
```

03 Aug 1939	2,410.0	15	1954	5,730.0	29.41
25 Jul 1940	1,180.0	16	1969	5,120.0	31.37
15 Mar 1941	1,630.0	17	1971	4,150.0	33.33
06 Apr 1942	985.0	18	2006	4,100.0	35.29
11 Mar 1943	1,330.0	19	1932	3,100.0	37.25
06 Apr 1944	1,180.0	20	1934	2,700.0	39.22
04 Aug 1945	2,620.0	21	1960	2,640.0	41.18
20 Sep 1946	892.0	22	1945	2,620.0	43.14
04 Aug 1947	2,460.0	23	1947	2,460.0	45.10
13 Apr 1948	825.0	24	1939	2,410.0	47.06
14 Apr 1949	1,150.0	25	1958	2,140.0	49.02
01 Mar 1950	616.0	26	1937	1,820.0	50.98
30 Aug 1951	7,200.0	27	1955	1,800.0	52.94
19 Jan 1952	25,300.0	28	1964	1,680.0	54.90
12 Mar 1953	650.0	29	1968	1,640.0	56.86
23 Mar 1954	5,730.0	30	1941	1,630.0	58.82
13 Jun 1955	1,800.0	31	1963	1,620.0	60.78
23 Jul 1956	562.0	32	1962	1,540.0	62.75
09 Jan 1957	8,680.0	33	1936	1,350.0	64.71
28 Sep 1958	2,140.0	34	1943	1,330.0	66.67
14 Aug 1959	1,320.0	35	1959	1,320.0	68.63
26 Dec 1959	2,640.0	36	1917	1,300.0	70.59
30 Jul 1961	500.0	37	1944	1,180.0	72.55
13 Feb 1962	1,540.0	38	1940	1,180.0	74.51
21 Aug 1963	1,620.0	39	1949	1,150.0	76.47
01 Aug 1964	1,680.0	40	1919	1,110.0	78.43
08 Jan 1965	13,100.0	41	1933	1,060.0	80.39
31 Dec 1965	13,300.0	42	1942	985.0	82.35
07 Dec 1966	8,890.0	43	1946	892.0	84.31
02 Apr 1968	1,640.0	44	1948	825.0	86.27
26 Jan 1969	5,120.0	45	1953	650.0	88.24
06 Sep 1970	8,020.0	46	1950	616.0	90.20
24 Aug 1971	4,150.0	47	1956	562.0	92.16
27 Dec 1971	9,040.0	48	1931	548.0	94.12
18 Dec 1978	33,600.0	49	1930	519.0	96.08
07 Aug 2006	4,100.0	50	1961	500.0	98.04

* Outlier

<< Skew Weighting >>

Based on 50 events, mean-square error of station skew =	0.135
Mean-square error of regional skew =	0.302

<< Frequency Curve >>

Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
88,230.7	112,461.3	0.2	187,441.6	50,707.6
58,174.3	69,660.0	0.5	114,479.3	35,250.3
41,567.3	47,721.3	1.0	76,989.2	26,255.0
29,014.8	32,121.0	2.0	50,447.0	19,128.2
19,639.9	21,071.7	4.0	31,963.2	13,529.3
17,178.0	18,262.6	5.0	27,351.3	12,003.7
10,945.3	11,366.6	10.0	16,256.2	7,992.3
6,461.4	6,585.2	20.0	8,950.5	4,909.5
2,493.2	2,493.2	50.0	3,222.0	1,923.7
1,033.7	1,017.7	80.0	1,362.8	743.6
670.8	651.8	90.0	913.4	455.9
476.1	455.3	95.0	669.3	307.3
258.8	237.1	99.0	388.6	151.1

<< Systematic Statistics >>

Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.419	Historic Events	0
Standard Dev	0.475	High Outliers	0
Station Skew	0.448	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.279	Missing Events	0
Adopted Skew	0.279	Systematic Events	50

--- End of Preliminary Results ---

<< High Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed high outlier test value = 53,976.54

1 high outlier(s) identified above input threshold of 33,600

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis. *

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Systematic Statistics >>

Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.420	Historic Events	1
Standard Dev	0.474	High Outliers	1
Station Skew	0.445	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.279	Missing Events	0
Adopted Skew	0.279	Systematic Events	50
		Historic Period	94

<< Low Outlier Test >>

Based on 94 events, 10 percent outlier test deviate K(N) = 2.996
Computed low outlier test value = 100.26

0 low outlier(s) identified below test value of 100.26

--- Final Results ---

<< Plotting Positions >>

Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
31 Dec 1969	33,600.0	1	1979	33,600.0*	1.05
19 Jan 1916	9,500.0	2	1978	33,600.0	2.11
24 Apr 1917	1,300.0	3	1952	25,300.0	3.62
13 Mar 1918	6,200.0	4	1929	16,100.0	5.60
01 Apr 1919	1,110.0	5	1966	13,300.0	7.57
05 Dec 1919	9,000.0	6	1965	13,100.0	9.55
04 Apr 1929	16,100.0	7	1916	9,500.0	11.53
27 Mar 1930	519.0	8	1938	9,400.0	13.50
19 Mar 1931	548.0	9	1972	9,040.0	15.48
10 Feb 1932	3,100.0	10	1920	9,000.0	17.45
20 Sep 1933	1,060.0	11	1967	8,890.0	19.43
01 Jan 1934	2,700.0	12	1957	8,680.0	21.41
12 Apr 1936	1,350.0	13	1970	8,020.0	23.38
08 Feb 1937	1,820.0	14	1951	7,200.0	25.36
04 Mar 1938	9,400.0	15	1918	6,200.0	27.34
03 Aug 1939	2,410.0	16	1954	5,730.0	29.31
25 Jul 1940	1,180.0	17	1969	5,120.0	31.29
15 Mar 1941	1,630.0	18	1971	4,150.0	33.27
06 Apr 1942	985.0	19	2006	4,100.0	35.24
11 Mar 1943	1,330.0	20	1932	3,100.0	37.22
06 Apr 1944	1,180.0	21	1934	2,700.0	39.19
04 Aug 1945	2,620.0	22	1960	2,640.0	41.17
20 Sep 1946	892.0	23	1945	2,620.0	43.15
04 Aug 1947	2,460.0	24	1947	2,460.0	45.12
13 Apr 1948	825.0	25	1939	2,410.0	47.10

14 Apr 1949	1,150.0	26	1958	2,140.0	49.08
01 Mar 1950	616.0	27	1937	1,820.0	51.05
30 Aug 1951	7,200.0	28	1955	1,800.0	53.03
19 Jan 1952	25,300.0	29	1964	1,680.0	55.01
12 Mar 1953	650.0	30	1968	1,640.0	56.98
23 Mar 1954	5,730.0	31	1941	1,630.0	58.96
13 Jun 1955	1,800.0	32	1963	1,620.0	60.93
23 Jul 1956	562.0	33	1962	1,540.0	62.91
09 Jan 1957	8,680.0	34	1936	1,350.0	64.89
28 Sep 1958	2,140.0	35	1943	1,330.0	66.86
14 Aug 1959	1,320.0	36	1959	1,320.0	68.84
26 Dec 1959	2,640.0	37	1917	1,300.0	70.82
30 Jul 1961	500.0	38	1944	1,180.0	72.79
13 Feb 1962	1,540.0	39	1940	1,180.0	74.77
21 Aug 1963	1,620.0	40	1949	1,150.0	76.75
01 Aug 1964	1,680.0	41	1919	1,110.0	78.72
08 Jan 1965	13,100.0	42	1933	1,060.0	80.70
31 Dec 1965	13,300.0	43	1942	985.0	82.67
07 Dec 1966	8,890.0	44	1946	892.0	84.65
02 Apr 1968	1,640.0	45	1948	825.0	86.63
26 Jan 1969	5,120.0	46	1953	650.0	88.60
06 Sep 1970	8,020.0	47	1950	616.0	90.58
24 Aug 1971	4,150.0	48	1956	562.0	92.56
27 Dec 1971	9,040.0	49	1931	548.0	94.53
18 Dec 1978	33,600.0	50	1930	519.0	96.51
07 Aug 2006	4,100.0	51	1961	500.0	98.49

Note: Plotting positions based on historic period (H) = 94
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8776

* Outlier

<< Skew Weighting >>

Based on 94 events, mean-square error of station skew =	0.08
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
94,266.7	121,360.2	0.2	202,578.7	53,749.2
61,181.6	73,762.6	0.5	121,410.6	36,861.6
43,216.1	49,849.2	1.0	80,535.5	27,184.4
29,834.8	33,132.0	2.0	52,081.2	19,617.4
19,985.9	21,482.2	4.0	32,593.5	13,750.4
17,425.2	18,552.3	5.0	27,786.1	12,165.9
11,001.8	11,434.0	10.0	16,339.0	8,034.9
6,446.4	6,571.7	20.0	8,920.4	4,901.7
2,478.2	2,478.2	50.0	3,200.6	1,912.4
1,037.3	1,021.7	80.0	1,367.1	746.6
679.9	661.3	90.0	924.7	463.0
487.7	467.2	95.0	684.1	316.0
272.0	250.4	99.0	406.1	160.1

<< Adjusted Statistics >>
Chevelon Creek near Winslow 09398000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.420	Historic Events	1
Standard Dev	0.474	High Outliers	1
Station Skew	0.445	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.331	Missing Events	0
Adopted Skew	0.331	Systematic Events	50
		Historic Period	94

Bulletin 17B Frequency Analysis
05 Nov 2009 11:08 AM

--- Input Data ---

Analysis Name: Clear Creek near Winslow 09398500
Description:

Data Set Name: Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /CLEAR CREEK/WILLOW CREEK, N WINSLOW, AZ./FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Clear_Creek_near_Winslow_09398500\Clear_Creek_near_Winslow_09398500.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Clear_Creek_near_Winslow_09398500\Clear_Creek_near_Winslow_09398500.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 29100.0

Use Historic Data
Historic Period Start Year: 1948
Historic Period End Year: 2009
Year: 1993 Value: 29,100

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
12 Apr 1948	1,810.0	1	1993	29,100.0*	2.17
15 Apr 1949	1,990.0	2	1979	19,700.0	4.35
28 Feb 1950	1,090.0	3	1952	16,400.0	6.52
29 Aug 1951	8,090.0	4	1970	15,800.0	8.70
18 Jan 1952	16,400.0	5	1966	13,100.0	10.87
11 Mar 1953	497.0	6	1978	10,500.0	13.04
23 Mar 1954	5,730.0	7	1967	9,970.0	15.22
14 Jun 1955	1,220.0	8	1957	8,880.0	17.39
26 Mar 1956	198.0	9	1973	8,190.0	19.57
10 Jan 1957	8,880.0	10	1980	8,140.0	21.74
22 Mar 1958	2,920.0	11	1951	8,090.0	23.91
20 Aug 1959	296.0	12	1972	5,840.0	26.09
25 Dec 1959	2,770.0	13	1954	5,730.0	28.26

05 Apr 1961	1,080.0	14	1965	5,600.0	30.43	
13 Feb 1962	2,240.0	15	1969	5,550.0	32.61	
11 Feb 1963	403.0	16	1982	5,230.0	34.78	
16 Apr 1964	1,210.0	17	1985	4,750.0	36.96	
07 Jan 1965	5,600.0	18	1976	4,170.0	39.13	
30 Dec 1965	13,100.0	19	1958	2,920.0	41.30	
07 Dec 1966	9,970.0	20	1991	2,770.0	43.48	
02 Apr 1968	1,840.0	21	1960	2,770.0	45.65	
26 Jan 1969	5,550.0	22	1986	2,570.0	47.83	
06 Sep 1970	15,800.0	23	1962	2,240.0	50.00	
27 Aug 1971	1,180.0	24	1984	2,130.0	52.17	
26 Dec 1971	5,840.0	25	1983	2,020.0	54.35	
20 Oct 1972	8,190.0	26	1949	1,990.0	56.52	
21 Mar 1974	589.0	27	1968	1,840.0	58.70	
26 Apr 1975	920.0	28	1948	1,810.0	60.87	
09 Feb 1976	4,170.0	29	1988	1,270.0	63.04	
09 Apr 1977	353.0	30	1955	1,220.0	65.22	
01 Mar 1978	10,500.0	31	1964	1,210.0	67.39	
18 Dec 1978	19,700.0	32	1971	1,180.0	69.57	
20 Feb 1980	8,140.0	33	1950	1,090.0	71.74	
08 Apr 1981	250.0	34	1961	1,080.0	73.91	
12 Mar 1982	5,230.0	35	1987	1,070.0	76.09	
25 Apr 1983	2,020.0	36	1975	920.0	78.26	
27 Dec 1983	2,130.0	37	1989	602.0	80.43	
12 Mar 1985	4,750.0	38	1974	589.0	82.61	
26 Nov 1985	2,570.0	39	1953	497.0	84.78	
12 Apr 1987	1,070.0	40	1963	403.0	86.96	
01 Nov 1987	1,270.0	41	1977	353.0	89.13	
11 Mar 1989	602.0	42	1959	296.0	91.30	
06 Apr 1990	194.0	43	1981	250.0	93.48	
08 Apr 1991	2,770.0	44	1956	198.0	95.65	
08 Jan 1993	29,100.0	45	1990	194.0	97.83	
						* Outlier

<< Skew Weighting >>

Based on 45 events, mean-square error of station skew =	0.124
Mean-square error of regional skew =	0.302

<< Frequency Curve >>

Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
83,673.3	104,307.3	0.2	193,054.4	45,468.4
58,996.9	69,857.7	0.5	127,317.0	33,524.4
44,050.1	50,368.7	1.0	89,991.8	25,955.5
31,884.6	35,310.4	2.0	61,396.4	19,527.8
22,151.5	23,845.6	4.0	39,998.0	14,137.2
19,482.1	20,799.8	5.0	34,415.1	12,606.2
12,476.7	13,006.7	10.0	20,504.2	8,436.0
7,200.4	7,360.9	20.0	10,948.4	5,081.6
2,438.3	2,438.3	50.0	3,384.2	1,760.1
792.3	773.3	80.0	1,121.5	522.2
432.9	412.9	90.0	642.5	261.9
260.5	241.4	95.0	407.0	145.0
98.4	83.3	99.0	172.4	45.9

<< Systematic Statistics >>

Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.374	Historic Events	0
Standard Dev	0.570	High Outliers	0
Station Skew	-0.148	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.134	Missing Events	0
Adopted Skew	-0.134	Systematic Events	45

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
Computed low outlier test value = 66.11

0 low outlier(s) identified below test value of 66.11

<< High Outlier Test >>

Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
Computed high outlier test value = 84,838.37

1 high outlier(s) identified above input threshold of 29,100

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.386	Historic Events	1
Standard Dev	0.576	High Outliers	1
Station Skew	-0.126	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.134	Missing Events	0
Adopted Skew	-0.134	Systematic Events	45
		Historic Period	62

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Events Analyzed Day Mon Year	FLOW CFS	Ordered Events Rank	Water Year	FLOW CFS	Weibull Plot Pos
31 Dec 1969	29,100.0	1	1993	29,100.0*	1.59
12 Apr 1948	1,810.0	2	1993	29,100.0	3.17
15 Apr 1949	1,990.0	3	1979	19,700.0	5.05
28 Feb 1950	1,090.0	4	1952	16,400.0	7.22
29 Aug 1951	8,090.0	5	1970	15,800.0	9.38
18 Jan 1952	16,400.0	6	1966	13,100.0	11.54
11 Mar 1953	497.0	7	1978	10,500.0	13.71
23 Mar 1954	5,730.0	8	1967	9,970.0	15.87
14 Jun 1955	1,220.0	9	1957	8,880.0	18.04
26 Mar 1956	198.0	10	1973	8,190.0	20.20
10 Jan 1957	8,880.0	11	1980	8,140.0	22.37
22 Mar 1958	2,920.0	12	1951	8,090.0	24.53
20 Aug 1959	296.0	13	1972	5,840.0	26.70
25 Dec 1959	2,770.0	14	1954	5,730.0	28.86
05 Apr 1961	1,080.0	15	1965	5,600.0	31.02
13 Feb 1962	2,240.0	16	1969	5,550.0	33.19
11 Feb 1963	403.0	17	1982	5,230.0	35.35
16 Apr 1964	1,210.0	18	1985	4,750.0	37.52
07 Jan 1965	5,600.0	19	1976	4,170.0	39.68
30 Dec 1965	13,100.0	20	1958	2,920.0	41.85
07 Dec 1966	9,970.0	21	1991	2,770.0	44.01
02 Apr 1968	1,840.0	22	1960	2,770.0	46.18
26 Jan 1969	5,550.0	23	1986	2,570.0	48.34
06 Sep 1970	15,800.0	24	1962	2,240.0	50.51
27 Aug 1971	1,180.0	25	1984	2,130.0	52.67
26 Dec 1971	5,840.0	26	1983	2,020.0	54.83
20 Oct 1972	8,190.0	27	1949	1,990.0	57.00
21 Mar 1974	589.0	28	1968	1,840.0	59.16
26 Apr 1975	920.0	29	1948	1,810.0	61.33

09 Feb 1976	4,170.0	30	1988	1,270.0	63.49
09 Apr 1977	353.0	31	1955	1,220.0	65.66
01 Mar 1978	10,500.0	32	1964	1,210.0	67.82
18 Dec 1978	19,700.0	33	1971	1,180.0	69.99
20 Feb 1980	8,140.0	34	1950	1,090.0	72.15
08 Apr 1981	250.0	35	1961	1,080.0	74.31
12 Mar 1982	5,230.0	36	1987	1,070.0	76.48
25 Apr 1983	2,020.0	37	1975	920.0	78.64
27 Dec 1983	2,130.0	38	1989	602.0	80.81
12 Mar 1985	4,750.0	39	1974	589.0	82.97
26 Nov 1985	2,570.0	40	1953	497.0	85.14
12 Apr 1987	1,070.0	41	1963	403.0	87.30
01 Nov 1987	1,270.0	42	1977	353.0	89.47
11 Mar 1989	602.0	43	1959	296.0	91.63
06 Apr 1990	194.0	44	1981	250.0	93.80
08 Apr 1991	2,770.0	45	1956	198.0	95.96
08 Jan 1993	29,100.0	46	1990	194.0	98.12

Note: Plotting positions based on historic period (H) = 62
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3636

* Outlier

<< Skew Weighting >>

Based on 62 events, mean-square error of station skew =	0.091
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
91,138.4	114,259.8	0.2	213,050.9	49,066.0
63,715.8	75,756.5	0.5	139,076.9	35,911.9
47,256.3	54,200.9	1.0	97,520.5	27,643.2
33,967.9	37,700.4	2.0	65,982.8	20,671.7
23,427.0	25,255.6	4.0	42,615.2	14,869.7
20,553.7	21,971.2	5.0	36,561.5	13,230.7
13,058.6	13,623.5	10.0	21,581.4	8,791.1
7,470.8	7,640.0	20.0	11,409.3	5,253.2
2,495.1	2,495.1	50.0	3,474.8	1,794.7
802.7	783.4	80.0	1,140.5	526.6
437.0	416.7	90.0	651.2	263.0
262.4	243.1	95.0	411.7	145.3
98.9	83.7	99.0	174.0	45.9

<< Adjusted Statistics >>
Clear Creek near Winslow 09398500-WILLOW CREEK, N WINSLOW, AZ.-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.386	Historic Events	1
Standard Dev	0.576	High Outliers	1
Station Skew	-0.126	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.120	Missing Events	0
Adopted Skew	-0.120	Systematic Events	45
		Historic Period	62

```
-------------------------------
Bulletin 17B Frequency Analysis
    05 Nov 2009   11:09 AM
-------------------------------


--- Input Data ---

Analysis Name: Clear Creek near Winslow 09399000
Description:

Data Set Name: Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK
DSS File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Peak_Flow_Frequency_Analysis.dss
DSS Pathname: /CLEAR CREEK/WINSLOW, AZ/FLOW-ANNUAL PEAK/01jan1900/IR-CENTURY/USGS/

Report File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Clear_Creek_near_Winslow_09399000\Clear_Creek
_near_Winslow_09399000.rpt
XML File Name: C:\PROJECTS\T24449 LCR Winslow\Analysis\Analysis-Final\HEC-
SSP\Peak_Flow_Frequency_Analysis\Bulletin17bResults\Clear_Creek_near_Winslow_09399000\Clear_Creek
_near_Winslow_09399000.xml

Start Date:
End Date:

Skew Option: Use Weighted Skew
Regional Skew: -0.1
Regional Skew MSE: 0.302

Plotting Position Type: Weibull

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95
Use High Outlier Threshold
High Outlier Threshold: 50000.0

Use Historic Data
Historic Period Start Year: 1929
Historic Period End Year: 2009
Year: 1929   Value: 50,000

Use non-standard frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---


--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK
```

Events Analyzed			Ordered Events			
Day Mon Year	FLOW CFS	Rank	Water Year	FLOW CFS	Weibull Plot Pos
04 Apr 1929	50,000.0	1	1929	50,000.0*	1.82
10 Apr 1930	1,080.0	2	1979	36,300.0	3.64
24 Mar 1931	850.0	3	1938	26,200.0	5.45
10 Feb 1932	6,100.0	4	1952	22,500.0	7.27
05 Apr 1933	780.0	5	1966	18,500.0	9.09
01 Jan 1934	6,300.0	6	1978	12,900.0	10.91
14 Apr 1936	1,680.0	7	1967	12,500.0	12.73
17 Mar 1937	2,790.0	8	1980	10,800.0	14.55
04 Mar 1938	26,200.0	9	1970	9,650.0	16.36
04 Apr 1939	1,500.0	10	1973	9,350.0	18.18
15 Aug 1940	1,840.0	11	1957	9,150.0	20.00
15 Mar 1941	3,300.0	12	1951	8,530.0	21.82
06 Apr 1942	1,940.0	13	1934	6,300.0	23.64
11 Mar 1943	1,500.0	14	1932	6,100.0	25.45

08 Apr 1944	1,500.0	15	1965	5,930.0	27.27
22 Apr 1945	2,230.0	16	1954	5,800.0	29.09
20 Sep 1946	1,100.0	17	1969	5,700.0	30.91
25 Nov 1946	1,740.0	18	1972	5,480.0	32.73
13 Apr 1948	1,810.0	19	1975	3,940.0	34.55
16 Apr 1949	1,970.0	20	1941	3,300.0	36.36
01 Mar 1950	1,000.0	21	1958	2,920.0	38.18
30 Aug 1951	8,530.0	22	1937	2,790.0	40.00
19 Jan 1952	22,500.0	23	1960	2,440.0	41.82
27 Aug 1953	695.0	24	1962	2,330.0	43.64
24 Mar 1954	5,800.0	25	1945	2,230.0	45.45
25 Aug 1955	1,080.0	26	1976	2,120.0	47.27
27 Mar 1956	173.0	27	1949	1,970.0	49.09
11 Jan 1957	9,150.0	28	1942	1,940.0	50.91
23 Mar 1958	2,920.0	29	1968	1,840.0	52.73
01 Oct 1958	542.0	30	1940	1,840.0	54.55
26 Dec 1959	2,440.0	31	1948	1,810.0	56.36
06 Apr 1961	925.0	32	1947	1,740.0	58.18
13 Feb 1962	2,330.0	33	1936	1,680.0	60.00
02 Sep 1963	881.0	34	1944	1,500.0	61.82
17 Apr 1964	1,060.0	35	1943	1,500.0	63.64
08 Jan 1965	5,930.0	36	1939	1,500.0	65.45
30 Dec 1965	18,500.0	37	1971	1,460.0	67.27
07 Dec 1966	12,500.0	38	1946	1,100.0	69.09
02 Apr 1968	1,840.0	39	1955	1,080.0	70.91
26 Jan 1969	5,700.0	40	1930	1,080.0	72.73
06 Sep 1970	9,650.0	41	1964	1,060.0	74.55
05 Aug 1971	1,460.0	42	1950	1,000.0	76.36
27 Dec 1971	5,480.0	43	1961	925.0	78.18
20 Oct 1972	9,350.0	44	1963	881.0	80.00
22 Mar 1974	538.0	45	1931	850.0	81.82
12 Sep 1975	3,940.0	46	1933	780.0	83.64
10 Feb 1976	2,120.0	47	1953	695.0	85.45
10 Apr 1977	372.0	48	1982	570.0	87.27
01 Mar 1978	12,900.0	49	1959	542.0	89.09
19 Dec 1978	36,300.0	50	1974	538.0	90.91
20 Feb 1980	10,800.0	51	1977	372.0	92.73
09 Apr 1982	570.0	52	1956	173.0	94.55
17 Aug 2005	37.0	53	2005	37.0	96.36
17 Aug 2006	15.0	54	2006	15.0*	98.18

* Outlier

<< Skew Weighting >>

Based on 54 events, mean-square error of station skew = 0.147
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
74,434.9	85,025.3	0.2	158,774.7	41,873.8
56,931.8	63,358.2	0.5	116,184.2	33,009.1
45,004.7	49,198.4	1.0	88,415.6	26,773.7
34,300.9	36,822.2	2.0	64,557.0	20,999.7
24,895.1	26,279.1	4.0	44,618.6	15,738.6
22,154.7	23,273.1	5.0	39,028.1	14,162.9
14,567.2	15,048.0	10.0	24,190.9	9,664.1
8,421.5	8,576.7	20.0	13,065.1	5,811.2
2,597.0	2,597.0	50.0	3,678.9	1,845.3
671.3	654.1	80.0	968.8	436.2
307.6	291.8	90.0	470.0	181.2
155.3	142.4	95.0	253.3	82.7
39.1	31.9	99.0	74.5	16.6

<< Systematic Statistics >>

Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.360	Historic Events	0
Standard Dev	0.660	High Outliers	0
Station Skew	-0.684	Low Outliers	0
Regional Skew	-0.100	Zero Events	0

```
|  Weighted Skew       -0.493  |  Missing Events         0      |
|  Adopted Skew        -0.493  |  Systematic Events       54  |
|------------------------------|-------------------------------|

--- End of Preliminary Results ---



----------------------
<< Low Outlier Test >>
----------------------
 Based on 54 events, 10 percent outlier test deviate K(N) = 2.798
                          Computed low outlier test value = 32.72

            1 low outlier(s) identified below test value of 32.72


     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, CFS           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                 3.426  |  Historic Events           1  |
|  Standard Dev         0.612  |  High Outliers          0      |
|  Station Skew        -0.094  |  Low Outliers           1      |
|  Regional Skew       -0.100  |  Zero Events            0      |
|  Weighted Skew       -0.493  |  Missing Events         0      |
|  Adopted Skew        -0.493  |  Systematic Events       54  |
|                              |  Historic Period         81  |
|------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
  Based on 53 events, 10 percent outlier test deviate K(N) = 2.79
                   Computed high outlier test value = 135,892.4

     1 high outlier(s) identified above input threshold of 50,000

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and         *
   *        comparison with similar data should be explored, *
   *        if not incorporated in this analysis.            *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                         and 1 historic event(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, CFS           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                 3.410  |  Historic Events           1  |
|  Standard Dev         0.597  |  High Outliers          1      |
|  Station Skew        -0.144  |  Low Outliers           1      |
|  Regional Skew       -0.100  |  Zero Events            0      |
|  Weighted Skew       -0.493  |  Missing Events         0      |
|  Adopted Skew        -0.493  |  Systematic Events       54  |
|                              |  Historic Period         81  |
|------------------------------|-------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK
--------------------------------------------------------------------
|     Events Analyzed       |            Ordered Events            |
|                      FLOW |          Water        FLOW  Weibull  |
```

Day Mon Year	CFS	Rank	Year	CFS	Plot Pos
31 Dec 1969	50,000.0	1	1929	50,000.0*	1.22
04 Apr 1929	50,000.0	2	1929	50,000.0	2.44
10 Apr 1930	1,080.0	3	1979	36,300.0	3.96
24 Mar 1931	850.0	4	1938	26,200.0	5.78
10 Feb 1932	6,100.0	5	1952	22,500.0	7.59
05 Apr 1933	780.0	6	1966	18,500.0	9.41
01 Jan 1934	6,300.0	7	1978	12,900.0	11.23
14 Apr 1936	1,680.0	8	1967	12,500.0	13.05
17 Mar 1937	2,790.0	9	1980	10,800.0	14.86
04 Mar 1938	26,200.0	10	1970	9,650.0	16.68
04 Apr 1939	1,500.0	11	1973	9,350.0	18.50
15 Aug 1940	1,840.0	12	1957	9,150.0	20.32
15 Mar 1941	3,300.0	13	1951	8,530.0	22.14
06 Apr 1942	1,940.0	14	1934	6,300.0	23.95
11 Mar 1943	1,500.0	15	1932	6,100.0	25.77
08 Apr 1944	1,500.0	16	1965	5,930.0	27.59
22 Apr 1945	2,230.0	17	1954	5,800.0	29.41
20 Sep 1946	1,100.0	18	1969	5,700.0	31.22
25 Nov 1946	1,740.0	19	1972	5,480.0	33.04
13 Apr 1948	1,810.0	20	1975	3,940.0	34.86
16 Apr 1949	1,970.0	21	1941	3,300.0	36.68
01 Mar 1950	1,000.0	22	1958	2,920.0	38.50
30 Aug 1951	8,530.0	23	1937	2,790.0	40.31
19 Jan 1952	22,500.0	24	1960	2,440.0	42.13
27 Aug 1953	695.0	25	1962	2,330.0	43.95
24 Mar 1954	5,800.0	26	1945	2,230.0	45.77
25 Aug 1955	1,080.0	27	1976	2,120.0	47.58
27 Mar 1956	173.0	28	1949	1,970.0	49.40
11 Jan 1957	9,150.0	29	1942	1,940.0	51.22
23 Mar 1958	2,920.0	30	1968	1,840.0	53.04
01 Oct 1958	542.0	31	1940	1,840.0	54.86
26 Dec 1959	2,440.0	32	1948	1,810.0	56.67
06 Apr 1961	925.0	33	1947	1,740.0	58.49
13 Feb 1962	2,330.0	34	1936	1,680.0	60.31
02 Sep 1963	881.0	35	1944	1,500.0	62.13
17 Apr 1964	1,060.0	36	1943	1,500.0	63.94
08 Jan 1965	5,930.0	37	1939	1,500.0	65.76
30 Dec 1965	18,500.0	38	1971	1,460.0	67.58
07 Dec 1966	12,500.0	39	1946	1,100.0	69.40
02 Apr 1968	1,840.0	40	1955	1,080.0	71.21
26 Jan 1969	5,700.0	41	1930	1,080.0	73.03
06 Sep 1970	9,650.0	42	1964	1,060.0	74.85
05 Aug 1971	1,460.0	43	1950	1,000.0	76.67
27 Dec 1971	5,480.0	44	1961	925.0	78.49
20 Oct 1972	9,350.0	45	1963	881.0	80.30
22 Mar 1974	538.0	46	1931	850.0	82.12
12 Sep 1975	3,940.0	47	1933	780.0	83.94
10 Feb 1976	2,120.0	48	1953	695.0	85.76
10 Apr 1977	372.0	49	1982	570.0	87.57
01 Mar 1978	12,900.0	50	1959	542.0	89.39
19 Dec 1978	36,300.0	51	1974	538.0	91.21
20 Feb 1980	10,800.0	52	1977	372.0	93.03
09 Apr 1982	570.0	53	1956	173.0	94.85
17 Aug 2005	37.0	54	2005	37.0	96.66
17 Aug 2006	15.0	55	2006	15.0*	98.48

Note: Plotting positions based on historic period (H) = 81
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.4906

* Outlier

<< Skew Weighting >>

Based on 81 events, mean-square error of station skew = 0.071
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Computed Curve FLOW, CFS	Expected Probability FLOW, CFS	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, CFS	Confidence Limits 0.95 FLOW, CFS
106,987.9	129,867.7	0.2	235,212.6	59,241.6
73,736.5	85,541.2	0.5	152,114.3	42,672.1
54,052.9	60,803.8	1.0	105,854.7	32,420.0
38,363.8	41,957.3	2.0	71,036.5	23,902.7
26,091.5	27,832.0	4.0	45,466.9	16,928.4

22,780.6	24,124.2	5.0	38,885.9	14,981.8
14,236.1	14,764.0	10.0	22,707.4	9,775.6
7,985.0	8,140.3	20.0	11,846.3	5,719.3
2,569.9	2,569.9	50.0	3,508.2	1,885.1
797.6	781.1	80.0	1,112.6	538.5
426.4	409.4	90.0	622.6	266.1
252.2	236.3	95.0	386.9	145.8
92.5	80.3	99.0	158.3	45.5

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-WINSLOW, AZ-FLOW-ANNUAL PEAK

Log Transform: FLOW, CFS		Number of Events	
Mean	3.399	Historic Events	1
Standard Dev	0.595	High Outliers	1
Station Skew	-0.116	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.113	Missing Events	0
Adopted Skew	-0.113	Systematic Events	54
		Historic Period	81

Appendix B

Peak-Flow-Frequency Analysis Using USGS Regional Regression Equations

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```
National Streamflow Statistics Program
Version 5.0
Based on Techniques and Methods Book 4-A6
Equations from database C:\Program Files\NSS2\NSS_v5_2010-07-26.mdb
Updated by tkoenig 5/28/2010 at 11:00:06 AM modify DRNDENSITY for OR
Equations for Arizona developed using English units

Site: LCR near Winslow-072810, Arizona
User: Fayzul.Pasha
Date: Wednesday, July 28, 2010 03:46 PM


Rural Estimate: Chevelon-09397500-Region-11
   Basin Drainage Area: 271 square miles
   1 Region
   Region: Northeastern_Arizona_Region_11
      Drainage_Area = 271 square miles
      Mean_Annual_Pan_Evaporation = 55 inches


Results for:  Chevelon-09397500-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

             Value,  Standard  Equivalent
Statistic      cfs   Err, log  Years
PK2            838      0.6       0.4
PK5           3000      0.3       2.8
PK10          5570      0.3       4.6
PK25          9470      0.2      17
PK50         15000      0.3       9.2
PK100        21000      0.9       1.3
PK500        39700*

  *Extrapolated value



Rural Estimate: Chevelon-09398000-Region-11
   Basin Drainage Area: 785 square miles
   1 Region
   Region: Northeastern_Arizona_Region_11
      Drainage_Area = 785 square miles
      Mean_Annual_Pan_Evaporation = 55 inches


Results for:  Chevelon-09398000-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

             Value,  Standard  Equivalent
Statistic      cfs   Err, log  Years
PK2           1620      0.6       0.4
PK5           5430      0.3       2.8
PK10          9680      0.3       4.6
PK25         16500      0.2      17
PK50         26600      0.3       9.2
PK100        39000      0.9       1.3
PK500        77600*

  *Extrapolated value



Rural Estimate: Clear-09398500-Region-11
   Basin Drainage Area: 317 square miles
```

1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 317 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Clear-09398500-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	924	0.6	0.4
PK5	3270	0.3	2.8
PK10	6040	0.3	4.6
PK25	10300	0.2	17
PK50	16300	0.3	9.2
PK100	23100	0.9	1.3
PK500	43800*		

*Extrapolated value

Rural Estimate: Clear-09399000-Region-11
Basin Drainage Area: 621 square miles
1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 621 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Clear-09399000-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	1400	0.6	0.4
PK5	4770	0.3	2.8
PK10	8570	0.3	4.6
PK25	14600	0.2	17
PK50	23400	0.3	9.2
PK100	34000	0.9	1.3
PK500	67000*		

*Extrapolated value

Rural Estimate: Jacks-09399400-Region-11
Basin Drainage Area: 295 square miles
1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 295 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Jacks-09399400-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)

PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	884	0.6	0.4
PK5	3140	0.3	2.8
PK10	5820	0.3	4.6
PK25	9900	0.2	17
PK50	15700	0.3	9.2
PK100	22100	0.9	1.3
PK500	41900*		

*Extrapolated value

Rural Estimate: Chevelon-09397500 -Navajo-11
Basin Drainage Area: 271 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 271 square miles
Mean_Basin_Slope_from_30m_DEM = 0.11 percent

Results for: Chevelon-09397500 -Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	1170	100	1000
PK5	2850	77	1000
PK10	4530	72	1000
PK25	7480	72	1000
PK50	10300	77	1000
PK100	13600	83	1000
PK500	23700	100	1000

Rural Estimate: Chevelon-09398000-Navajo-11
Basin Drainage Area: 785 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 785 square miles
Mean_Basin_Slope_from_30m_DEM = 0.0686 percent

Results for: Chevelon-09398000-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	1430	100	1000
PK5	3390	77	1000
PK10	5270	72	1000
PK25	8470	72	1000
PK50	11400	77	1000
PK100	14800	83	1000
PK500	24800	100	1000

Rural Estimate: Clear-09398500-Navajo-11

Basin Drainage Area: 317 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 317 square miles
Mean_Basin_Slope_from_30m_DEM = 0.15 percent

Results for: Clear-09398500-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	1510	100	1000
PK5	3740	77	1000
PK10	6000	72	1000
PK25	10000	72	1000
PK50	13900	77	1000
PK100	18500	83	1000
PK500	32700	100	1000

Rural Estimate: Clear-09399000-Navajo-11
Basin Drainage Area: 621 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 621 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: Clear-09399000-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	1610	100	1000
PK5	3880	77	1000
PK10	6120	72	1000
PK25	10000	72	1000
PK50	13600	77	1000
PK100	17900	83	1000
PK500	30700	100	1000

Rural Estimate: Jacks-09399400-Navajo-11
Basin Drainage Area: 295 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 295 square miles
Mean_Basin_Slope_from_30m_DEM = 0.085 percent

Results for: Jacks-09399400-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	1020	100	1000
PK5	2460	77	1000
PK10	3870	72	1000
PK25	6310	72	1000
PK50	8580	77	1000
PK100	11300	83	1000
PK500	19300	100	1000

Rural Estimate: U/S diversion levee-Region-11
Basin Drainage Area: 4.8 square miles
1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 4.8 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: U/S diversion levee-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	68.8	0.6	0.4
PK5	313	0.3	2.8
PK10	684	0.3	4.6
PK25	1160	0.2	17
PK50	1690	0.3	9.2
PK100	2030	0.9	1.3
PK500	3270 *		

*Extrapolated value

Rural Estimate: Ruby Wash at diversion levee-Region-11
Basin Drainage Area: 8.6 square miles
1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 8.6 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Ruby Wash at diversion levee-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	98.7	0.6	0.4
PK5	434	0.3	2.8
PK10	926	0.3	4.6
PK25	1570	0.2	17
PK50	2320	0.3	9.2
PK100	2850	0.9	1.3
PK500	4670 *		

*Extrapolated value

Rural Estimate: D/S diversion levee-Region-11
Basin Drainage Area: 20.1 square miles

1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 20.1 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: D/S diversion levee-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	167	0.6	0.4
PK5	698	0.3	2.8
PK10	1440	0.3	4.6
PK25	2450	0.2	17
PK50	3670	0.3	9.2
PK100	4660	0.9	1.3
PK500	7880*		

*Extrapolated value

Rural Estimate: U/S diversion levee-Navajo-11
Basin Drainage Area: 4.8 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 4.8 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: U/S diversion levee-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	159	100	1000
PK5	393	77	1000
PK10	635	72	1000
PK25	1070	72	1000
PK50	1490	77	1000
PK100	2010	83	1000
PK500	3630	100	1000

Rural Estimate: Ruby Wash at diversion levee-Navajo-11
Basin Drainage Area: 8.6 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 8.6 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: Ruby Wash at diversion levee-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	209	100	1000
PK5	517	77	1000
PK10	833	72	1000
PK25	1400	72	1000
PK50	1940	77	1000
PK100	2610	83	1000
PK500	4690	100	1000

Rural Estimate: D/S diversion levee-Navajo-11
Basin Drainage Area: 20.1 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 20.1 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: D/S diversion levee-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	314	100	1000
PK5	771	77	1000
PK10	1240	72	1000
PK25	2070	72	1000
PK50	2860	77	1000
PK100	3830	83	1000
PK500	6810	100	1000

Rural Estimate: Ice House at Railroad-Region-11
Basin Drainage Area: 2.7 square miles
1 Region
Region: Northeastern_Arizona_Region_11
Drainage_Area = 2.7 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Ice House at Railroad-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	48.1	0.6	0.4
PK5	227	0.3	2.8
PK10	507	0.3	4.6
PK25	862	0.2	17
PK50	1240	0.3	9.2
PK100	1450	0.9	1.3
PK500	2300 *		

*Extrapolated value

Rural Estimate: Ruby Wash at Railroad-Region-11
Basin Drainage Area: 2.9 square miles
1 Region

Region: Northeastern_Arizona_Region_11
Drainage_Area = 2.9 square miles
Mean_Annual_Pan_Evaporation = 55 inches

Results for: Ruby Wash at Railroad-Region-11

Equations used:
PK2 = 26* (DRNAREA)^(0.62)
PK5 = 130* (DRNAREA)^(0.56)
PK10 = 0.1* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK25 = 0.17* (DRNAREA)^(0.52)* (EVAPAN)^(2)
PK50 = 0.24* (DRNAREA)^(0.54)* (EVAPAN)^(2)
PK100 = 0.27* (DRNAREA)^(0.58)* (EVAPAN)^(2)
PK500 = 0

Statistic	Value, cfs	Standard Err, log	Equivalent Years
PK2	50.3	0.6	0.4
PK5	236	0.3	2.8
PK10	526	0.3	4.6
PK25	895	0.2	17
PK50	1290	0.3	9.2
PK100	1510	0.9	1.3
PK500	2400 *		

*Extrapolated value

Rural Estimate: Ics House at Railroad-Navajo-11
Basin Drainage Area: 2.7 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 2.7 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: Ics House at Railroad-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	121	100	1000
PK5	300	77	1000
PK10	486	72	1000
PK25	820	72	1000
PK50	1150	77	1000
PK100	1550	83	1000
PK500	2820	100	1000

Rural Estimate: Ruby Wash at Railroad-Navajo-11
Basin Drainage Area: 2.9 square miles
1 Region
Region: Navajo_Flood_Region_11
Drainage_Area = 2.9 square miles
Mean_Basin_Slope_from_30m_DEM = 0.1 percent

Results for: Ruby Wash at Railroad-Navajo-11

Equations used:
PK2 = 305* (DRNAREA)^(0.476)* (BSLDEM30M)^(0.608)
PK5 = 844* (DRNAREA)^(0.471)* (BSLDEM30M)^(0.653)
PK10 = 1490* (DRNAREA)^(0.466)* (BSLDEM30M)^(0.688)
PK25 = 2790* (DRNAREA)^(0.46)* (BSLDEM30M)^(0.73)
PK50 = 4190* (DRNAREA)^(0.455)* (BSLDEM30M)^(0.759)
PK100 = 6030* (DRNAREA)^(0.45)* (BSLDEM30M)^(0.784)
PK500 = 12500* (DRNAREA)^(0.439)* (BSLDEM30M)^(0.836)

Statistic	Value, cfs	Prediction Error, %	Equivalent Years
PK2	125	100	1000
PK5	310	77	1000
PK10	502	72	1000
PK25	848	72	1000
PK50	1180	77	1000
PK100	1600	83	1000
PK500	2910	100	1000

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Appendix C

Volume-Flow-Frequency Analysis

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Volume-Duration Analysis
  16 Sep 2011   04:47 PM
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--- Input Data ---

Analysis Name: LCR at Holbrook 09397000
Description:

Data Set Name: LCR at Holbrook 09397000-LCR at Holbrook-FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR
Winslow\Analysis\Volume_Frequency_Analysi/LCR at
Halbrook/FLOW//1DAY/09397000/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\LCR_at_Holbrook_09397000\LCR_at_Ho
lbrook_09397000.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\LCR_at_Holbrook_09397000\LCR_at_Ho
lbrook_09397000.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 17 Mar 1946
Record End Date:   11 Aug 1980


User-Specified Durations
   Duration:   1 day
   Duration:   2 days
   Duration:   3 days
   Duration:   4 days
   Duration:   5 days
   Duration:   6 days
   Duration:   7 days
   Duration:   8 days
   Duration:   9 days
   Duration:  10 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
   Frequency: 0.2
   Frequency: 0.5
   Frequency: 1.0
   Frequency: 2.0
   Frequency: 4.0
   Frequency: 5.0
   Frequency: 10.0
   Frequency: 20.0
   Frequency: 50.0
   Frequency: 80.0
   Frequency: 90.0
```

```
   Frequency: 95.0
   Frequency: 99.0

Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1
  8-day Regional Skew: -0.1
  8-day Regional Skew MSE: -0.1
  9-day Regional Skew: -0.1
  9-day Regional Skew MSE: -0.1
 10-day Regional Skew: -0.1
 10-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1876
Historic Period End Year: 1980

  1-day Historic Events
  Year: 1876   Value: 20,200

  2-day Historic Events
  Year: 1876   Value: 13,750

  3-day Historic Events
  Year: 1942   Value: 10,153

  4-day Historic Events
  Year: 1942   Value: 7,895

  5-day Historic Events
  Year: 1942   Value: 6,456

  6-day Historic Events
  Year: 1939   Value: 6,038

  7-day Historic Events
  Year: 1939   Value: 6,463

  8-day Historic Events
  Year: 1939   Value: 5,759

  9-day Historic Events
  Year: 1939   Value: 5,278

  10-day Historic Events
  Year: 1939   Value: 4,814

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---



====================================================================
Statistical Analysis of 1-day Maximum values
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Note: Data is missing for all or part of 9 years in analysis period.
```

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Events Analyzed Day	Mon	Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
28	Nov	1946	20,200.0	1	1946	20,200.0*	2.78
23	Mar	1948	1,800.0	2	1971	18,100.0	5.56
31	May	1949	---	3	1970	13,600.0	8.33
14	Sep	1949	699.0	4	1968	12,300.0	11.11
19	Jul	1950	840.0	5	1972	10,900.0	13.89
19	Jan	1952	6,690.0	6	1959	9,500.0	16.67
22	Sep	1952	2,110.0	7	1964	9,180.0	19.44
29	Jul	1953	1,590.0	8	1967	7,670.0	22.22
23	Jul	1954	4,670.0	9	1977	7,410.0	25.00
08	Aug	1955	4,480.0	10	1951	6,690.0	27.78
16	Aug	1956	1,220.0	11	1965	6,580.0	30.56
26	Aug	1957	3,720.0	12	1969	5,820.0	33.33
22	Aug	1958	3,430.0	13	1963	5,630.0	36.11
30	Oct	1959	9,500.0	14	1978	5,270.0	38.89
18	Oct	1960	979.0	15	1954	4,670.0	41.67
31	Oct	1961	2,520.0	16	1955	4,480.0	44.44
18	Oct	1962	3,530.0	17	1957	3,720.0	47.22
01	Sep	1963	5,630.0	18	1962	3,530.0	50.00
09	Sep	1964	9,180.0	19	1958	3,430.0	52.78
25	Jul	1965	6,580.0	20	1966	3,100.0	55.56
16	Sep	1966	3,100.0	21	1961	2,520.0	58.33
29	Jan	1968	7,670.0	22	1979	2,180.0	61.11
11	Aug	1968	12,300.0	23	1975	2,110.0	63.89
05	Sep	1969	5,820.0	24	1952	2,110.0	66.67
06	Sep	1970	13,600.0	25	1947	1,800.0	69.44
30	Sep	1971	18,100.0	26	1953	1,590.0	72.22
20	Oct	1972	10,900.0	27	1976	1,530.0	75.00
21	Jan	1974	269.0	28	1956	1,220.0	77.78
18	Jul	1974	737.0	29	1960	979.0	80.56
21	Feb	1976	2,110.0	30	1950	840.0	83.33
12	Aug	1976	1,530.0	31	1974	737.0	86.11
31	Jul	1977	7,410.0	32	1949	699.0	88.89
05	Aug	1978	5,270.0	33	1973	269.0	91.67
25	Jul	1979	2,180.0	34	1980	160.0	94.44
29	Jul	1980	160.0	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
35,301.0	39,901.3	0.2	71,569.6	21,370.4
30,163.0	33,424.6	0.5	59,094.4	18,643.5
26,157.1	28,564.3	1.0	49,708.1	16,466.0
22,079.9	23,725.3	2.0	40,497.7	14,194.1
17,969.1	19,014.0	4.0	31,608.9	11,834.2
16,646.6	17,538.0	5.0	28,844.1	11,057.3
12,569.7	13,017.5	10.0	20,654.7	8,595.2
8,596.6	8,772.6	20.0	13,247.6	6,067.8
3,652.6	3,652.6	50.0	5,117.1	2,635.8
1,294.4	1,252.3	80.0	1,824.8	849.4
697.2	650.9	90.0	1,036.6	411.5
401.5	358.0	95.0	636.4	212.0

128.6	97.3	99.0	238.6	52.6

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.507	Historic Events	0
Standard Dev	0.498	High Outliers	0
Station Skew	-0.672	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.672	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
35,133.3	---	0.2	---	---
29,990.5	---	0.5	---	---
25,980.5	---	1.0	---	---
21,906.2	---	2.0	---	---
17,794.8	---	4.0	---	---
16,466.1	---	5.0	---	---
12,390.9	---	10.0	---	---
8,427.7	---	20.0	---	---
3,501.6	---	50.0	---	---
1,144.9	---	80.0	---	---
539.8	---	90.0	---	---
220.7	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 159.68

0 low outlier(s) identified below test value of 159.68

Based on statistics after 0 zero events and 1 missing events were deleted.

<< High Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed high outlier test value = 64,718.46

1 high outlier(s) identified above input threshold of 20,200

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.499	Historic Events	1
Standard Dev	0.489	High Outliers	1
Station Skew	-0.670	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.672	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1876	20,200.0	1	1946	20,200.0*	0.94
28 Nov 1946	20,200.0	2	1876	20,200.0	1.89
23 Mar 1948	1,800.0	3	1971	18,100.0	3.79
31 May 1949	---	4	1970	13,600.0	6.65
14 Sep 1949	699.0	5	1968	12,300.0	9.50
19 Jul 1950	840.0	6	1972	10,900.0	12.36
19 Jan 1952	6,690.0	7	1959	9,500.0	15.22
22 Sep 1952	2,110.0	8	1964	9,180.0	18.08
29 Jul 1953	1,590.0	9	1967	7,670.0	20.94
23 Jul 1954	4,670.0	10	1977	7,410.0	23.79
08 Aug 1955	4,480.0	11	1951	6,690.0	26.65
16 Aug 1956	1,220.0	12	1965	6,580.0	29.51
26 Aug 1957	3,720.0	13	1969	5,820.0	32.37
22 Aug 1958	3,430.0	14	1963	5,630.0	35.22
30 Oct 1959	9,500.0	15	1978	5,270.0	38.08
18 Oct 1960	979.0	16	1954	4,670.0	40.94
31 Oct 1961	2,520.0	17	1955	4,480.0	43.80
18 Oct 1962	3,530.0	18	1957	3,720.0	46.66
01 Sep 1963	5,630.0	19	1962	3,530.0	49.51
09 Sep 1964	9,180.0	20	1958	3,430.0	52.37
25 Jul 1965	6,580.0	21	1966	3,100.0	55.23
16 Sep 1966	3,100.0	22	1961	2,520.0	58.09
29 Jan 1968	7,670.0	23	1979	2,180.0	60.95
11 Aug 1968	12,300.0	24	1975	2,110.0	63.80
05 Sep 1969	5,820.0	25	1952	2,110.0	66.66
06 Sep 1970	13,600.0	26	1947	1,800.0	69.52
30 Sep 1971	18,100.0	27	1953	1,590.0	72.38
20 Oct 1972	10,900.0	28	1976	1,530.0	75.24
21 Jan 1974	269.0	29	1956	1,220.0	78.09
18 Jul 1974	737.0	30	1960	979.0	80.95
21 Feb 1976	2,110.0	31	1950	840.0	83.81
12 Aug 1976	1,530.0	32	1974	737.0	86.67
31 Jul 1977	7,410.0	33	1949	699.0	89.53
05 Aug 1978	5,270.0	34	1973	269.0	92.38
25 Jul 1979	2,180.0	35	1980	160.0	95.24
29 Jul 1980	160.0	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew =	0.087
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
39,194.0	45,420.7	0.2	81,354.9	23,351.6
32,421.4	36,555.6	0.5	64,585.1	19,813.6
27,415.8	30,312.6	1.0	52,698.7	17,123.8
22,555.3	24,440.5	2.0	41,630.0	14,436.6
17,884.7	19,019.9	4.0	31,502.1	11,766.5
16,429.8	17,379.0	5.0	28,462.9	10,913.2
12,089.3	12,546.3	10.0	19,776.4	8,290.6
8,067.3	8,238.1	20.0	12,338.2	5,722.3
3,347.6	3,347.6	50.0	4,658.3	2,426.3
1,199.9	1,163.4	80.0	1,684.9	791.6
660.3	619.6	90.0	975.7	394.0
390.3	351.3	95.0	612.4	209.9
134.1	104.4	99.0	243.2	57.2

<< Adjusted Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.480	Historic Events	1
Standard Dev	0.498	High Outliers	1
Station Skew	-0.670	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.542	Missing Events	1
Adopted Skew	-0.542	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
35,800.4	41,285.3	0.2	72,405.0	21,727.4
29,803.4	33,468.6	0.5	57,927.0	18,537.6
25,345.9	27,928.7	1.0	47,593.0	16,100.7
20,992.3	22,684.3	2.0	37,901.3	13,653.8
16,779.4	17,806.5	4.0	28,958.1	11,207.6
15,460.0	16,321.3	5.0	26,256.7	10,422.1
11,498.7	11,917.8	10.0	18,477.6	7,994.2
7,783.8	7,942.8	20.0	11,722.1	5,590.7
3,333.8	3,333.8	50.0	4,583.6	2,444.8
1,240.6	1,204.2	80.0	1,720.7	830.9
697.9	656.5	90.0	1,016.8	424.3
420.6	380.2	95.0	649.3	231.5

150.5	118.2	99.0	266.9	66.2

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 2-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
29	Nov	1946	13,750.0	1	1946	13,750.0*	2.78
24	Mar	1948	1,500.0	2	1971	12,310.0	5.56
31	May	1949	---	3	1968	10,860.0	8.33
15	Sep	1949	562.0	4	1964	7,750.0	11.11
09	Jul	1950	542.5	5	1970	7,700.0	13.89
19	Jan	1952	4,250.0	6	1967	7,535.0	16.67
23	Sep	1952	1,610.0	7	1959	6,655.0	19.44
30	Jul	1953	1,330.0	8	1972	6,550.0	22.22
24	Jul	1954	4,505.0	9	1977	6,450.0	25.00
08	Aug	1955	4,140.0	10	1963	4,645.0	27.78
17	Aug	1956	713.0	11	1954	4,505.0	30.56
06	Aug	1957	2,935.0	12	1965	4,425.0	33.33
14	Sep	1958	2,740.0	13	1951	4,250.0	36.11
31	Oct	1959	6,655.0	14	1955	4,140.0	38.89
19	Oct	1960	755.5	15	1978	4,080.0	41.67
01	Nov	1961	2,045.0	16	1969	3,875.0	44.44
19	Oct	1962	3,265.0	17	1962	3,265.0	47.22
01	Sep	1963	4,645.0	18	1957	2,935.0	50.00
14	Aug	1964	7,750.0	19	1966	2,925.0	52.78
30	Jul	1965	4,425.0	20	1958	2,740.0	55.56
16	Sep	1966	2,925.0	21	1961	2,045.0	58.33
29	Jan	1968	7,535.0	22	1975	1,880.0	61.11
12	Aug	1968	10,860.0	23	1952	1,610.0	63.89
05	Sep	1969	3,875.0	24	1947	1,500.0	66.67
06	Sep	1970	7,700.0	25	1976	1,405.0	69.44
01	Oct	1971	12,310.0	26	1953	1,330.0	72.22
21	Oct	1972	6,550.0	27	1979	1,298.0	75.00
22	Jan	1974	223.0	28	1960	755.5	77.78
18	Jul	1974	424.5	29	1956	713.0	80.56
22	Feb	1976	1,880.0	30	1949	562.0	83.33
13	Aug	1976	1,405.0	31	1950	542.5	86.11
01	Aug	1977	6,450.0	32	1974	424.5	88.89
06	Aug	1978	4,080.0	33	1973	223.0	91.67
26	Jul	1979	1,298.0	34	1980	90.5*	94.44
30	Jul	1980	90.5	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,898.4	23,828.7	0.2	42,697.7	13,549.2
19,525.8	21,043.5	0.5	37,159.0	12,257.2
17,510.9	18,729.8	1.0	32,577.0	11,140.3
15,300.1	16,201.5	2.0	27,690.4	9,891.0
12,894.9	13,518.4	4.0	22,558.8	8,498.7
12,080.9	12,630.5	5.0	20,870.0	8,018.4
9,439.8	9,734.5	10.0	15,577.5	6,422.1
6,659.4	6,784.6	20.0	10,365.6	4,662.1
2,889.3	2,889.3	50.0	4,090.8	2,070.5
984.7	950.3	80.0	1,397.6	642.0
505.8	469.0	90.0	759.9	294.3
275.9	243.0	95.0	445.1	142.0
76.8	55.9	99.0	148.2	29.6

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.387	Historic Events	0
Standard Dev	0.510	High Outliers	0
Station Skew	-0.876	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.876	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,822.5	---	0.2	---	---
19,440.4	---	0.5	---	---
17,416.7	---	1.0	---	---
15,201.6	---	2.0	---	---
12,788.1	---	4.0	---	---
11,965.8	---	5.0	---	---
9,316.5	---	10.0	---	---
6,534.7	---	20.0	---	---
2,768.2	---	50.0	---	---
862.8	---	80.0	---	---
381.9	---	90.0	---	---
141.5	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

```
----------------------
<< Low Outlier Test >>
----------------------
 Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
                         Computed low outlier test value = 112.67

           1 low outlier(s) identified below test value of 112.67

Based on statistics after 0 zero events and 1 missing events were deleted.

     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:          |                               |
|          FLOW, cfs             |       Number of Events        |
|--------------------------------|-------------------------------|
|  Mean                   3.451  |  Historic Events          1   |
|  Standard Dev           0.460  |  High Outliers         0      |
|  Station Skew          -0.537  |  Low Outliers          1      |
|  Regional Skew         -0.100  |  Zero Events           0      |
|  Weighted Skew            ---  |  Missing Events        1      |
|  Adopted Skew          -0.876  |  Systematic Events       35   |
|                                |  Historic Period        105   |
|--------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
                     Computed high outlier test value = 44,526.87

     1 high outlier(s) identified above input threshold of 13,750

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and           *
   *        comparison with similar data should be explored,   *
   *        if not incorporated in this analysis.              *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                       and 1 historic event(s)


<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:          |                               |
|          FLOW, cfs             |       Number of Events        |
|--------------------------------|-------------------------------|
|  Mean                   3.423  |  Historic Events          1   |
|  Standard Dev           0.442  |  High Outliers         1      |
|  Station Skew          -0.556  |  Low Outliers          1      |
|  Regional Skew         -0.100  |  Zero Events           0      |
|  Weighted Skew            ---  |  Missing Events        1      |
|  Adopted Skew          -0.876  |  Systematic Events       35   |
|                                |  Historic Period        105   |
|--------------------------------|-------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.



--- Final Results ---
```

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1876	13,750.0	1	1946	13,750.0*	0.94
29 Nov 1946	13,750.0	2	1876	13,750.0	1.89
24 Mar 1948	1,500.0	3	1971	12,310.0	3.79
31 May 1949	---	4	1968	10,860.0	6.65
15 Sep 1949	562.0	5	1964	7,750.0	9.50
09 Jul 1950	542.5	6	1970	7,700.0	12.36
19 Jan 1952	4,250.0	7	1967	7,535.0	15.22
23 Sep 1952	1,610.0	8	1959	6,655.0	18.08
30 Jul 1953	1,330.0	9	1972	6,550.0	20.94
24 Jul 1954	4,505.0	10	1977	6,450.0	23.79
08 Aug 1955	4,140.0	11	1963	4,645.0	26.65
17 Aug 1956	713.0	12	1954	4,505.0	29.51
06 Aug 1957	2,935.0	13	1965	4,425.0	32.37
14 Sep 1958	2,740.0	14	1951	4,250.0	35.22
31 Oct 1959	6,655.0	15	1955	4,140.0	38.08
19 Oct 1960	755.5	16	1978	4,080.0	40.94
01 Nov 1961	2,045.0	17	1969	3,875.0	43.80
19 Oct 1962	3,265.0	18	1962	3,265.0	46.66
01 Sep 1963	4,645.0	19	1957	2,935.0	49.51
14 Aug 1964	7,750.0	20	1966	2,925.0	52.37
30 Jul 1965	4,425.0	21	1958	2,740.0	55.23
16 Sep 1966	2,925.0	22	1961	2,045.0	58.09
29 Jan 1968	7,535.0	23	1975	1,880.0	60.95
12 Aug 1968	10,860.0	24	1952	1,610.0	63.80
05 Sep 1969	3,875.0	25	1947	1,500.0	66.66
06 Sep 1970	7,700.0	26	1976	1,405.0	69.52
01 Oct 1971	12,310.0	27	1953	1,330.0	72.38
21 Oct 1972	6,550.0	28	1979	1,298.0	75.24
22 Jan 1974	223.0	29	1960	755.5	78.09
18 Jul 1974	424.5	30	1956	713.0	80.95
22 Feb 1976	1,880.0	31	1949	562.0	83.81
13 Aug 1976	1,405.0	32	1950	542.5	86.67
01 Aug 1977	6,450.0	33	1974	424.5	89.53
06 Aug 1978	4,080.0	34	1973	223.0	92.38
26 Jul 1979	1,298.0	35	1980	90.5*	95.24
30 Jul 1980	90.5	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.081
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
28,443.0	33,097.9	0.2	56,994.1	17,403.0
23,461.4	26,500.6	0.5	45,076.0	14,734.6
19,827.5	21,930.3	1.0	36,744.4	12,731.0
16,333.6	17,689.3	2.0	29,064.5	10,748.4
13,003.0	13,812.4	4.0	22,092.5	8,793.8
11,969.6	12,644.0	5.0	20,008.0	8,171.6

8,893.6	9,218.9	10.0	14,059.6	6,263.9
6,040.6	6,162.9	20.0	8,953.1	4,394.7
2,644.1	2,644.1	50.0	3,588.6	1,961.7
1,028.1	999.6	80.0	1,408.6	698.7
597.4	564.1	90.0	857.4	370.5
371.7	338.2	95.0	563.1	210.0
143.0	114.5	99.0	246.4	65.6

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.386	Historic Events	1
Standard Dev	0.461	High Outliers	1
Station Skew	-0.573	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.473	Missing Events	1
Adopted Skew	-0.473	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
28,838.5	33,256.8	0.2	58,324.9	17,502.2
24,007.8	26,960.2	0.5	46,662.3	14,932.7
20,417.1	22,497.6	1.0	38,337.9	12,969.7
16,910.0	18,273.1	2.0	30,530.9	10,998.6
13,516.5	14,343.8	4.0	23,326.8	9,028.1
12,453.6	13,147.4	5.0	21,150.8	8,395.4
9,262.6	9,600.2	10.0	14,884.4	6,439.6
6,270.2	6,398.2	20.0	9,442.6	4,503.5
2,685.5	2,685.5	50.0	3,692.2	1,969.3
999.4	970.0	80.0	1,386.1	669.3
562.2	528.8	90.0	819.0	341.8
338.8	306.2	95.0	523.0	186.4
121.2	95.3	99.0	215.0	53.3

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 3-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Events Analyzed			Ordered Events			
Day Mon Year		FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
30 Nov 1946		9,500.0	1	1971	10,153.3*	2.78
25 Mar 1948		1,274.7	2	1946	9,500.0	5.56
31 May 1949		---	3	1968	8,040.0	8.33
16 Sep 1949		480.7	4	1964	7,796.7	11.11
10 Jul 1950		426.0	5	1967	6,456.7	13.89
20 Jan 1952		3,346.7	6	1970	5,700.0	16.67
24 Sep 1952		1,111.0	7	1959	5,376.7	19.44
31 Jul 1953		1,053.0	8	1972	4,916.7	22.22
25 Jul 1954		4,383.3	9	1977	4,660.0	25.00
09 Aug 1955		3,670.0	10	1954	4,383.3	27.78
18 Aug 1956		577.0	11	1978	4,210.0	30.56
26 Aug 1957		2,473.3	12	1955	3,670.0	33.33
15 Sep 1958		1,924.7	13	1963	3,370.0	36.11
31 Oct 1959		5,376.7	14	1951	3,346.7	38.89
19 Oct 1960		672.7	15	1969	3,280.0	41.67
02 Nov 1961		1,557.3	16	1965	3,165.7	44.44
20 Oct 1962		2,820.0	17	1962	2,820.0	47.22
01 Sep 1963		3,370.0	18	1957	2,473.3	50.00
03 Aug 1964		7,796.7	19	1966	2,025.0	52.78
30 Jul 1965		3,165.7	20	1958	1,924.7	55.56
17 Sep 1966		2,025.0	21	1961	1,557.3	58.33
12 Aug 1967		6,456.7	22	1975	1,459.7	61.11
12 Aug 1968		8,040.0	23	1947	1,274.7	63.89
04 Aug 1969		3,280.0	24	1976	1,242.7	66.67
07 Sep 1970		5,700.0	25	1979	1,203.7	69.44
01 Oct 1971		10,153.3	26	1952	1,111.0	72.22
22 Oct 1972		4,916.7	27	1953	1,053.0	75.00
23 Jan 1974		199.7	28	1960	672.7	77.78
18 Jul 1974		284.6	29	1956	577.0	80.56
23 Feb 1976		1,459.7	30	1949	480.7	83.33
13 Aug 1976		1,242.7	31	1950	426.0	86.11
02 Aug 1977		4,660.0	32	1974	284.6	88.89
07 Aug 1978		4,210.0	33	1973	199.7	91.67
25 Jul 1979		1,203.7	34	1980	68.0*	94.44
31 Jul 1980		68.0	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
16,932.9	18,306.7	0.2	32,749.7	10,525.6
15,211.7	16,314.2	0.5	28,764.6	9,583.1
13,724.7	14,625.3	1.0	25,405.7	8,755.2
12,068.6	12,745.1	2.0	21,764.0	7,816.2
10,239.2	10,715.2	4.0	17,875.0	6,754.6
9,613.7	10,036.2	5.0	16,580.7	6,384.9
7,563.3	7,792.9	10.0	12,478.1	5,144.5
5,370.7	5,469.7	20.0	8,367.8	3,756.7
2,344.0	2,344.0	50.0	3,323.1	1,678.6
794.9	766.9	80.0	1,128.9	518.1
405.3	375.4	90.0	609.6	235.5
219.1	192.5	95.0	354.2	112.4
59.6	43.0	99.0	115.6	22.8

```
|-------------------------|-------------|-------------------------|
```

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.293	Historic Events	0
Standard Dev	0.512	High Outliers	0
Station Skew	-0.914	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.914	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
16,878.0	---	0.2	---	---
15,148.8	---	0.5	---	---
13,654.3	---	1.0	---	---
11,994.1	---	2.0	---	---
10,157.2	---	4.0	---	---
9,524.7	---	5.0	---	---
7,466.4	---	10.0	---	---
5,271.3	---	20.0	---	---
2,245.7	---	50.0	---	---
695.5	---	80.0	---	---
304.7	---	90.0	---	---
111.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 90.02

1 low outlier(s) identified below test value of 90.02

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.357	Historic Events	1
Standard Dev	0.457	High Outliers	0
Station Skew	-0.559	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.914	Systematic Events	35
		Historic Period	105

<< High Outlier Test >>

Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
Computed high outlier test value = 35,149.05

1 high outlier(s) identified above input threshold of 10,153.3

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.330	Historic Events	1
Standard Dev	0.441	High Outliers	1
Station Skew	-0.558	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.914	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1942	10,153.3	1	1971	10,153.3*	0.94
30 Nov 1946	9,500.0	2	1942	10,153.3	1.89
25 Mar 1948	1,274.7	3	1946	9,500.0	3.79
31 May 1949	---	4	1968	8,040.0	6.65
16 Sep 1949	480.7	5	1964	7,796.7	9.50
10 Jul 1950	426.0	6	1967	6,456.7	12.36
20 Jan 1952	3,346.7	7	1970	5,700.0	15.22
24 Sep 1952	1,111.0	8	1959	5,376.7	18.08
31 Jul 1953	1,053.0	9	1972	4,916.7	20.94
25 Jul 1954	4,383.3	10	1977	4,660.0	23.79
09 Aug 1955	3,670.0	11	1954	4,383.3	26.65
18 Aug 1956	577.0	12	1978	4,210.0	29.51
26 Aug 1957	2,473.3	13	1955	3,670.0	32.37
15 Sep 1958	1,924.7	14	1963	3,370.0	35.22
31 Oct 1959	5,376.7	15	1951	3,346.7	38.08
19 Oct 1960	672.7	16	1969	3,280.0	40.94
02 Nov 1961	1,557.3	17	1965	3,165.7	43.80
20 Oct 1962	2,820.0	18	1962	2,820.0	46.66
01 Sep 1963	3,370.0	19	1957	2,473.3	49.51
03 Aug 1964	7,796.7	20	1966	2,025.0	52.37

30 Jul 1965	3,165.7	21	1958	1,924.7	55.23
17 Sep 1966	2,025.0	22	1961	1,557.3	58.09
12 Aug 1967	6,456.7	23	1975	1,459.7	60.95
12 Aug 1968	8,040.0	24	1947	1,274.7	63.80
04 Aug 1969	3,280.0	25	1976	1,242.7	66.66
07 Sep 1970	5,700.0	26	1979	1,203.7	69.52
01 Oct 1971	10,153.3	27	1952	1,111.0	72.38
22 Oct 1972	4,916.7	28	1953	1,053.0	75.24
23 Jan 1974	199.7	29	1960	672.7	78.09
18 Jul 1974	284.6	30	1956	577.0	80.95
23 Feb 1976	1,459.7	31	1949	480.7	83.81
13 Aug 1976	1,242.7	32	1950	426.0	86.67
02 Aug 1977	4,660.0	33	1974	284.6	89.53
07 Aug 1978	4,210.0	34	1973	199.7	92.38
25 Jul 1979	1,203.7	35	1980	68.0*	95.24
31 Jul 1980	68.0	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.081
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
22,805.8	26,518.7	0.2	45,609.6	13,972.4
18,827.7	21,255.1	0.5	36,110.3	11,838.7
15,922.7	17,604.0	1.0	29,461.2	10,235.1
13,126.9	14,211.9	2.0	23,325.1	8,646.8
10,458.8	11,107.4	4.0	17,747.6	7,079.5
9,630.3	10,171.0	5.0	16,078.6	6,580.2
7,162.3	7,423.5	10.0	11,311.4	5,048.3
4,870.2	4,968.5	20.0	7,212.5	3,545.5
2,136.1	2,136.1	50.0	2,897.3	1,585.8
832.0	809.0	80.0	1,139.2	565.9
483.9	456.9	90.0	694.0	300.4
301.3	274.2	95.0	456.0	170.4
116.0	92.9	99.0	199.7	53.3

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.293	Historic Events	1
Standard Dev	0.460	High Outliers	1
Station Skew	-0.576	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.475	Missing Events	1
Adopted Skew	-0.475	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
23,293.9	26,862.7	0.2	47,111.1	14,137.2
19,391.9	21,776.7	0.5	37,690.8	12,061.7
16,491.6	18,172.1	1.0	30,966.9	10,476.1
13,658.8	14,759.8	2.0	24,660.9	8,884.0
10,917.7	11,586.0	4.0	18,841.9	7,292.3
10,059.2	10,619.6	5.0	17,084.2	6,781.3
7,481.7	7,754.5	10.0	12,022.7	5,201.5
5,064.6	5,168.1	20.0	7,627.1	3,637.6
2,169.2	2,169.2	50.0	2,982.4	1,590.7
807.2	783.5	80.0	1,119.6	540.6
454.1	427.1	90.0	661.6	276.1
273.7	247.4	95.0	422.5	150.6
97.9	76.9	99.0	173.7	43.0

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 4-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Dec 1946	7,190.0	1	1971	7,895.0*	2.78
26 Mar 1948	1,156.0	2	1964	7,395.0	5.56
31 May 1949	---	3	1946	7,190.0	8.33
17 Sep 1949	380.0	4	1968	6,355.0	11.11
11 Jul 1950	350.8	5	1967	5,382.5	13.89
21 Jan 1952	2,615.8	6	1970	4,338.8	16.67
25 Sep 1952	843.2	7	1959	4,191.5	19.44
01 Aug 1953	917.2	8	1972	4,077.5	22.22
25 Jul 1954	3,897.5	9	1954	3,897.5	25.00
09 Aug 1955	3,232.5	10	1978	3,812.5	27.78
18 Aug 1956	476.8	11	1977	3,629.8	30.56
26 Aug 1957	2,082.0	12	1955	3,232.5	33.33
23 Aug 1958	1,517.2	13	1969	2,689.0	36.11
01 Nov 1959	4,191.5	14	1963	2,667.8	38.89
19 Oct 1960	560.2	15	1951	2,615.8	41.67
03 Nov 1961	1,244.5	16	1965	2,459.2	44.44
20 Oct 1962	2,314.8	17	1962	2,314.8	47.22
02 Sep 1963	2,667.8	18	1957	2,082.0	50.00
04 Aug 1964	7,395.0	19	1966	1,545.5	52.78
06 Sep 1965	2,459.2	20	1958	1,517.2	55.56

17 Sep 1966	1,545.5	21	1975	1,309.2	58.33
13 Aug 1967	5,382.5	22	1961	1,244.5	61.11
12 Aug 1968	6,355.0	23	1947	1,156.0	63.89
04 Aug 1969	2,689.0	24	1979	1,042.0	66.67
08 Sep 1970	4,338.8	25	1976	993.0	69.44
02 Oct 1971	7,895.0	26	1953	917.2	72.22
22 Oct 1972	4,077.5	27	1952	843.2	75.00
24 Jan 1974	174.2	28	1960	560.2	77.78
18 Jul 1974	213.4	29	1956	476.8	80.56
24 Feb 1976	1,309.2	30	1949	380.0	83.33
14 Aug 1976	993.0	31	1950	350.8	86.11
02 Aug 1977	3,629.8	32	1974	213.4	88.89
08 Aug 1978	3,812.5	33	1973	174.2	91.67
25 Jul 1979	1,042.0	34	1980	52.9*	94.44
01 Aug 1980	52.9	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,417.9	14,433.1	0.2	25,787.6	8,370.2
12,126.0	12,954.4	0.5	22,816.1	7,659.8
10,994.2	11,680.4	1.0	20,272.9	7,027.5
9,717.9	10,240.1	2.0	17,477.6	6,301.8
8,289.9	8,662.7	4.0	14,450.4	5,471.7
7,797.6	8,130.2	5.0	13,433.4	5,180.4
6,169.2	6,352.0	10.0	10,178.7	4,194.7
4,404.6	4,484.5	20.0	6,869.9	3,078.2
1,931.5	1,931.5	50.0	2,742.0	1,382.0
652.0	628.7	80.0	926.6	424.7
330.2	305.5	90.0	497.2	191.5
177.1	155.3	95.0	286.9	90.5
47.1	33.8	99.0	91.9	17.9

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.206	Historic Events	0
Standard Dev	0.513	High Outliers	0
Station Skew	-0.946	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.946	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,376.8	---	0.2	---	---

```
|    12,078.3         --- |      0.5     |         ---         --- |
|    10,940.2         --- |      1.0     |         ---         --- |
|     9,660.1         --- |      2.0     |         ---         --- |
|     8,225.5         --- |      4.0     |         ---         --- |
|     7,727.0         --- |      5.0     |         ---         --- |
|     6,091.4         --- |     10.0     |         ---         --- |
|     4,323.9         --- |     20.0     |         ---         --- |
|     1,850.4         --- |     50.0     |         ---         --- |
|       569.7         --- |     80.0     |         ---         --- |
|       247.3         --- |     90.0     |         ---         --- |
|        88.8         --- |     95.0     |         ---         --- |
|         ---         --- |     99.0     |         ---         --- |
|-------------------------|--------------|-------------------------|

--- End of Preliminary Results ---



----------------------
<< Low Outlier Test >>
----------------------
 Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
                         Computed low outlier test value = 73.07

            1 low outlier(s) identified below test value of 73.07

Based on statistics after 0 zero events and 1 missing events were deleted.

     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                  3.270 |  Historic Events           1  |
|  Standard Dev          0.455 |  High Outliers          0     |
|  Station Skew         -0.581 |  Low Outliers           1     |
|  Regional Skew        -0.100 |  Zero Events            0     |
|  Weighted Skew           --- |  Missing Events         1     |
|  Adopted Skew         -0.946 |  Systematic Events        35  |
|                              |  Historic Period         105  |
|------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
                    Computed high outlier test value = 28,498.17

      1 high outlier(s) identified above input threshold of 7,895

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and            *
   *        comparison with similar data should be explored,   *
   *        if not incorporated in this analysis.              *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                        and 1 historic event(s)


<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                  3.244 |  Historic Events           1  |
```

Standard Dev	0.441	High Outliers	1
Station Skew	-0.569	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.946	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Events Analyzed				Ordered Events			
			FLOW		Analysis	FLOW	Weibull
Day	Mon	Year	cfs	Rank	Year	cfs	Plot Pos
01	Jan	1942	7,895.0	1	1971	7,895.0*	0.94
01	Dec	1946	7,190.0	2	1942	7,895.0	1.89
26	Mar	1948	1,156.0	3	1964	7,395.0	3.79
31	May	1949	---	4	1946	7,190.0	6.65
17	Sep	1949	380.0	5	1968	6,355.0	9.50
11	Jul	1950	350.8	6	1967	5,382.5	12.36
21	Jan	1952	2,615.8	7	1970	4,338.8	15.22
25	Sep	1952	843.2	8	1959	4,191.5	18.08
01	Aug	1953	917.2	9	1972	4,077.5	20.94
25	Jul	1954	3,897.5	10	1954	3,897.5	23.79
09	Aug	1955	3,232.5	11	1978	3,812.5	26.65
18	Aug	1956	476.8	12	1977	3,629.8	29.51
26	Aug	1957	2,082.0	13	1955	3,232.5	32.37
23	Aug	1958	1,517.2	14	1969	2,689.0	35.22
01	Nov	1959	4,191.5	15	1963	2,667.8	38.08
19	Oct	1960	560.2	16	1951	2,615.8	40.94
03	Nov	1961	1,244.5	17	1965	2,459.2	43.80
20	Oct	1962	2,314.8	18	1962	2,314.8	46.66
02	Sep	1963	2,667.8	19	1957	2,082.0	49.51
04	Aug	1964	7,395.0	20	1966	1,545.5	52.37
06	Sep	1965	2,459.2	21	1958	1,517.2	55.23
17	Sep	1966	1,545.5	22	1975	1,309.2	58.09
13	Aug	1967	5,382.5	23	1961	1,244.5	60.95
12	Aug	1968	6,355.0	24	1947	1,156.0	63.80
04	Aug	1969	2,689.0	25	1979	1,042.0	66.66
08	Sep	1970	4,338.8	26	1976	993.0	69.52
02	Oct	1971	7,895.0	27	1953	917.2	72.38
22	Oct	1972	4,077.5	28	1952	843.2	75.24
24	Jan	1974	174.2	29	1960	560.2	78.09
18	Jul	1974	213.4	30	1956	476.8	80.95
24	Feb	1976	1,309.2	31	1949	380.0	83.81
14	Aug	1976	993.0	32	1950	350.8	86.67
02	Aug	1977	3,629.8	33	1974	213.4	89.53
08	Aug	1978	3,812.5	34	1973	174.2	92.38
25	Jul	1979	1,042.0	35	1980	52.9*	95.24
01	Aug	1980	52.9	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.082

Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
18,502.5	21,472.4	0.2	36,913.9	11,353.1
15,308.8	17,258.4	0.5	29,305.5	9,637.4
12,968.6	14,323.5	1.0	23,959.1	8,343.9
10,709.6	11,586.8	2.0	19,008.6	7,059.3
8,547.3	9,073.4	4.0	14,493.3	5,788.2
7,874.5	8,313.7	5.0	13,139.0	5,382.5
5,866.2	6,078.9	10.0	9,261.8	4,135.4
3,995.1	4,075.4	20.0	5,916.4	2,908.4
1,754.8	1,754.8	50.0	2,380.3	1,302.8
683.0	664.1	80.0	935.1	464.6
396.7	374.5	90.0	569.0	246.3
246.6	224.3	95.0	373.4	139.4
94.6	75.7	99.0	162.9	43.4

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.207	Historic Events	1
Standard Dev	0.460	High Outliers	1
Station Skew	-0.588	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.484	Missing Events	1
Adopted Skew	-0.484	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
19,106.7	22,034.0	0.2	38,642.6	11,595.9
15,906.1	17,862.2	0.5	30,915.7	9,893.6
13,527.2	14,905.6	1.0	25,400.5	8,593.0
11,203.6	12,106.6	2.0	20,228.0	7,287.0
8,955.2	9,503.3	4.0	15,455.0	5,981.5
8,251.0	8,710.7	5.0	14,013.3	5,562.3
6,136.9	6,360.6	10.0	9,861.5	4,266.5
4,154.2	4,239.1	20.0	6,256.1	2,983.8
1,779.2	1,779.2	50.0	2,446.3	1,304.8
662.1	642.7	80.0	918.3	443.5
372.5	350.4	90.0	542.6	226.5
224.5	202.9	95.0	346.5	123.5
80.3	63.1	99.0	142.5	35.3

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---

Standard Dev	0.480	
User Skew	-0.540	

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Events Analyzed				Ordered Events			
			FLOW		Analysis	FLOW	Weibull
Day	Mon	Year	cfs	Rank	Year	cfs	Plot Pos
01	Dec	1946	5,784.0	1	1971	6,456.0*	2.78
27	Mar	1948	1,092.8	2	1964	6,322.0	5.56
31	May	1949	---	3	1968	6,074.0	8.33
18	Sep	1949	310.8	4	1946	5,784.0	11.11
12	Jul	1950	299.2	5	1967	4,578.0	13.89
21	Jan	1952	2,151.0	6	1959	3,488.0	16.67
26	Sep	1952	680.8	7	1970	3,478.6	19.44
01	Aug	1953	832.8	8	1972	3,422.0	22.22
25	Jul	1954	3,227.0	9	1978	3,410.0	25.00
09	Aug	1955	2,830.0	10	1954	3,227.0	27.78
19	Aug	1956	406.6	11	1977	2,941.4	30.56
27	Aug	1957	1,839.8	12	1955	2,830.0	33.33
23	Aug	1958	1,331.6	13	1965	2,472.8	36.11
02	Nov	1959	3,488.0	14	1969	2,297.8	38.89
19	Oct	1960	493.2	15	1963	2,229.0	41.67
15	Feb	1962	1,047.2	16	1951	2,151.0	44.44
21	Oct	1962	1,899.4	17	1962	1,899.4	47.22
01	Sep	1963	2,229.0	18	1957	1,839.8	50.00
04	Aug	1964	6,322.0	19	1958	1,331.6	52.78
29	Jul	1965	2,472.8	20	1966	1,253.8	55.56
17	Sep	1966	1,253.8	21	1975	1,162.0	58.33
13	Aug	1967	4,578.0	22	1947	1,092.8	61.11
12	Aug	1968	6,074.0	23	1961	1,047.2	63.89
05	Aug	1969	2,297.8	24	1979	916.8	66.67
09	Sep	1970	3,478.6	25	1976	869.8	69.44
03	Oct	1971	6,456.0	26	1953	832.8	72.22
23	Oct	1972	3,422.0	27	1952	680.8	75.00
25	Jan	1974	146.0	28	1960	493.2	77.78
18	Jul	1974	170.7	29	1956	406.6	80.56
25	Feb	1976	1,162.0	30	1949	310.8	83.33
15	Aug	1976	869.8	31	1950	299.2	86.11
02	Aug	1977	2,941.4	32	1974	170.7	88.89
08	Aug	1978	3,410.0	33	1973	146.0	91.67
26	Jul	1979	916.8	34	1980	57.6*	94.44
25	Jul	1980	57.6	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,053.5	13,087.2	0.2	23,300.6	7,502.5
10,776.8	11,593.9	0.5	20,345.3	6,803.0
9,687.5	10,346.7	1.0	17,887.8	6,195.7
8,487.2	8,977.0	2.0	15,254.2	5,513.8
7,175.2	7,515.8	4.0	12,474.0	4,750.6
6,729.7	7,030.6	5.0	11,555.6	4,486.5
5,279.2	5,441.3	10.0	8,665.6	3,606.0
3,742.7	3,812.0	20.0	5,799.7	2,629.5
1,640.0	1,640.0	50.0	2,314.0	1,179.2
564.7	545.1	80.0	798.7	369.8
291.7	270.6	90.0	436.5	170.6
159.8	140.9	95.0	256.7	82.8
44.9	32.7	99.0	86.1	17.5

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.141	Historic Events	0
Standard Dev	0.505	High Outliers	0
Station Skew	-0.884	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.884	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,012.7	---	0.2	---	---
10,730.7	---	0.5	---	---
9,636.4	---	1.0	---	---
8,433.5	---	2.0	---	---
7,116.8	---	4.0	---	---
6,666.7	---	5.0	---	---
5,211.2	---	10.0	---	---
3,673.5	---	20.0	---	---
1,571.9	---	50.0	---	---
495.3	---	80.0	---	---
220.7	---	90.0	---	---
82.4	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 65.97

1 low outlier(s) identified below test value of 65.97

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.202	Historic Events	1
Standard Dev	0.455	High Outliers	0
Station Skew	-0.632	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.884	Systematic Events	35
		Historic Period	105

<< High Outlier Test >>

Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
Computed high outlier test value = 24,406.02

1 high outlier(s) identified above input threshold of 6,456

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.177	Historic Events	1
Standard Dev	0.442	High Outliers	1
Station Skew	-0.613	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.884	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1942	6,456.0	1	1971	6,456.0*	0.94
01 Dec 1946	5,784.0	2	1942	6,456.0	1.89
27 Mar 1948	1,092.8	3	1964	6,322.0	3.79

31 May 1949	---	4	1968	6,074.0	6.65
18 Sep 1949	310.8	5	1946	5,784.0	9.50
12 Jul 1950	299.2	6	1967	4,578.0	12.36
21 Jan 1952	2,151.0	7	1959	3,488.0	15.22
26 Sep 1952	680.8	8	1970	3,478.6	18.08
01 Aug 1953	832.8	9	1972	3,422.0	20.94
25 Jul 1954	3,227.0	10	1978	3,410.0	23.79
09 Aug 1955	2,830.0	11	1954	3,227.0	26.65
19 Aug 1956	406.6	12	1977	2,941.4	29.51
27 Aug 1957	1,839.8	13	1955	2,830.0	32.37
23 Aug 1958	1,331.6	14	1965	2,472.8	35.22
02 Nov 1959	3,488.0	15	1969	2,297.8	38.08
19 Oct 1960	493.2	16	1963	2,229.0	40.94
15 Feb 1962	1,047.2	17	1951	2,151.0	43.80
21 Oct 1962	1,899.4	18	1962	1,899.4	46.66
01 Sep 1963	2,229.0	19	1957	1,839.8	49.51
04 Aug 1964	6,322.0	20	1958	1,331.6	52.37
29 Jul 1965	2,472.8	21	1966	1,253.8	55.23
17 Sep 1966	1,253.8	22	1975	1,162.0	58.09
13 Aug 1967	4,578.0	23	1947	1,092.8	60.95
12 Aug 1968	6,074.0	24	1961	1,047.2	63.80
05 Aug 1969	2,297.8	25	1979	916.8	66.66
09 Sep 1970	3,478.6	26	1976	869.8	69.52
03 Oct 1971	6,456.0	27	1953	832.8	72.38
23 Oct 1972	3,422.0	28	1952	680.8	75.24
25 Jan 1974	146.0	29	1960	493.2	78.09
18 Jul 1974	170.7	30	1956	406.6	80.95
25 Feb 1976	1,162.0	31	1949	310.8	83.81
15 Aug 1976	869.8	32	1950	299.2	86.67
02 Aug 1977	2,941.4	33	1974	170.7	89.53
08 Aug 1978	3,410.0	34	1973	146.0	92.38
26 Jul 1979	916.8	35	1980	57.6*	95.24
25 Jul 1980	57.6	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.085
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
15,410.3	17,770.8	0.2	30,599.9	9,480.2
12,839.5	14,410.9	0.5	24,503.2	8,095.0
10,933.8	12,038.3	1.0	20,163.0	7,039.7
9,075.7	9,798.3	2.0	16,098.5	5,981.9
7,279.2	7,717.5	4.0	12,349.2	4,925.4
6,716.4	7,083.9	5.0	11,216.2	4,586.3
5,025.5	5,204.9	10.0	7,948.7	3,537.1
3,434.4	3,502.8	20.0	5,098.6	2,495.4
1,509.2	1,509.2	50.0	2,051.6	1,118.6
582.4	566.0	80.0	798.8	395.4
335.5	316.4	90.0	482.3	207.6
206.7	187.6	95.0	314.0	116.2
77.5	61.6	99.0	134.5	35.2

<< Synthetic Statistics >>

LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.139	Historic Events	1
Standard Dev	0.463	High Outliers	1
Station Skew	-0.634	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.517	Missing Events	1
Adopted Skew	-0.517	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
16,328.9	18,830.6	0.2	33,024.7	9,910.1
13,593.7	15,265.4	0.5	26,421.1	8,455.2
11,560.5	12,738.6	1.0	21,707.7	7,343.7
9,574.8	10,346.5	2.0	17,287.2	6,227.6
7,653.3	8,121.7	4.0	13,208.1	5,111.9
7,051.5	7,444.3	5.0	11,976.0	4,753.6
5,244.7	5,435.8	10.0	8,427.8	3,646.2
3,550.3	3,622.8	20.0	5,346.6	2,550.0
1,520.6	1,520.6	50.0	2,090.6	1,115.1
565.9	549.2	80.0	784.8	379.0
318.3	299.4	90.0	463.8	193.5
191.9	173.4	95.0	296.1	105.6
68.6	53.9	99.0	121.8	30.2

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 6-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
30 Nov 1946	4,868.3	1	1968	6,038.3*	2.78
28 Mar 1948	1,050.7	2	1964	5,588.3	5.56
31 May 1949	---	3	1971	5,449.2	8.33

19 Sep 1949	262.0	4	1946	4,868.3	11.11
12 Jul 1950	254.0	5	1967	3,956.3	13.89
19 Jan 1952	1,966.7	6	1978	3,256.7	16.67
27 Sep 1952	571.0	7	1959	3,153.3	19.44
02 Aug 1953	767.8	8	1970	2,901.5	22.22
26 Jul 1954	2,776.8	9	1972	2,885.0	25.00
09 Aug 1955	2,600.0	10	1954	2,776.8	27.78
20 Aug 1956	359.3	11	1965	2,737.3	30.56
28 Aug 1957	1,655.2	12	1955	2,600.0	33.33
23 Aug 1958	1,279.7	13	1977	2,550.5	36.11
03 Nov 1959	3,153.3	14	1963	2,232.5	38.89
20 Oct 1960	429.5	15	1969	2,130.0	41.67
15 Feb 1962	1,012.7	16	1951	1,966.7	44.44
22 Oct 1962	1,592.2	17	1957	1,655.2	47.22
01 Sep 1963	2,232.5	18	1962	1,592.2	50.00
05 Aug 1964	5,588.3	19	1958	1,279.7	52.78
30 Jul 1965	2,737.3	20	1966	1,138.3	55.56
02 Aug 1966	1,138.3	21	1947	1,050.7	58.33
15 Aug 1967	3,956.3	22	1975	1,043.8	61.11
12 Aug 1968	6,038.3	23	1961	1,012.7	63.89
10 Sep 1969	2,130.0	24	1979	803.8	66.67
10 Sep 1970	2,901.5	25	1953	767.8	69.44
04 Oct 1971	5,449.2	26	1976	760.0	72.22
24 Oct 1972	2,885.0	27	1952	571.0	75.00
23 Jan 1974	144.2	28	1960	429.5	77.78
18 Jul 1974	142.3	29	1956	359.3	80.56
26 Feb 1976	1,043.8	30	1949	262.0	83.33
15 Aug 1976	760.0	31	1950	254.0	86.11
05 Aug 1977	2,550.5	32	1973	144.2	88.89
07 Aug 1978	3,256.7	33	1974	142.3	91.67
28 Jul 1979	803.8	34	1980	49.4*	94.44
26 Jul 1980	49.4	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,652.3	11,515.6	0.2	20,551.1	6,633.8
9,571.1	10,263.7	0.5	18,053.9	6,040.7
8,637.2	9,202.8	1.0	15,949.5	5,519.8
7,597.2	8,022.1	2.0	13,668.0	4,929.1
6,448.4	6,747.4	4.0	11,231.4	4,261.3
6,055.6	6,320.9	5.0	10,420.4	4,028.8
4,767.6	4,911.9	10.0	7,849.0	3,248.3
3,389.5	3,451.8	20.0	5,270.8	2,374.6
1,484.2	1,484.2	50.0	2,100.9	1,064.4
505.8	488.0	80.0	717.2	330.3
258.7	239.7	90.0	388.4	150.7
140.3	123.3	95.0	226.3	72.2
38.4	27.8	99.0	74.3	14.7

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.095	Historic Events	0
Standard Dev	0.510	High Outliers	0

Station Skew	-0.912	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.912	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,617.8	---	0.2	---	---
9,531.6	---	0.5	---	---
8,593.1	---	1.0	---	---
7,550.5	---	2.0	---	---
6,396.9	---	4.0	---	---
5,999.7	---	5.0	---	---
4,706.7	---	10.0	---	---
3,327.0	---	20.0	---	---
1,422.2	---	50.0	---	---
442.8	---	80.0	---	---
194.8	---	90.0	---	---
71.3	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 57.84

1 low outlier(s) identified below test value of 57.84

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.156	Historic Events	1
Standard Dev	0.459	High Outliers	0
Station Skew	-0.654	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.912	Systematic Events	35
		Historic Period	105

<< High Outlier Test >>

Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
Computed high outlier test value = 22,442.77

1 high outlier(s) identified above input threshold of 6,038.3

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and            *
*        comparison with similar data should be explored,    *
*        if not incorporated in this analysis.               *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.131	Historic Events	1
Standard Dev	0.445	High Outliers	1
Station Skew	-0.643	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.912	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1939	6,038.3	1	1968	6,038.3*	0.94
30 Nov 1946	4,868.3	2	1939	6,038.3	1.89
28 Mar 1948	1,050.7	3	1964	5,588.3	3.79
31 May 1949	---	4	1971	5,449.2	6.65
19 Sep 1949	262.0	5	1946	4,868.3	9.50
12 Jul 1950	254.0	6	1967	3,956.3	12.36
19 Jan 1952	1,966.7	7	1978	3,256.7	15.22
27 Sep 1952	571.0	8	1959	3,153.3	18.08
02 Aug 1953	767.8	9	1970	2,901.5	20.94
26 Jul 1954	2,776.8	10	1972	2,885.0	23.79
09 Aug 1955	2,600.0	11	1954	2,776.8	26.65
20 Aug 1956	359.3	12	1965	2,737.3	29.51
28 Aug 1957	1,655.2	13	1955	2,600.0	32.37
23 Aug 1958	1,279.7	14	1977	2,550.5	35.22
03 Nov 1959	3,153.3	15	1963	2,232.5	38.08
20 Oct 1960	429.5	16	1969	2,130.0	40.94
15 Feb 1962	1,012.7	17	1951	1,966.7	43.80
22 Oct 1962	1,592.2	18	1957	1,655.2	46.66
01 Sep 1963	2,232.5	19	1962	1,592.2	49.51
05 Aug 1964	5,588.3	20	1958	1,279.7	52.37
30 Jul 1965	2,737.3	21	1966	1,138.3	55.23
02 Aug 1966	1,138.3	22	1947	1,050.7	58.09
15 Aug 1967	3,956.3	23	1975	1,043.8	60.95
12 Aug 1968	6,038.3	24	1961	1,012.7	63.80
10 Sep 1969	2,130.0	25	1979	803.8	66.66
10 Sep 1970	2,901.5	26	1953	767.8	69.52
04 Oct 1971	5,449.2	27	1976	760.0	72.38
24 Oct 1972	2,885.0	28	1952	571.0	75.24
23 Jan 1974	144.2	29	1960	429.5	78.09
18 Jul 1974	142.3	30	1956	359.3	80.95
26 Feb 1976	1,043.8	31	1949	262.0	83.81

15 Aug 1976	760.0	32	1950	254.0	86.67
05 Aug 1977	2,550.5	33	1973	144.2	89.53
07 Aug 1978	3,256.7	34	1974	142.3	92.38
28 Jul 1979	803.8	35	1980	49.4*	95.24
26 Jul 1980	49.4	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.087
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,730.5	15,777.0	0.2	27,242.9	8,447.2
11,484.4	12,858.4	0.5	21,920.4	7,236.6
9,807.8	10,780.1	1.0	18,101.8	6,308.3
8,163.3	8,803.4	2.0	14,501.6	5,372.8
6,563.7	6,954.6	4.0	11,158.8	4,433.3
6,060.8	6,389.2	5.0	10,144.2	4,130.6
4,543.7	4,704.8	10.0	7,206.1	3,190.9
3,108.4	3,170.1	20.0	4,628.1	2,253.2
1,362.7	1,362.7	50.0	1,857.0	1,007.9
521.3	506.4	80.0	716.5	353.1
298.1	280.8	90.0	429.7	183.7
182.2	165.2	95.0	277.9	102.0
67.1	53.1	99.0	117.2	30.2

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.093	Historic Events	1
Standard Dev	0.467	High Outliers	1
Station Skew	-0.665	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.538	Missing Events	1
Adopted Skew	-0.538	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
14,678.0	16,926.8	0.2	29,685.8	8,908.2
12,219.3	13,722.0	0.5	23,749.9	7,600.4
10,391.8	11,450.7	1.0	19,513.0	6,601.2
8,606.8	9,300.5	2.0	15,539.4	5,598.0
6,879.5	7,300.6	4.0	11,872.7	4,595.1
6,338.5	6,691.7	5.0	10,765.2	4,273.0

4,714.4	4,886.3	10.0	7,575.8	3,277.6
3,191.3	3,256.5	20.0	4,806.0	2,292.2
1,366.8	1,366.8	50.0	1,879.3	1,002.3
508.7	493.7	80.0	705.5	340.7
286.1	269.2	90.0	416.9	174.0
172.5	155.9	95.0	266.2	94.9
61.7	48.5	99.0	109.4	27.1

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 7-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
30	Nov	1946	4,231.7	1	1968	6,462.9	2.78
29	Mar	1948	1,019.4	2	1964	4,913.1	5.56
31	May	1949	---	3	1971	4,702.4	8.33
20	Sep	1949	226.3	4	1946	4,231.7	11.11
13	Jul	1950	220.9	5	1967	3,585.4	13.89
20	Jan	1952	1,905.7	6	1978	3,165.7	16.67
28	Sep	1952	492.4	7	1959	2,753.4	19.44
02	Aug	1953	685.0	8	1965	2,604.9	22.22
27	Jul	1954	2,432.3	9	1970	2,500.3	25.00
13	Aug	1955	2,405.1	10	1972	2,487.1	27.78
20	Aug	1956	320.7	11	1954	2,432.3	30.56
30	Aug	1957	1,621.6	12	1955	2,405.1	33.33
24	Aug	1958	1,166.9	13	1977	2,263.1	36.11
04	Nov	1959	2,753.4	14	1969	2,101.4	38.89
21	Oct	1960	375.4	15	1963	1,993.7	41.67
16	Feb	1962	963.1	16	1951	1,905.7	44.44
23	Oct	1962	1,369.0	17	1957	1,621.6	47.22
02	Sep	1963	1,993.7	18	1962	1,369.0	50.00
06	Aug	1964	4,913.1	19	1958	1,166.9	52.78
30	Jul	1965	2,604.9	20	1966	1,019.4	55.56
03	Aug	1966	1,019.4	21	1947	1,019.4	58.33
15	Aug	1967	3,585.4	22	1961	963.1	61.11
12	Aug	1968	6,462.9	23	1975	944.4	63.89
10	Sep	1969	2,101.4	24	1979	768.6	66.67
11	Sep	1970	2,500.3	25	1976	699.0	69.44
05	Oct	1971	4,702.4	26	1953	685.0	72.22
25	Oct	1972	2,487.1	27	1952	492.4	75.00
24	Jan	1974	137.6	28	1960	375.4	77.78
18	Jul	1974	122.0	29	1956	320.7	80.56
27	Feb	1976	944.4	30	1949	226.3	83.33
15	Aug	1976	699.0	31	1950	220.9	86.11

05 Aug 1977	2,263.1	32	1973	137.6	88.89
08 Aug 1978	3,165.7	33	1974	122.0	91.67
28 Jul 1979	768.6	34	1980	45.3*	94.44
29 Jul 1980	45.3	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,966.1	10,797.8	0.2	19,370.7	6,175.3
8,930.1	9,593.4	0.5	16,960.0	5,609.9
8,039.7	8,578.7	1.0	14,939.8	5,115.7
7,052.7	7,455.6	2.0	12,761.1	4,557.6
5,968.0	6,249.8	4.0	10,447.5	3,929.6
5,598.4	5,848.0	5.0	9,680.5	3,711.6
4,391.2	4,526.2	10.0	7,259.1	2,982.7
3,107.8	3,165.7	20.0	4,848.9	2,171.5
1,349.6	1,349.6	50.0	1,915.1	965.4
456.5	440.3	80.0	649.0	297.0
232.7	215.5	90.0	350.4	135.0
125.8	110.6	95.0	203.7	64.4
34.3	24.8	99.0	66.6	13.1

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.054	Historic Events	0
Standard Dev	0.513	High Outliers	0
Station Skew	-0.902	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.902	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,933.1	---	0.2	---	---
8,892.4	---	0.5	---	---
7,997.7	---	1.0	---	---
7,008.5	---	2.0	---	---
5,919.5	---	4.0	---	---
5,545.9	---	5.0	---	---
4,334.4	---	10.0	---	---
3,049.9	---	20.0	---	---
1,292.8	---	50.0	---	---
399.3	---	80.0	---	---
175.0	---	90.0	---	---
63.8	---	95.0	---	---

---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 51.43

1 low outlier(s) identified below test value of 51.43

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.117	Historic Events	1
Standard Dev	0.466	High Outliers	0
Station Skew	-0.634	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.902	Systematic Events	35
		Historic Period	105

<< High Outlier Test >>

Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
Computed high outlier test value = 21,458.83

0 high outlier(s) identified above input threshold of 6,462.9

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.104	Historic Events	1
Standard Dev	0.456	High Outliers	0
Station Skew	-0.632	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.902	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1939	6,462.9	1	1939	6,462.9	0.94
30 Nov 1946	4,231.7	2	1968	6,462.9	2.82
29 Mar 1948	1,019.4	3	1964	4,913.1	5.62
31 May 1949	---	4	1971	4,702.4	8.42
20 Sep 1949	226.3	5	1946	4,231.7	11.23
13 Jul 1950	220.9	6	1967	3,585.4	14.03
20 Jan 1952	1,905.7	7	1978	3,165.7	16.83
28 Sep 1952	492.4	8	1959	2,753.4	19.64
02 Aug 1953	685.0	9	1965	2,604.9	22.44
27 Jul 1954	2,432.3	10	1970	2,500.3	25.24
13 Aug 1955	2,405.1	11	1972	2,487.1	28.05
20 Aug 1956	320.7	12	1954	2,432.3	30.85
30 Aug 1957	1,621.6	13	1955	2,405.1	33.65
24 Aug 1958	1,166.9	14	1977	2,263.1	36.46
04 Nov 1959	2,753.4	15	1969	2,101.4	39.26
21 Oct 1960	375.4	16	1963	1,993.7	42.06
16 Feb 1962	963.1	17	1951	1,905.7	44.87
23 Oct 1962	1,369.0	18	1957	1,621.6	47.67
02 Sep 1963	1,993.7	19	1962	1,369.0	50.47
06 Aug 1964	4,913.1	20	1958	1,166.9	53.27
30 Jul 1965	2,604.9	21	1966	1,019.4	56.08
03 Aug 1966	1,019.4	22	1947	1,019.4	58.88
15 Aug 1967	3,585.4	23	1961	963.1	61.68
12 Aug 1968	6,462.9	24	1975	944.4	64.49
10 Sep 1969	2,101.4	25	1979	768.6	67.29
11 Sep 1970	2,500.3	26	1976	699.0	70.09
05 Oct 1971	4,702.4	27	1953	685.0	72.90
25 Oct 1972	2,487.1	28	1952	492.4	75.70
24 Jan 1974	137.6	29	1960	375.4	78.50
18 Jul 1974	122.0	30	1956	320.7	81.31
27 Feb 1976	944.4	31	1949	226.3	84.11
15 Aug 1976	699.0	32	1950	220.9	86.91
05 Aug 1977	2,263.1	33	1973	137.6	89.72
08 Aug 1978	3,165.7	34	1974	122.0	92.52
28 Jul 1979	768.6	35	1980	45.3*	95.32
29 Jul 1980	45.3	36	1948	---	98.13

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 2.9714

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.086
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,743.5	15,869.6	0.2	27,748.0	8,353.2
11,426.4	12,842.2	0.5	22,163.3	7,119.1
9,708.8	10,703.8	1.0	18,189.2	6,178.7
8,035.2	8,685.5	2.0	14,471.7	5,236.5
6,419.3	6,813.0	4.0	11,049.5	4,296.5
5,913.8	6,243.7	5.0	10,017.3	3,995.1

4,398.3	4,558.7	10.0	7,048.8	3,064.4
2,979.3	3,040.1	20.0	4,475.0	2,144.4
1,280.7	1,280.7	50.0	1,757.1	941.0
480.0	466.0	80.0	664.4	322.3
271.4	255.5	90.0	394.5	165.6
164.4	148.8	95.0	253.0	90.9
59.5	46.9	99.0	105.1	26.3

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.066	Historic Events	1
Standard Dev	0.477	High Outliers	0
Station Skew	-0.653	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.530	Missing Events	1
Adopted Skew	-0.530	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,786.6	15,898.8	0.2	27,882.8	8,367.1
11,477.2	12,888.6	0.5	22,307.4	7,138.8
9,760.6	10,755.2	1.0	18,327.9	6,200.3
8,084.0	8,735.6	2.0	14,595.6	5,258.0
6,461.7	6,857.2	4.0	11,151.6	4,316.0
5,953.6	6,285.2	5.0	10,111.4	4,013.5
4,428.1	4,589.5	10.0	7,115.7	3,078.5
2,997.5	3,058.7	20.0	4,514.1	2,152.9
1,283.8	1,283.8	50.0	1,765.1	941.5
477.8	463.7	80.0	662.6	320.0
268.8	252.8	90.0	391.5	163.4
162.0	146.4	95.0	250.0	89.1
57.9	45.5	99.0	102.8	25.5

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 8-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

Warning: 1 events occur in first 13 days of analysis year for 8-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
30 Nov 1946	3,810.2	1	1968	5,759.2*	2.78
30 Mar 1948	992.0	2	1964	4,430.2	5.56
31 May 1949	---	3	1971	4,127.6	8.33
21 Sep 1949	199.4	4	1946	3,810.2	11.11
14 Jul 1950	194.6	5	1967	3,534.1	13.89
21 Jan 1952	1,720.4	6	1978	3,061.2	16.67
29 Sep 1952	434.1	7	1959	2,465.8	19.44
02 Aug 1953	646.6	8	1955	2,344.5	22.22
28 Jul 1954	2,162.0	9	1965	2,319.6	25.00
13 Aug 1955	2,344.5	10	1970	2,189.0	27.78
21 Aug 1956	286.6	11	1972	2,183.8	30.56
31 Aug 1957	1,597.6	12	1954	2,162.0	33.33
23 Aug 1958	1,050.4	13	1977	2,003.8	36.11
05 Nov 1959	2,465.8	14	1969	1,901.2	38.89
22 Oct 1960	331.1	15	1963	1,785.6	41.67
16 Feb 1962	908.1	16	1951	1,720.4	44.44
24 Oct 1962	1,200.0	17	1957	1,597.6	47.22
02 Sep 1963	1,785.6	18	1962	1,200.0	50.00
07 Aug 1964	4,430.2	19	1958	1,050.4	52.78
30 Jul 1965	2,319.6	20	1947	992.0	55.56
04 Aug 1966	933.1	21	1966	933.1	58.33
12 Aug 1967	3,534.1	22	1961	908.1	61.11
12 Aug 1968	5,759.2	23	1975	866.2	63.89
11 Sep 1969	1,901.2	24	1979	704.5	66.67
11 Sep 1970	2,189.0	25	1953	646.6	69.44
06 Oct 1971	4,127.6	26	1976	631.6	72.22
26 Oct 1972	2,183.8	27	1952	434.1	75.00
01 Jun 1973	142.5	28	1960	331.1	77.78
18 Jul 1974	106.7	29	1956	286.6	80.56
28 Feb 1976	866.2	30	1949	199.4	83.33
15 Aug 1976	631.6	31	1950	194.6	86.11
05 Aug 1977	2,003.8	32	1973	142.5	88.89
08 Aug 1978	3,061.2	33	1974	106.7	91.67
29 Jul 1979	704.5	34	1980	48.7*	94.44
29 Jul 1980	48.7	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,458.6	10,332.4	0.2	18,476.7	5,848.9
8,397.1	9,075.6	0.5	15,993.7	5,271.6
7,505.0	8,044.3	1.0	13,962.8	4,777.3
6,534.8	6,929.9	2.0	11,817.9	4,229.0
5,488.7	5,759.2	4.0	9,587.5	3,623.0
5,136.7	5,374.3	5.0	8,858.1	3,415.1
4,001.2	4,127.8	10.0	6,586.7	2,727.9

2,816.0	2,869.3	20.0	4,370.5	1,976.1
1,222.5	1,222.5	50.0	1,726.3	878.0
420.3	405.8	80.0	595.2	274.7
217.7	202.1	90.0	326.1	127.2
119.8	105.7	95.0	192.5	62.0
34.1	25.0	99.0	65.3	13.3

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.016	Historic Events	0
Standard Dev	0.507	High Outliers	0
Station Skew	-0.852	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.852	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,424.5	---	0.2	---	---
8,359.3	---	0.5	---	---
7,463.5	---	1.0	---	---
6,491.8	---	2.0	---	---
5,442.5	---	4.0	---	---
5,087.1	---	5.0	---	---
3,948.6	---	10.0	---	---
2,763.2	---	20.0	---	---
1,171.5	---	50.0	---	---
368.9	---	80.0	---	---
165.0	---	90.0	---	---
62.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 48.95

1 low outlier(s) identified below test value of 48.95

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.077	Historic Events	1

```
|  Standard Dev         0.465  |  High Outliers          0      |
|  Station Skew        -0.642  |  Low Outliers           1      |
|  Regional Skew       -0.100  |  Zero Events            0      |
|  Weighted Skew          ---  |  Missing Events         1      |
|  Adopted Skew        -0.852  |  Systematic Events        35  |
|                              |  Historic Period         105  |
|------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 33 events, 10 percent outlier test deviate K(N) = 2.604
                     Computed high outlier test value = 19,445.98

    1 high outlier(s) identified above input threshold of 5,759.2

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and            *
   *        comparison with similar data should be explored,   *
   *        if not incorporated in this analysis.               *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                          and 1 historic event(s)


<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)
-----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                 3.049  |  Historic Events           1  |
|  Standard Dev         0.448  |  High Outliers          1      |
|  Station Skew        -0.662  |  Low Outliers           1      |
|  Regional Skew       -0.100  |  Zero Events            0      |
|  Weighted Skew          ---  |  Missing Events         1      |
|  Adopted Skew        -0.852  |  Systematic Events        35  |
|                              |  Historic Period         105  |
|------------------------------|-------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)
---------------------------------------------------------------------
|     Events Analyzed        |            Ordered Events             |
|                      FLOW  |      Analysis        FLOW  Weibull   |
| Day Mon Year          cfs  |  Rank     Year         cfs  Plot Pos  |
|----------------------------|---------------------------------------|
|  01 Jan 1939     5,759.2   |    1       1968     5,759.2*   0.94   |
|  30 Nov 1946     3,810.2   |    2       1939     5,759.2    1.89   |
|  30 Mar 1948       992.0   |    3       1964     4,430.2    3.79   |
|  31 May 1949         ---   |    4       1971     4,127.6    6.65   |
|  21 Sep 1949       199.4   |    5       1946     3,810.2    9.50   |
|  14 Jul 1950       194.6   |    6       1967     3,534.1   12.36   |
|  21 Jan 1952     1,720.4   |    7       1978     3,061.2   15.22   |
|  29 Sep 1952       434.1   |    8       1959     2,465.8   18.08   |
|  02 Aug 1953       646.6   |    9       1955     2,344.5   20.94   |
|  28 Jul 1954     2,162.0   |   10       1965     2,319.6   23.79   |
|  13 Aug 1955     2,344.5   |   11       1970     2,189.0   26.65   |
|  21 Aug 1956       286.6   |   12       1972     2,183.8   29.51   |
|  31 Aug 1957     1,597.6   |   13       1954     2,162.0   32.37   |
|  23 Aug 1958     1,050.4   |   14       1977     2,003.8   35.22   |
```

05 Nov 1959	2,465.8	15	1969	1,901.2	38.08
22 Oct 1960	331.1	16	1963	1,785.6	40.94
16 Feb 1962	908.1	17	1951	1,720.4	43.80
24 Oct 1962	1,200.0	18	1957	1,597.6	46.66
02 Sep 1963	1,785.6	19	1962	1,200.0	49.51
07 Aug 1964	4,430.2	20	1958	1,050.4	52.37
30 Jul 1965	2,319.6	21	1947	992.0	55.23
04 Aug 1966	933.1	22	1966	933.1	58.09
12 Aug 1967	3,534.1	23	1961	908.1	60.95
12 Aug 1968	5,759.2	24	1975	866.2	63.80
11 Sep 1969	1,901.2	25	1979	704.5	66.66
11 Sep 1970	2,189.0	26	1953	646.6	69.52
06 Oct 1971	4,127.6	27	1976	631.6	72.38
26 Oct 1972	2,183.8	28	1952	434.1	75.24
01 Jun 1973	142.5	29	1960	331.1	78.09
18 Jul 1974	106.7	30	1956	286.6	80.95
28 Feb 1976	866.2	31	1949	199.4	83.81
15 Aug 1976	631.6	32	1950	194.6	86.67
05 Aug 1977	2,003.8	33	1973	142.5	89.53
08 Aug 1978	3,061.2	34	1974	106.7	92.38
29 Jul 1979	704.5	35	1980	48.7*	95.24
29 Jul 1980	48.7	36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.088
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,391.5	13,064.6	0.2	22,646.4	6,996.2
9,546.7	10,675.7	0.5	18,266.4	6,003.3
8,164.0	8,966.1	1.0	15,109.7	5,239.1
6,803.0	7,332.9	2.0	12,122.3	4,466.4
5,474.9	5,799.6	4.0	9,338.4	3,688.1
5,056.4	5,329.7	5.0	8,491.6	3,436.8
3,791.7	3,926.0	10.0	6,034.4	2,655.4
2,592.2	2,643.8	20.0	3,872.7	1,873.9
1,131.2	1,131.2	50.0	1,545.9	834.7
428.7	416.4	80.0	590.8	289.5
243.5	229.2	90.0	352.1	149.4
147.8	133.8	95.0	226.4	82.2
53.6	42.3	99.0	94.2	23.9

<< Synthetic Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.010	Historic Events	1
Standard Dev	0.471	High Outliers	1
Station Skew	-0.685	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.553	Missing Events	1
Adopted Skew	-0.553	Systematic Events	35

	Historic Period 105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,144.3	14,004.9	0.2	24,561.3	7,370.4
10,110.0	11,353.3	0.5	19,650.1	6,288.4
8,597.9	9,474.0	1.0	16,144.6	5,461.7
7,121.0	7,695.0	2.0	12,856.9	4,631.7
5,692.0	6,040.3	4.0	9,823.2	3,801.9
5,244.4	5,536.5	5.0	8,906.9	3,535.4
3,900.6	4,042.8	10.0	6,268.0	2,711.8
2,640.4	2,694.4	20.0	3,976.4	1,896.5
1,130.9	1,130.9	50.0	1,554.8	829.3
420.8	408.5	80.0	583.7	281.9
236.8	222.7	90.0	344.9	143.9
142.7	129.0	95.0	220.2	78.5
51.0	40.1	99.0	90.5	22.4

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

===

Statistical Analysis of 9-day Maximum values

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Note: Data is missing for all or part of 9 years in analysis period.

Warning: 1 events occur in first 14 days of analysis year for 9-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Dec 1946	3,415.8	1	1968	5,278.2*	2.78
31 Mar 1948	959.6	2	1964	4,009.0	5.56
31 May 1949	---	3	1967	3,774.8	8.33
22 Sep 1949	178.3	4	1971	3,673.3	11.11
16 Jul 1950	174.7	5	1946	3,415.8	13.89
22 Jan 1952	1,556.7	6	1978	2,823.0	16.67
28 Aug 1952	420.3	7	1959	2,223.9	19.44
02 Aug 1953	617.7	8	1955	2,219.6	22.22

29 Jul 1954	1,941.8	9	1965	2,074.1	25.00
13 Aug 1955	2,219.6	10	1977	2,010.7	27.78
21 Aug 1956	257.7	11	1970	1,976.8	30.56
31 Aug 1957	1,521.0	12	1972	1,947.7	33.33
23 Aug 1958	1,015.7	13	1954	1,941.8	36.11
06 Nov 1959	2,223.9	14	1969	1,712.2	38.89
23 Oct 1960	295.8	15	1963	1,640.8	41.67
17 Feb 1962	851.6	16	1951	1,556.7	44.44
25 Oct 1962	1,067.8	17	1957	1,521.0	47.22
07 Sep 1963	1,640.8	18	1962	1,067.8	50.00
08 Aug 1964	4,009.0	19	1958	1,015.7	52.78
31 Jul 1965	2,074.1	20	1947	959.6	55.56
04 Aug 1966	843.2	21	1961	851.6	58.33
12 Aug 1967	3,774.8	22	1966	843.2	61.11
12 Aug 1968	5,278.2	23	1975	797.0	63.89
12 Sep 1969	1,712.2	24	1979	646.2	66.67
13 Sep 1970	1,976.8	25	1953	617.7	69.44
07 Oct 1971	3,673.3	26	1976	595.3	72.22
25 Oct 1972	1,947.7	27	1952	420.3	75.00
01 Jun 1973	165.6	28	1960	295.8	77.78
18 Jul 1974	94.9	29	1956	257.7	80.56
29 Feb 1976	797.0	30	1949	178.3	83.33
15 Aug 1976	595.3	31	1950	174.7	86.11
08 Aug 1977	2,010.7	32	1973	165.6	88.89
06 Aug 1978	2,823.0	33	1974	94.9	91.67
30 Jul 1979	646.2	34	1980	52.3	94.44
29 Jul 1980	52.3	35	1948	---	97.22

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,995.0	9,889.6	0.2	17,590.6	5,565.0
7,928.4	8,609.3	0.5	15,092.3	4,985.2
7,046.8	7,579.2	1.0	13,085.8	4,496.5
6,101.8	6,486.1	2.0	10,999.8	3,961.6
5,097.5	5,356.4	4.0	8,864.8	3,378.3
4,762.7	4,988.7	5.0	8,173.8	3,180.0
3,693.0	3,811.9	10.0	6,043.9	2,530.1
2,591.3	2,640.7	20.0	3,995.7	1,827.9
1,129.1	1,129.1	50.0	1,585.4	814.8
395.5	382.2	80.0	557.4	259.9
208.2	193.7	90.0	310.0	122.6
116.6	103.3	95.0	185.8	61.1
34.6	25.6	99.0	65.3	13.8

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.986	Historic Events	0
Standard Dev	0.499	High Outliers	0
Station Skew	-0.809	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.809	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,960.7	---	0.2	---	---
7,890.9	---	0.5	---	---
7,006.3	---	1.0	---	---
6,060.3	---	2.0	---	---
5,053.5	---	4.0	---	---
4,715.9	---	5.0	---	---
3,644.0	---	10.0	---	---
2,542.6	---	20.0	---	---
1,082.6	---	50.0	---	---
348.2	---	80.0	---	---
159.1	---	90.0	---	---
61.7	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 47.82

0 low outlier(s) identified below test value of 47.82

Based on statistics after 0 zero events and 1 missing events were deleted.

<< High Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed high outlier test value = 19,611.18

1 high outlier(s) identified above input threshold of 5,278.2

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.979	Historic Events	1
Standard Dev	0.491	High Outliers	1
Station Skew	-0.797	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.809	Systematic Events	35
		Historic Period	105

|-----------------------------|------------------------------|

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Events Analyzed			Ordered Events			
Day Mon Year	FLOW cfs		Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1939	5,278.2		1	1968	5,278.2*	0.94
01 Dec 1946	3,415.8		2	1939	5,278.2	1.89
31 Mar 1948	959.6		3	1964	4,009.0	3.79
31 May 1949	---		4	1967	3,774.8	6.65
22 Sep 1949	178.3		5	1971	3,673.3	9.50
16 Jul 1950	174.7		6	1946	3,415.8	12.36
22 Jan 1952	1,556.7		7	1978	2,823.0	15.22
28 Aug 1952	420.3		8	1959	2,223.9	18.08
02 Aug 1953	617.7		9	1955	2,219.6	20.94
29 Jul 1954	1,941.8		10	1965	2,074.1	23.79
13 Aug 1955	2,219.6		11	1977	2,010.7	26.65
21 Aug 1956	257.7		12	1970	1,976.8	29.51
31 Aug 1957	1,521.0		13	1972	1,947.7	32.37
23 Aug 1958	1,015.7		14	1954	1,941.8	35.22
06 Nov 1959	2,223.9		15	1969	1,712.2	38.08
23 Oct 1960	295.8		16	1963	1,640.8	40.94
17 Feb 1962	851.6		17	1951	1,556.7	43.80
25 Oct 1962	1,067.8		18	1957	1,521.0	46.66
07 Sep 1963	1,640.8		19	1962	1,067.8	49.51
08 Aug 1964	4,009.0		20	1958	1,015.7	52.37
31 Jul 1965	2,074.1		21	1947	959.6	55.23
04 Aug 1966	843.2		22	1961	851.6	58.09
12 Aug 1967	3,774.8		23	1966	843.2	60.95
12 Aug 1968	5,278.2		24	1975	797.0	63.80
12 Sep 1969	1,712.2		25	1979	646.2	66.66
13 Sep 1970	1,976.8		26	1953	617.7	69.52
07 Oct 1971	3,673.3		27	1976	595.3	72.38
25 Oct 1972	1,947.7		28	1952	420.3	75.24
01 Jun 1973	165.6		29	1960	295.8	78.09
18 Jul 1974	94.9		30	1956	257.7	80.95
29 Feb 1976	797.0		31	1949	178.3	83.81
15 Aug 1976	595.3		32	1950	174.7	86.67
08 Aug 1977	2,010.7		33	1973	165.6	89.53
06 Aug 1978	2,823.0		34	1974	94.9	92.38
30 Jul 1979	646.2		35	1980	52.3	95.24
29 Jul 1980	52.3		36	1948	---	98.10

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 3.0294

* Outlier

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.097
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,747.1	12,219.5	0.2	21,906.6	6,470.7
9,081.7	10,102.5	0.5	17,855.1	5,590.5
7,806.0	8,546.8	1.0	14,865.3	4,899.1
6,527.9	7,026.1	2.0	11,981.6	4,188.3
5,260.4	5,571.2	4.0	9,247.8	3,461.2
4,857.2	5,120.5	5.0	8,407.7	3,224.4
3,628.7	3,758.9	10.0	5,950.2	2,482.1
2,453.5	2,503.8	20.0	3,770.5	1,733.7
1,025.6	1,025.6	50.0	1,433.8	741.0
360.6	349.2	80.0	508.0	237.1
194.2	181.7	90.0	288.3	115.1
112.0	100.3	95.0	177.2	59.5
36.2	27.7	99.0	66.8	15.0

<< Adjusted Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.958	Historic Events	1
Standard Dev	0.504	High Outliers	1
Station Skew	-0.806	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.634	Missing Events	1
Adopted Skew	-0.634	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,765.5	12,414.9	0.2	21,772.8	6,533.6
8,962.2	10,064.3	0.5	17,419.2	5,574.4
7,621.8	8,398.4	1.0	14,311.7	4,841.6
6,312.6	6,821.4	2.0	11,397.3	4,105.8
5,045.7	5,354.6	4.0	8,708.0	3,370.2
4,649.0	4,908.0	5.0	7,895.6	3,134.0
3,457.8	3,583.8	10.0	5,556.4	2,403.9
2,340.7	2,388.5	20.0	3,524.9	1,681.2
1,002.5	1,002.5	50.0	1,378.3	735.2
373.1	362.1	80.0	517.4	249.9
209.9	197.4	90.0	305.7	127.6
126.5	114.3	95.0	195.2	69.6
45.2	35.6	99.0	80.3	19.9

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

```
=====================================================================
Statistical Analysis of 10-day Maximum values
=====================================================================

Note: Data is missing for all or part of 9 years in analysis period.


Warning: 1 events occur in first 15 days of analysis year for 10-day
duration.

Suggest reviewing data and changing the year/season specification on the
General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)
---------------------------------------------------------------------
|      Events Analyzed        |            Ordered Events            |
|                     FLOW    |        Analysis        FLOW  Weibull |
|  Day Mon Year        cfs    |   Rank     Year         cfs  Plot Pos |
|-----------------------------|--------------------------------------|
|   02 Dec 1946     3,085.7   |     1       1968     4,814.4    2.78   |
|   01 Apr 1948       918.3   |     2       1964     3,683.0    5.56   |
|   31 May 1949         ---   |     3       1967     3,613.3    8.33   |
|   23 Sep 1949       161.4   |     4       1971     3,309.0   11.11   |
|   17 Jul 1950       160.2   |     5       1946     3,085.7   13.89   |
|   23 Jan 1952     1,420.4   |     6       1978     2,987.7   16.67   |
|   28 Aug 1952       412.7   |     7       1955     2,142.6   19.44   |
|   03 Aug 1953       568.7   |     8       1965     2,044.9   22.22   |
|   30 Jul 1954     1,768.0   |     9       1959     2,016.0   25.00   |
|   13 Aug 1955     2,142.6   |    10       1977     1,891.0   27.78   |
|   22 Aug 1956       233.2   |    11       1972     1,846.2   30.56   |
|   01 Sep 1957     1,411.0   |    12       1970     1,800.6   33.33   |
|   24 Aug 1958       963.1   |    13       1954     1,768.0   36.11   |
|   07 Nov 1959     2,016.0   |    14       1969     1,643.5   38.89   |
|   24 Oct 1960       267.2   |    15       1963     1,508.4   41.67   |
|   18 Feb 1962       793.1   |    16       1951     1,420.4   44.44   |
|   26 Oct 1962       969.2   |    17       1957     1,411.0   47.22   |
|   07 Sep 1963     1,508.4   |    18       1962       969.2   50.00   |
|   09 Aug 1964     3,683.0   |    19       1958       963.1   52.78   |
|   02 Aug 1965     2,044.9   |    20       1947       918.3   55.56   |
|   02 Aug 1966       770.7   |    21       1961       793.1   58.33   |
|   13 Aug 1967     3,613.3   |    22       1966       770.7   61.11   |
|   13 Aug 1968     4,814.4   |    23       1975       766.5   63.89   |
|   04 Aug 1969     1,643.5   |    24       1979       590.6   66.67   |
|   14 Sep 1970     1,800.6   |    25       1953       568.7   69.44   |
|   08 Oct 1971     3,309.0   |    26       1976       564.1   72.22   |
|   22 Oct 1972     1,846.2   |    27       1952       412.7   75.00   |
|   01 Jun 1973       192.0   |    28       1960       267.2   77.78   |
|   18 Jul 1974        85.4   |    29       1956       233.2   80.56   |
|   22 Feb 1976       766.5   |    30       1973       192.0   83.33   |
|   15 Aug 1976       564.1   |    31       1949       161.4   86.11   |
|   09 Aug 1977     1,891.0   |    32       1950       160.2   88.89   |
|   07 Aug 1978     2,987.7   |    33       1974        85.4   91.67   |
|   30 Jul 1979       590.6   |    34       1980        49.2   94.44   |
|   30 Jul 1980        49.2   |    35       1948         ---   97.22   |
|-----------------------------|--------------------------------------|


Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.


<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)
--------------------------------------------------------------------
|   Computed    Expected    |   Percent   |    Confidence Limits    |
```

Curve FLOW, cfs	Probability FLOW, cfs	Chance Exceedance	0.05 FLOW, cfs	0.95 FLOW, cfs
8,347.6	9,168.2	0.2	16,276.8	5,174.7
7,367.1	7,993.1	0.5	13,986.6	4,640.5
6,554.8	7,045.4	1.0	12,142.7	4,189.4
5,682.4	6,037.2	2.0	10,221.7	3,694.8
4,753.3	4,992.9	4.0	8,250.7	3,154.4
4,443.1	4,652.5	5.0	7,611.7	2,970.4
3,450.4	3,560.9	10.0	5,638.6	2,366.5
2,425.4	2,471.5	20.0	3,735.7	1,712.6
1,060.2	1,060.2	50.0	1,487.3	765.7
372.3	359.8	80.0	524.1	245.0
196.2	182.6	90.0	291.8	115.7
109.9	97.4	95.0	175.0	57.7
32.7	24.2	99.0	61.6	13.0

<< Conditional Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.959	Historic Events	0
Standard Dev	0.498	High Outliers	0
Station Skew	-0.814	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.814	Systematic Events	35

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,316.1	---	0.2	---	---
7,332.5	---	0.5	---	---
6,517.4	---	1.0	---	---
5,644.0	---	2.0	---	---
4,712.6	---	4.0	---	---
4,399.7	---	5.0	---	---
3,404.9	---	10.0	---	---
2,380.1	---	20.0	---	---
1,016.6	---	50.0	---	---
327.8	---	80.0	---	---
150.0	---	90.0	---	---
58.3	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed low outlier test value = 45.25

0 low outlier(s) identified below test value of 45.25

Based on statistics after 0 zero events and 1 missing events were deleted.

<< High Outlier Test >>

Based on 34 events, 10 percent outlier test deviate K(N) = 2.616
Computed high outlier test value = 18,259.01

0 high outlier(s) identified above input threshold of 4,814.4

Statistics and frequency curve adjusted for 0 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>

LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.966	Historic Events	1
Standard Dev	0.496	High Outliers	0
Station Skew	-0.781	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.814	Systematic Events	35
		Historic Period	105

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>

LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Jan 1939	4,814.4	1	1939	4,814.4	0.94
02 Dec 1946	3,085.7	2	1968	4,814.4	2.82
01 Apr 1948	918.3	3	1964	3,683.0	5.62
31 May 1949	---	4	1967	3,613.3	8.42
23 Sep 1949	161.4	5	1971	3,309.0	11.23
17 Jul 1950	160.2	6	1946	3,085.7	14.03
23 Jan 1952	1,420.4	7	1978	2,987.7	16.83
28 Aug 1952	412.7	8	1955	2,142.6	19.64
03 Aug 1953	568.7	9	1965	2,044.9	22.44
30 Jul 1954	1,768.0	10	1959	2,016.0	25.24
13 Aug 1955	2,142.6	11	1977	1,891.0	28.05
22 Aug 1956	233.2	12	1972	1,846.2	30.85
01 Sep 1957	1,411.0	13	1970	1,800.6	33.65
24 Aug 1958	963.1	14	1954	1,768.0	36.46
07 Nov 1959	2,016.0	15	1969	1,643.5	39.26
24 Oct 1960	267.2	16	1963	1,508.4	42.06
18 Feb 1962	793.1	17	1951	1,420.4	44.87
26 Oct 1962	969.2	18	1957	1,411.0	47.67
07 Sep 1963	1,508.4	19	1962	969.2	50.47
09 Aug 1964	3,683.0	20	1958	963.1	53.27
02 Aug 1965	2,044.9	21	1947	918.3	56.08
02 Aug 1966	770.7	22	1961	793.1	58.88
13 Aug 1967	3,613.3	23	1966	770.7	61.68
13 Aug 1968	4,814.4	24	1975	766.5	64.49
04 Aug 1969	1,643.5	25	1979	590.6	67.29
14 Sep 1970	1,800.6	26	1953	568.7	70.09
08 Oct 1971	3,309.0	27	1976	564.1	72.90
22 Oct 1972	1,846.2	28	1952	412.7	75.70

01 Jun 1973	192.0	29	1960	267.2	78.50
18 Jul 1974	85.4	30	1956	233.2	81.31
22 Feb 1976	766.5	31	1973	192.0	84.11
15 Aug 1976	564.1	32	1949	161.4	86.91
09 Aug 1977	1,891.0	33	1950	160.2	89.72
07 Aug 1978	2,987.7	34	1974	85.4	92.52
30 Jul 1979	590.6	35	1980	49.2	95.32
30 Jul 1980	49.2	36	1948	---	98.13

Note: Plotting positions based on historic period (H) = 105
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 2.9714

<< Skew Weighting >>

Based on 105 events, mean-square error of station skew = 0.096
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,808.4	12,333.2	0.2	22,227.0	6,468.8
9,094.6	10,144.2	0.5	18,021.9	5,568.5
7,790.0	8,547.0	1.0	14,940.5	4,865.3
6,490.2	6,996.3	2.0	11,987.2	4,145.9
5,208.7	5,522.3	4.0	9,206.5	3,414.1
4,802.7	5,067.8	5.0	8,356.2	3,176.6
3,571.3	3,701.6	10.0	5,880.8	2,435.3
2,401.9	2,451.8	20.0	3,703.3	1,692.7
995.0	995.0	50.0	1,394.5	717.1
347.4	336.4	80.0	490.7	227.7
186.5	174.5	90.0	277.8	110.1
107.4	96.2	95.0	170.4	56.9
34.6	26.5	99.0	64.1	14.3

<< Adjusted Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.946	Historic Events	1
Standard Dev	0.508	High Outliers	0
Station Skew	-0.788	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.622	Missing Events	1
Adopted Skew	-0.622	Systematic Events	35
		Historic Period	105

<< User Frequency Curve >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,459.0	12,061.4	0.2	21,152.9	6,347.6
8,707.0	9,777.8	0.5	16,923.2	5,415.7
7,404.7	8,159.3	1.0	13,904.1	4,703.8
6,132.8	6,627.1	2.0	11,072.7	3,988.9

4,902.1	5,202.1	4.0	8,460.0	3,274.3
4,516.6	4,768.2	5.0	7,670.8	3,044.8
3,359.3	3,481.8	10.0	5,398.2	2,335.5
2,274.0	2,320.5	20.0	3,424.6	1,633.3
974.0	974.0	50.0	1,339.1	714.2
362.4	351.8	80.0	502.7	242.8
203.9	191.8	90.0	297.0	124.0
122.9	111.1	95.0	189.7	67.6
44.0	34.5	99.0	78.0	19.3

<< User Statistics >>
LCR at Holbrook 09397000-LCR at Holbrook-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.480		
User Skew	-0.540		

Note: No ordinates specified for graphical frequency curve

```
--------------------------
Volume-Duration Analysis
  16 Sep 2011   04:57 PM
--------------------------


--- Input Data ---

Analysis Name: LCR at Grand Falls 09401000
Description:

Data Set Name: LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR
Winslow\Analysis\Volume_Frequency_Analysi/LCR at Grand
Falls/FLOW//1DAY/09401000/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\LCR_at_Grand_Falls_09401000\LCR_at
_Grand_Falls_09401000.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\LCR_at_Grand_Falls_09401000\LCR_at
_Grand_Falls_09401000.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 14 Nov 1925
Record End Date:   02 Jul 1966


User-Specified Durations
   Duration:   1 day
   Duration:   2 days
   Duration:   3 days
   Duration:   4 days
   Duration:   5 days
   Duration:   6 days
   Duration:   7 days
   Duration:   8 days
   Duration:   9 days
   Duration:  10 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
   Frequency: 0.2
   Frequency: 0.5
   Frequency: 1.0
   Frequency: 2.0
   Frequency: 4.0
   Frequency: 5.0
   Frequency: 10.0
   Frequency: 20.0
   Frequency: 50.0
   Frequency: 80.0
   Frequency: 90.0
```

```
   Frequency: 95.0
   Frequency: 99.0

Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1
  8-day Regional Skew: -0.1
  8-day Regional Skew MSE: -0.1
  9-day Regional Skew: -0.1
  9-day Regional Skew MSE: -0.1
 10-day Regional Skew: -0.1
 10-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1896
Historic Period End Year: 1980

  1-day Historic Events
  Year: 1928   Value: 27,100

  2-day Historic Events
  Year: 1928   Value: 22,000

  3-day Historic Events
  Year: 1928   Value: 16,780

  4-day Historic Events
  Year: 1928   Value: 13,345

  5-day Historic Events
  Year: 1928   Value: 11,084

  6-day Historic Events
  Year: 1928   Value: 9,557

  7-day Historic Events
  Year: 1928   Value: 8,476

  8-day Historic Events
  Year: 1928   Value: 7,649

  9-day Historic Events
  Year: 1928   Value: 7,001

  10-day Historic Events
  Year: 1928   Value: 6,430

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---



==================================================================
Statistical Analysis of 1-day Maximum values
==================================================================

Note: Data is missing for all or part of 9 years in analysis period.
```

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
27 Sep 1926	13,900.0	1	1928	27,100.0*	2.38
29 Jun 1927	12,700.0	2	1931	19,800.0	4.76
05 Apr 1929	27,100.0	3	1937	19,200.0	7.14
29 Jul 1929	13,200.0	4	1963	15,300.0	9.52
11 Aug 1930	5,570.0	5	1926	13,900.0	11.90
11 Feb 1932	19,800.0	6	1929	13,200.0	14.29
30 Aug 1932	2,190.0	7	1936	12,700.0	16.67
12 Sep 1933	4,630.0	8	1927	12,700.0	19.05
10 Apr 1935	4,530.0	9	1940	11,800.0	21.43
05 Aug 1935	2,820.0	10	1947	10,300.0	23.81
09 Feb 1937	12,700.0	11	1949	8,260.0	26.19
05 Mar 1938	19,200.0	12	1951	6,970.0	28.57
06 Apr 1939	4,520.0	13	1941	6,820.0	30.95
13 Sep 1939	917.0	14	1955	6,810.0	33.33
16 Mar 1941	11,800.0	15	1946	6,610.0	35.71
30 Sep 1941	6,820.0	16	1958	6,310.0	38.10
08 Mar 1943	2,640.0	17	1954	5,880.0	40.48
27 Sep 1943	2,100.0	18	1953	5,610.0	42.86
21 Apr 1945	2,570.0	19	1930	5,570.0	45.24
24 Jul 1945	2,370.0	20	1952	5,280.0	47.62
20 Sep 1946	6,610.0	21	1933	4,630.0	50.00
15 Oct 1947	10,300.0	22	1934	4,530.0	52.38
06 Aug 1948	3,660.0	23	1938	4,520.0	54.76
09 Aug 1949	8,260.0	24	1948	3,660.0	57.14
08 May 1951	380.0	25	1956	3,590.0	59.52
31 Aug 1951	6,970.0	26	1957	3,340.0	61.90
25 Mar 1953	5,280.0	27	1961	3,010.0	64.29
25 Jul 1953	5,610.0	28	1935	2,820.0	66.67
09 Aug 1954	5,880.0	29	1942	2,640.0	69.05
13 Jan 1956	6,810.0	30	1944	2,570.0	71.43
27 Aug 1956	3,590.0	31	1945	2,370.0	73.81
23 Aug 1957	3,340.0	32	1964	2,270.0	76.19
01 Nov 1958	6,310.0	33	1932	2,190.0	78.57
06 Mar 1960	11.0	34	1943	2,100.0	80.95
11 Apr 1961	91.0	35	1962	1,540.0	83.33
12 Apr 1962	3,010.0	36	1965	1,250.0	85.71
25 Mar 1963	1,540.0	37	1939	917.0	88.10
13 Jan 1964	15,300.0	38	1950	380.0	90.48
22 Mar 1965	2,270.0	39	1960	91.0	92.86
05 Sep 1965	1,250.0	40	1959	11.0*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
14,678.3	14,687.4	0.2	24,444.7	9,705.0
14,647.9	14,664.6	0.5	24,386.7	9,686.3
14,590.6	14,620.3	1.0	24,277.7	9,651.1
14,463.6	14,508.9	2.0	24,036.2	9,573.1
14,181.9	14,252.2	4.0	23,502.0	9,399.7
14,032.1	14,118.2	5.0	23,218.8	9,307.3

13,230.3	13,312.5	10.0	21,712.8	8,810.6
11,491.9	11,565.3	20.0	18,508.2	7,719.8
6,150.3	6,150.3	50.0	9,269.6	4,220.9
1,657.8	1,583.0	80.0	2,437.5	1,061.4
596.7	535.0	90.0	943.4	330.1
212.0	174.8	95.0	376.2	97.0
18.7	10.8	99.0	46.2	5.1

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.585	Historic Events	0
Standard Dev	0.628	High Outliers	0
Station Skew	-2.157	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.157	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
14,677.5	---	0.2	---	---
14,645.9	---	0.5	---	---
14,586.3	---	1.0	---	---
14,456.2	---	2.0	---	---
14,165.5	---	4.0	---	---
14,004.8	---	5.0	---	---
13,170.6	---	10.0	---	---
11,382.9	---	20.0	---	---
5,924.4	---	50.0	---	---
1,396.8	---	80.0	---	---
399.9	---	90.0	---	---
80.2	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 79.53

1 low outlier(s) identified below test value of 79.53

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	3.669	Historic Events	1
Standard Dev	0.489	High Outliers	0
Station Skew	-1.181	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.157	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 94,794.17

1 high outlier(s) identified above input threshold of 27,100

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and             *
*        comparison with similar data should be explored,     *
*        if not incorporated in this analysis.                *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.649	Historic Events	1
Standard Dev	0.476	High Outliers	1
Station Skew	-1.250	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.157	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
27 Sep 1926	13,900.0	1	1928	27,100.0*	1.16
29 Jun 1927	12,700.0	2	1928	27,100.0	2.33
01 Jan 1928	27,100.0	3	1931	19,800.0	4.11
05 Apr 1929	27,100.0	4	1937	19,200.0	6.53
29 Jul 1929	13,200.0	5	1963	15,300.0	8.94
11 Aug 1930	5,570.0	6	1926	13,900.0	11.35
11 Feb 1932	19,800.0	7	1929	13,200.0	13.76
30 Aug 1932	2,190.0	8	1936	12,700.0	16.18
12 Sep 1933	4,630.0	9	1927	12,700.0	18.59
10 Apr 1935	4,530.0	10	1940	11,800.0	21.00
05 Aug 1935	2,820.0	11	1947	10,300.0	23.42
09 Feb 1937	12,700.0	12	1949	8,260.0	25.83
05 Mar 1938	19,200.0	13	1951	6,970.0	28.24

06 Apr 1939	4,520.0	14	1941	6,820.0	30.65
13 Sep 1939	917.0	15	1955	6,810.0	33.07
16 Mar 1941	11,800.0	16	1946	6,610.0	35.48
30 Sep 1941	6,820.0	17	1958	6,310.0	37.89
08 Mar 1943	2,640.0	18	1954	5,880.0	40.31
27 Sep 1943	2,100.0	19	1953	5,610.0	42.72
21 Apr 1945	2,570.0	20	1930	5,570.0	45.13
24 Jul 1945	2,370.0	21	1952	5,280.0	47.54
20 Sep 1946	6,610.0	22	1933	4,630.0	49.96
15 Oct 1947	10,300.0	23	1934	4,530.0	52.37
06 Aug 1948	3,660.0	24	1938	4,520.0	54.78
09 Aug 1949	8,260.0	25	1948	3,660.0	57.19
08 May 1951	380.0	26	1956	3,590.0	59.61
31 Aug 1951	6,970.0	27	1957	3,340.0	62.02
25 Mar 1953	5,280.0	28	1961	3,010.0	64.43
25 Jul 1953	5,610.0	29	1935	2,820.0	66.85
09 Aug 1954	5,880.0	30	1942	2,640.0	69.26
13 Jan 1956	6,810.0	31	1944	2,570.0	71.67
27 Aug 1956	3,590.0	32	1945	2,370.0	74.08
23 Aug 1957	3,340.0	33	1964	2,270.0	76.50
01 Nov 1958	6,310.0	34	1932	2,190.0	78.91
06 Mar 1960	11.0	35	1943	2,100.0	81.32
11 Apr 1961	91.0	36	1962	1,540.0	83.74
12 Apr 1962	3,010.0	37	1965	1,250.0	86.15
25 Mar 1963	1,540.0	38	1939	917.0	88.56
13 Jan 1964	15,300.0	39	1950	380.0	90.97
22 Mar 1965	2,270.0	40	1960	91.0	93.39
05 Sep 1965	1,250.0	41	1959	11.0*	95.80
02 Jul 1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.206
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
40,426.5	43,817.5	0.2	75,020.0	25,594.3
35,524.4	38,062.7	0.5	64,335.5	22,838.1
31,477.7	33,464.9	1.0	55,742.6	20,521.0
27,148.8	28,583.7	2.0	46,802.5	17,993.5
22,562.3	23,528.2	4.0	37,648.1	15,250.3
21,037.6	21,880.3	5.0	34,685.3	14,321.0
16,183.5	16,625.6	10.0	25,557.0	11,292.5
11,224.2	11,406.7	20.0	16,794.3	8,057.0
4,750.0	4,750.0	50.0	6,533.4	3,492.5
1,599.4	1,553.1	80.0	2,215.3	1,082.1
821.4	772.1	90.0	1,200.1	502.8
449.5	405.2	95.0	701.1	247.0
127.0	98.3	99.0	233.2	54.3

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (1-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	3.607	Historic Events	1
Standard Dev	0.518	High Outliers	1
Station Skew	-1.305	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.817	Missing Events	1
Adopted Skew	-0.817	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

==
Statistical Analysis of 2-day Maximum values
==

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
28 Sep 1926	9,165.0	1	1928	22,000.0*	2.38
29 Jun 1927	8,215.0	2	1931	18,050.0	4.76
06 Apr 1929	22,000.0	3	1937	15,900.0	7.14
30 Jul 1929	11,060.0	4	1963	14,550.0	9.52
11 Aug 1930	5,405.0	5	1940	11,350.0	11.90
11 Feb 1932	18,050.0	6	1929	11,060.0	14.29
31 Aug 1932	1,930.0	7	1947	9,890.0	16.67
12 Sep 1933	4,060.0	8	1926	9,165.0	19.05
11 Apr 1935	3,925.0	9	1936	8,350.0	21.43
05 Aug 1935	2,255.0	10	1927	8,215.0	23.81
10 Feb 1937	8,350.0	11	1951	6,660.0	26.19
05 Mar 1938	15,900.0	12	1949	6,435.0	28.57
06 Apr 1939	3,880.0	13	1955	6,200.0	30.95
02 Mar 1940	587.0	14	1946	5,825.0	33.33
16 Mar 1941	11,350.0	15	1941	5,675.0	35.71
30 Sep 1941	5,675.0	16	1930	5,405.0	38.10
08 Mar 1943	2,125.0	17	1953	5,210.0	40.48
09 Apr 1944	2,075.0	18	1954	5,145.0	42.86
22 Apr 1945	2,445.0	19	1958	4,745.0	45.24
13 Aug 1945	1,550.0	20	1933	4,060.0	47.62
20 Sep 1946	5,825.0	21	1934	3,925.0	50.00
15 Oct 1947	9,890.0	22	1938	3,880.0	52.38
22 Mar 1949	2,645.0	23	1952	3,610.0	54.76
10 Aug 1949	6,435.0	24	1961	2,995.0	57.14
09 May 1951	312.5	25	1956	2,910.0	59.52
31 Aug 1951	6,660.0	26	1948	2,645.0	61.90
26 Mar 1953	3,610.0	27	1957	2,600.0	64.29
25 Jul 1953	5,210.0	28	1944	2,445.0	66.67
09 Aug 1954	5,145.0	29	1935	2,255.0	69.05
13 Jan 1956	6,200.0	30	1964	2,200.0	71.43
25 Mar 1957	2,910.0	31	1942	2,125.0	73.81
24 Aug 1957	2,600.0	32	1943	2,075.0	76.19
01 Nov 1958	4,745.0	33	1932	1,930.0	78.57
06 Mar 1960	6.9	34	1945	1,550.0	80.95
11 Apr 1961	84.0	35	1962	1,520.0	83.33
12 Apr 1962	2,995.0	36	1965	1,051.0	85.71
26 Mar 1963	1,520.0	37	1939	587.0	88.10
13 Jan 1964	14,550.0	38	1950	312.5	90.48
23 Mar 1965	2,200.0	39	1960	84.0	92.86
05 Sep 1965	1,051.0	40	1959	6.9*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,694.8	11,698.3	0.2	19,474.5	7,708.7
11,681.3	11,688.7	0.5	19,448.9	7,700.4
11,653.4	11,667.9	1.0	19,396.1	7,683.3
11,585.8	11,609.9	2.0	19,267.8	7,641.8
11,421.7	11,463.2	4.0	18,957.2	7,540.7
11,329.5	11,382.5	5.0	18,783.2	7,483.9
10,802.6	10,857.0	10.0	17,793.3	7,158.0
9,550.4	9,603.7	20.0	15,477.6	6,375.0
5,261.2	5,261.2	50.0	8,004.1	3,584.2
1,400.5	1,335.3	80.0	2,071.9	892.1
487.6	435.2	90.0	776.4	267.5
165.9	135.6	95.0	297.8	74.7
12.9	7.2	99.0	32.9	3.4

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.505	Historic Events	0
Standard Dev	0.640	High Outliers	0
Station Skew	-2.273	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.273	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,694.4	---	0.2	---	---
11,680.3	---	0.5	---	---
11,651.1	---	1.0	---	---
11,581.7	---	2.0	---	---
11,411.6	---	4.0	---	---
11,311.7	---	5.0	---	---
10,760.0	---	10.0	---	---
9,466.7	---	20.0	---	---
5,069.8	---	50.0	---	---
1,173.4	---	80.0	---	---
321.3	---	90.0	---	---
59.9	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

```
----------------------
<< Low Outlier Test >>
----------------------
 Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
                         Computed low outlier test value = 61.45

            1 low outlier(s) identified below test value of 61.45

Based on statistics after 0 zero events and 1 missing events were deleted.

     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:         |                                |
|          FLOW, cfs            |        Number of Events        |
|-------------------------------|--------------------------------|
|  Mean                  3.593  |  Historic Events           1   |
|  Standard Dev          0.487  |  High Outliers          0      |
|  Station Skew         -1.166  |  Low Outliers           1      |
|  Regional Skew        -0.100  |  Zero Events            0      |
|  Weighted Skew           ---  |  Missing Events         1      |
|  Adopted Skew         -2.273  |  Systematic Events        41   |
|                               |  Historic Period          85   |
|-------------------------------|--------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
                    Computed high outlier test value = 78,335.74

     1 high outlier(s) identified above input threshold of 22,000

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and          *
   *        comparison with similar data should be explored,  *
   *        if not incorporated in this analysis.             *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                       and 1 historic event(s)


<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:         |                                |
|          FLOW, cfs            |        Number of Events        |
|-------------------------------|--------------------------------|
|  Mean                  3.573  |  Historic Events           1   |
|  Standard Dev          0.474  |  High Outliers          1      |
|  Station Skew         -1.226  |  Low Outliers           1      |
|  Regional Skew        -0.100  |  Zero Events            0      |
|  Weighted Skew           ---  |  Missing Events         1      |
|  Adopted Skew         -2.273  |  Systematic Events        41   |
|                               |  Historic Period          85   |
|-------------------------------|--------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.
```

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Events Analyzed Day	Mon	Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
28	Sep	1926	9,165.0	1	1928	22,000.0*	1.16
29	Jun	1927	8,215.0	2	1928	22,000.0	2.33
01	Jan	1928	22,000.0	3	1931	18,050.0	4.11
06	Apr	1929	22,000.0	4	1937	15,900.0	6.53
30	Jul	1929	11,060.0	5	1963	14,550.0	8.94
11	Aug	1930	5,405.0	6	1940	11,350.0	11.35
11	Feb	1932	18,050.0	7	1929	11,060.0	13.76
31	Aug	1932	1,930.0	8	1947	9,890.0	16.18
12	Sep	1933	4,060.0	9	1926	9,165.0	18.59
11	Apr	1935	3,925.0	10	1936	8,350.0	21.00
05	Aug	1935	2,255.0	11	1927	8,215.0	23.42
10	Feb	1937	8,350.0	12	1951	6,660.0	25.83
05	Mar	1938	15,900.0	13	1949	6,435.0	28.24
06	Apr	1939	3,880.0	14	1955	6,200.0	30.65
02	Mar	1940	587.0	15	1946	5,825.0	33.07
16	Mar	1941	11,350.0	16	1941	5,675.0	35.48
30	Sep	1941	5,675.0	17	1930	5,405.0	37.89
08	Mar	1943	2,125.0	18	1953	5,210.0	40.31
09	Apr	1944	2,075.0	19	1954	5,145.0	42.72
22	Apr	1945	2,445.0	20	1958	4,745.0	45.13
13	Aug	1945	1,550.0	21	1933	4,060.0	47.54
20	Sep	1946	5,825.0	22	1934	3,925.0	49.96
15	Oct	1947	9,890.0	23	1938	3,880.0	52.37
22	Mar	1949	2,645.0	24	1952	3,610.0	54.78
10	Aug	1949	6,435.0	25	1961	2,995.0	57.19
09	May	1951	312.5	26	1956	2,910.0	59.61
31	Aug	1951	6,660.0	27	1948	2,645.0	62.02
26	Mar	1953	3,610.0	28	1957	2,600.0	64.43
25	Jul	1953	5,210.0	29	1944	2,445.0	66.85
09	Aug	1954	5,145.0	30	1935	2,255.0	69.26
13	Jan	1956	6,200.0	31	1964	2,200.0	71.67
25	Mar	1957	2,910.0	32	1942	2,125.0	74.08
24	Aug	1957	2,600.0	33	1943	2,075.0	76.50
01	Nov	1958	4,745.0	34	1932	1,930.0	78.91
06	Mar	1960	6.9	35	1945	1,550.0	81.32
11	Apr	1961	84.0	36	1962	1,520.0	83.74
12	Apr	1962	2,995.0	37	1965	1,051.0	86.15
26	Mar	1963	1,520.0	38	1939	587.0	88.56
13	Jan	1964	14,550.0	39	1950	312.5	90.97
23	Mar	1965	2,200.0	40	1960	84.0	93.39
05	Sep	1965	1,051.0	41	1959	6.9*	95.80
02	Jul	1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.2
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs

Appendix C

33,752.4	36,600.4	0.2	62,511.0	21,403.4
29,642.9	31,770.5	0.5	53,571.1	19,089.4
26,256.6	27,919.3	1.0	46,395.1	17,147.4
22,639.6	23,838.3	2.0	38,940.7	15,032.1
18,812.5	19,618.3	4.0	31,318.9	12,739.3
17,541.3	18,243.9	5.0	28,854.3	11,963.2
13,497.4	13,865.7	10.0	21,266.3	9,435.6
9,368.9	9,520.9	20.0	13,987.8	6,737.4
3,978.6	3,978.6	50.0	5,462.5	2,930.1
1,348.2	1,309.4	80.0	1,864.0	914.0
695.5	654.1	90.0	1,014.1	426.9
382.3	344.9	95.0	594.8	210.9
109.1	84.6	99.0	199.6	46.9

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.531	Historic Events	1
Standard Dev	0.515	High Outliers	1
Station Skew	-1.281	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.811	Missing Events	1
Adopted Skew	-0.811	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 3-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
29 Sep 1926	6,500.0	1	1928	16,780.0*	2.38
30 Jun 1927	6,200.0	2	1931	14,906.7	4.76
07 Apr 1929	16,780.0	3	1963	12,943.3	7.14
31 Jul 1929	9,496.7	4	1937	12,053.3	9.52
11 Aug 1930	4,963.3	5	1940	9,500.0	11.90
12 Feb 1932	14,906.7	6	1929	9,496.7	14.29
31 Aug 1932	1,618.3	7	1947	8,190.0	16.67
13 Sep 1933	3,256.7	8	1926	6,500.0	19.05
12 Apr 1935	3,276.7	9	1936	6,343.3	21.43
15 Apr 1936	1,983.3	10	1927	6,200.0	23.81
11 Feb 1937	6,343.3	11	1951	5,166.7	26.19
06 Mar 1938	12,053.3	12	1949	5,056.7	28.57
07 Apr 1939	3,286.7	13	1953	5,036.7	30.95
03 Mar 1940	573.0	14	1930	4,963.3	33.33
17 Mar 1941	9,500.0	15	1955	4,943.3	35.71
01 Oct 1941	4,393.3	16	1946	4,790.0	38.10
09 Mar 1943	1,943.3	17	1954	4,476.7	40.48
09 Apr 1944	2,036.7	18	1941	4,393.3	42.86
23 Apr 1945	2,420.0	19	1958	3,840.0	45.24
14 Aug 1945	1,410.0	20	1938	3,286.7	47.62

21 Sep 1946	4,790.0	21	1934	3,276.7	50.00
16 Oct 1947	8,190.0	22	1933	3,256.7	52.38
21 Mar 1949	2,603.3	23	1961	2,836.7	54.76
11 Aug 1949	5,056.7	24	1952	2,750.0	57.14
10 May 1951	263.0	25	1948	2,603.3	59.52
01 Sep 1951	5,166.7	26	1956	2,456.7	61.90
27 Mar 1953	2,750.0	27	1944	2,420.0	64.29
26 Jul 1953	5,036.7	28	1957	2,223.3	66.67
10 Aug 1954	4,476.7	29	1943	2,036.7	69.05
14 Jan 1956	4,943.3	30	1935	1,983.3	71.43
26 Mar 1957	2,456.7	31	1964	1,963.3	73.81
30 Sep 1957	2,223.3	32	1942	1,943.3	76.19
02 Nov 1958	3,840.0	33	1932	1,618.3	78.57
06 Mar 1960	5.3	34	1962	1,480.0	80.95
12 Apr 1961	77.0	35	1945	1,410.0	83.33
13 Apr 1962	2,836.7	36	1965	885.0	85.71
06 Apr 1963	1,480.0	37	1939	573.0	88.10
14 Jan 1964	12,943.3	38	1950	263.0	90.48
24 Mar 1965	1,963.3	39	1960	77.0	92.86
06 Sep 1965	885.0	40	1959	5.3*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,916.1	8,916.9	0.2	14,566.2	5,944.1
8,912.3	8,914.3	0.5	14,559.2	5,941.8
8,903.2	8,907.9	1.0	14,542.4	5,936.1
8,877.7	8,886.8	2.0	14,495.1	5,920.2
8,806.5	8,824.9	4.0	14,363.4	5,875.7
8,763.0	8,788.1	5.0	14,283.0	5,848.4
8,485.9	8,514.7	10.0	13,772.6	5,674.5
7,720.8	7,753.9	20.0	12,379.6	5,190.6
4,554.9	4,554.9	50.0	6,907.0	3,117.5
1,261.3	1,202.2	80.0	1,853.5	812.2
436.8	389.0	90.0	689.5	242.7
145.6	118.4	95.0	259.5	66.2
10.5	5.7	99.0	26.8	2.7

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.434	Historic Events	0
Standard Dev	0.632	High Outliers	0
Station Skew	-2.449	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.449	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,916.0	---	0.2	---	---
8,912.0	---	0.5	---	---
8,902.4	---	1.0	---	---
8,876.0	---	2.0	---	---
8,801.8	---	4.0	---	---
8,753.7	---	5.0	---	---
8,460.3	---	10.0	---	---
7,664.2	---	20.0	---	---
4,399.0	---	50.0	---	---
1,055.9	---	80.0	---	---
285.5	---	90.0	---	---
51.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 54.92

1 low outlier(s) identified below test value of 54.92

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.522	Historic Events	1
Standard Dev	0.468	High Outliers	0
Station Skew	-1.265	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.449	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 59,244.04

1 high outlier(s) identified above input threshold of 16,780

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>

LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.503	Historic Events	1
Standard Dev	0.457	High Outliers	1
Station Skew	-1.321	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.449	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
29 Sep 1926	6,500.0	1	1928	16,780.0*	1.16
30 Jun 1927	6,200.0	2	1928	16,780.0	2.33
01 Jan 1928	16,780.0	3	1931	14,906.7	4.11
07 Apr 1929	16,780.0	4	1963	12,943.3	6.53
31 Jul 1929	9,496.7	5	1937	12,053.3	8.94
11 Aug 1930	4,963.3	6	1940	9,500.0	11.35
12 Feb 1932	14,906.7	7	1929	9,496.7	13.76
31 Aug 1932	1,618.3	8	1947	8,190.0	16.18
13 Sep 1933	3,256.7	9	1926	6,500.0	18.59
12 Apr 1935	3,276.7	10	1936	6,343.3	21.00
15 Apr 1936	1,983.3	11	1927	6,200.0	23.42
11 Feb 1937	6,343.3	12	1951	5,166.7	25.83
06 Mar 1938	12,053.3	13	1949	5,056.7	28.24
07 Apr 1939	3,286.7	14	1953	5,036.7	30.65
03 Mar 1940	573.0	15	1930	4,963.3	33.07
17 Mar 1941	9,500.0	16	1955	4,943.3	35.48
01 Oct 1941	4,393.3	17	1946	4,790.0	37.89
09 Mar 1943	1,943.3	18	1954	4,476.7	40.31
09 Apr 1944	2,036.7	19	1941	4,393.3	42.72
23 Apr 1945	2,420.0	20	1958	3,840.0	45.13
14 Aug 1945	1,410.0	21	1938	3,286.7	47.54
21 Sep 1946	4,790.0	22	1934	3,276.7	49.96
16 Oct 1947	8,190.0	23	1933	3,256.7	52.37
21 Mar 1949	2,603.3	24	1961	2,836.7	54.78
11 Aug 1949	5,056.7	25	1952	2,750.0	57.19
10 May 1951	263.0	26	1948	2,603.3	59.61
01 Sep 1951	5,166.7	27	1956	2,456.7	62.02
27 Mar 1953	2,750.0	28	1944	2,420.0	64.43
26 Jul 1953	5,036.7	29	1957	2,223.3	66.85
10 Aug 1954	4,476.7	30	1943	2,036.7	69.26
14 Jan 1956	4,943.3	31	1935	1,983.3	71.67
26 Mar 1957	2,456.7	32	1964	1,963.3	74.08
30 Sep 1957	2,223.3	33	1942	1,943.3	76.50
02 Nov 1958	3,840.0	34	1932	1,618.3	78.91
06 Mar 1960	5.3	35	1962	1,480.0	81.32
12 Apr 1961	77.0	36	1945	1,410.0	83.74
13 Apr 1962	2,836.7	37	1965	885.0	86.15
06 Apr 1963	1,480.0	38	1939	573.0	88.56
14 Jan 1964	12,943.3	39	1950	263.0	90.97
24 Mar 1965	1,963.3	40	1960	77.0	93.39
06 Sep 1965	885.0	41	1959	5.3*	95.80
02 Jul 1966	---	42	1966	---	98.21

```
|---------------------------|-------------------------------------|
|       Note: Plotting positions based on historic period (H) = 85 |
|             Number of historic events plus high outliers (Z) = 2 |
|               Weighting factor for systematic events (W) = 2.075 |
--------------------------------------------------------------------
                                                        * Outlier
```

<< Skew Weighting >>

```
-----------------------------------------------------------------
Based on 85 events, mean-square error of station skew =     0.226
Mean-square error of regional skew =                        0.302
-----------------------------------------------------------------
```

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
26,174.9	28,225.6	0.2	47,367.0	16,875.9
23,180.3	24,733.8	0.5	40,999.8	15,161.3
20,681.0	21,910.5	1.0	35,815.1	13,705.2
17,979.1	18,877.0	2.0	30,355.9	12,101.7
15,082.2	15,694.9	4.0	24,690.1	10,342.3
14,110.9	14,648.1	5.0	22,838.3	9,741.6
10,988.1	11,274.1	10.0	17,069.2	7,766.3
7,741.9	7,862.4	20.0	11,421.9	5,622.1
3,386.9	3,386.9	50.0	4,607.7	2,517.2
1,183.4	1,150.2	80.0	1,620.4	811.9
620.6	584.4	90.0	894.8	386.4
345.7	312.6	95.0	531.2	193.9
101.2	78.9	99.0	182.3	44.5

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.461	Historic Events	1
Standard Dev	0.500	High Outliers	1
Station Skew	-1.380	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.832	Missing Events	1
Adopted Skew	-0.832	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

```
====================================================================
Statistical Analysis of 4-day Maximum values
====================================================================
```

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

```
--------------------------------------------------------------------
|     Events Analyzed       |              Ordered Events            |
|                     FLOW  |       Analysis        FLOW  Weibull   |
```

Day Mon Year	cfs	Rank	Year	cfs	Plot Pos
30 Sep 1926	4,980.2	1	1928	13,345.0*	2.38
15 Sep 1927	5,087.5	2	1931	12,447.5	4.76
08 Apr 1929	13,345.0	3	1963	11,242.5	7.14
01 Aug 1929	8,527.5	4	1937	9,790.0	9.52
12 Aug 1930	4,700.0	5	1929	8,527.5	11.90
13 Feb 1932	12,447.5	6	1940	8,070.0	14.29
31 Aug 1932	1,415.0	7	1947	6,567.5	16.67
13 Sep 1933	2,707.5	8	1936	5,507.5	19.05
12 Apr 1935	2,827.5	9	1927	5,087.5	21.43
16 Apr 1936	1,955.0	10	1926	4,980.2	23.81
19 Feb 1937	5,507.5	11	1930	4,700.0	26.19
06 Mar 1938	9,790.0	12	1953	4,365.0	28.57
07 Apr 1939	2,875.0	13	1951	4,107.0	30.95
04 Mar 1940	548.8	14	1955	4,052.5	33.33
18 Mar 1941	8,070.0	15	1949	4,024.5	35.71
02 Oct 1941	3,458.2	16	1946	3,892.5	38.10
10 Mar 1943	1,757.5	17	1954	3,890.0	40.48
10 Apr 1944	1,977.5	18	1941	3,458.2	42.86
24 Apr 1945	2,432.5	19	1958	3,220.0	45.24
14 Aug 1945	1,306.0	20	1938	2,875.0	47.62
22 Sep 1946	3,892.5	21	1934	2,827.5	50.00
16 Oct 1947	6,567.5	22	1961	2,747.5	52.38
22 Mar 1949	2,607.5	23	1933	2,707.5	54.76
12 Aug 1949	4,024.5	24	1948	2,607.5	57.14
11 May 1951	223.2	25	1944	2,432.5	59.52
02 Sep 1951	4,107.0	26	1952	2,252.5	61.90
28 Mar 1953	2,252.5	27	1956	2,165.0	64.29
26 Jul 1953	4,365.0	28	1957	2,045.0	66.67
10 Aug 1954	3,890.0	29	1943	1,977.5	69.05
14 Jan 1956	4,052.5	30	1935	1,955.0	71.43
28 Aug 1956	2,165.0	31	1942	1,757.5	73.81
01 Oct 1957	2,045.0	32	1964	1,727.5	76.19
03 Nov 1958	3,220.0	33	1962	1,447.5	78.57
06 Mar 1960	4.6	34	1932	1,415.0	80.95
13 Apr 1961	68.0	35	1945	1,306.0	83.33
13 Apr 1962	2,747.5	36	1965	720.2	85.71
06 Apr 1963	1,447.5	37	1939	548.8	88.10
14 Jan 1964	11,242.5	38	1950	223.2	90.48
25 Mar 1965	1,727.5	39	1960	68.0	92.86
07 Sep 1965	720.2	40	1959	4.6*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
7,270.1	7,270.4	0.2	11,732.2	4,883.9
7,268.5	7,269.4	0.5	11,729.4	4,882.9
7,264.5	7,266.6	1.0	11,722.0	4,880.3
7,251.9	7,256.4	2.0	11,699.0	4,872.3
7,212.9	7,223.0	4.0	11,627.8	4,847.7
7,187.7	7,202.2	5.0	11,581.9	4,831.8
7,014.8	7,032.8	10.0	11,267.6	4,722.2
6,486.2	6,509.3	20.0	10,316.0	4,385.1
3,998.0	3,998.0	50.0	6,042.2	2,747.2
1,141.4	1,088.1	80.0	1,668.7	741.0
395.6	352.0	90.0	620.2	221.9
130.6	106.0	95.0	231.5	59.9
9.0	4.9	99.0	23.0	2.4

|-------------------------|-------------|-------------------------|

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.374	Historic Events	0
Standard Dev	0.625	High Outliers	0
Station Skew	-2.562	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.562	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
7,270.0	---	0.2	---	---
7,268.4	---	0.5	---	---
7,264.0	---	1.0	---	---
7,251.0	---	2.0	---	---
7,210.1	---	4.0	---	---
7,181.9	---	5.0	---	---
6,997.1	---	10.0	---	---
6,444.3	---	20.0	---	---
3,867.1	---	50.0	---	---
955.7	---	80.0	---	---
257.7	---	90.0	---	---
45.2	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 49.87

1 low outlier(s) identified below test value of 49.87

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.460	Historic Events	1
Standard Dev	0.457	High Outliers	0
Station Skew	-1.388	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.562	Systematic Events	41
		Historic Period	85

|-----------------------------|------------------------------|

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 47,830.44

1 high outlier(s) identified above input threshold of 13,345

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.443	Historic Events	1
Standard Dev	0.446	High Outliers	1
Station Skew	-1.439	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.562	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
30 Sep 1926	4,980.2	1	1928	13,345.0*	1.16
15 Sep 1927	5,087.5	2	1928	13,345.0	2.33
01 Jan 1928	13,345.0	3	1931	12,447.5	4.11
08 Apr 1929	13,345.0	4	1963	11,242.5	6.53
01 Aug 1929	8,527.5	5	1937	9,790.0	8.94
12 Aug 1930	4,700.0	6	1929	8,527.5	11.35
13 Feb 1932	12,447.5	7	1940	8,070.0	13.76
31 Aug 1932	1,415.0	8	1947	6,567.5	16.18
13 Sep 1933	2,707.5	9	1936	5,507.5	18.59
12 Apr 1935	2,827.5	10	1927	5,087.5	21.00
16 Apr 1936	1,955.0	11	1926	4,980.2	23.42
19 Feb 1937	5,507.5	12	1930	4,700.0	25.83
06 Mar 1938	9,790.0	13	1953	4,365.0	28.24
07 Apr 1939	2,875.0	14	1951	4,107.0	30.65
04 Mar 1940	548.8	15	1955	4,052.5	33.07
18 Mar 1941	8,070.0	16	1949	4,024.5	35.48
02 Oct 1941	3,458.2	17	1946	3,892.5	37.89
10 Mar 1943	1,757.5	18	1954	3,890.0	40.31
10 Apr 1944	1,977.5	19	1941	3,458.2	42.72
24 Apr 1945	2,432.5	20	1958	3,220.0	45.13

14 Aug 1945	1,306.0	21	1938	2,875.0	47.54
22 Sep 1946	3,892.5	22	1934	2,827.5	49.96
16 Oct 1947	6,567.5	23	1961	2,747.5	52.37
22 Mar 1949	2,607.5	24	1933	2,707.5	54.78
12 Aug 1949	4,024.5	25	1948	2,607.5	57.19
11 May 1951	223.2	26	1944	2,432.5	59.61
02 Sep 1951	4,107.0	27	1952	2,252.5	62.02
28 Mar 1953	2,252.5	28	1956	2,165.0	64.43
26 Jul 1953	4,365.0	29	1957	2,045.0	66.85
10 Aug 1954	3,890.0	30	1943	1,977.5	69.26
14 Jan 1956	4,052.5	31	1935	1,955.0	71.67
28 Aug 1956	2,165.0	32	1942	1,757.5	74.08
01 Oct 1957	2,045.0	33	1964	1,727.5	76.50
03 Nov 1958	3,220.0	34	1962	1,447.5	78.91
06 Mar 1960	4.6	35	1932	1,415.0	81.32
13 Apr 1961	68.0	36	1945	1,306.0	83.74
13 Apr 1962	2,747.5	37	1965	720.2	86.15
06 Apr 1963	1,447.5	38	1939	548.8	88.56
14 Jan 1964	11,242.5	39	1950	223.2	90.97
25 Mar 1965	1,727.5	40	1960	68.0	93.39
07 Sep 1965	720.2	41	1959	4.6*	95.80
02 Jul 1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.262
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,552.0	23,155.9	0.2	38,493.6	14,024.9
19,189.3	20,416.6	0.5	33,534.7	12,659.2
17,199.1	18,179.3	1.0	29,455.3	11,489.5
15,029.4	15,751.7	2.0	25,119.4	10,191.2
12,681.8	13,179.8	4.0	20,573.3	8,754.8
11,889.6	12,328.0	5.0	19,076.8	8,261.5
9,324.8	9,560.5	10.0	14,377.9	6,628.7
6,627.4	6,727.9	20.0	9,717.8	4,837.0
2,947.1	2,947.1	50.0	3,990.8	2,200.6
1,045.8	1,016.8	80.0	1,424.8	721.9
552.6	520.6	90.0	792.2	346.6
309.7	280.3	95.0	472.8	175.1
91.6	71.5	99.0	163.7	40.7

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.401	Historic Events	1
Standard Dev	0.492	High Outliers	1
Station Skew	-1.500	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.849	Missing Events	1
Adopted Skew	-0.849	Systematic Events	41

	Historic Period 85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
01 Oct 1926	4,026.2	1	1928	11,084.0*	2.38
16 Sep 1927	4,348.0	2	1931	10,654.0	4.76
08 Apr 1929	11,084.0	3	1963	10,088.0	7.14
31 Jul 1929	7,850.0	4	1937	8,332.0	9.52
13 Aug 1930	4,334.0	5	1929	7,850.0	11.90
14 Feb 1932	10,654.0	6	1940	7,006.0	14.29
31 Aug 1932	1,282.6	7	1947	5,466.0	16.67
14 Sep 1933	2,314.8	8	1936	4,890.0	19.05
12 Apr 1935	2,616.0	9	1927	4,348.0	21.43
17 Apr 1936	1,882.0	10	1930	4,334.0	23.81
20 Feb 1937	4,890.0	11	1926	4,026.2	26.19
07 Mar 1938	8,332.0	12	1953	3,734.0	28.57
08 Apr 1939	2,604.0	13	1955	3,494.0	30.95
05 Mar 1940	514.0	14	1954	3,420.0	33.33
19 Mar 1941	7,006.0	15	1951	3,390.0	35.71
04 Oct 1941	2,842.6	16	1949	3,359.0	38.10
12 Mar 1943	1,712.0	17	1946	3,250.0	40.48
10 Apr 1944	1,926.0	18	1958	3,062.0	42.86
25 Apr 1945	2,346.0	19	1941	2,842.6	45.24
15 Aug 1945	1,243.6	20	1961	2,632.0	47.62
23 Sep 1946	3,250.0	21	1934	2,616.0	50.00
17 Oct 1947	5,466.0	22	1938	2,604.0	52.38
22 Mar 1949	2,600.0	23	1948	2,600.0	54.76
12 Aug 1949	3,359.0	24	1944	2,346.0	57.14
12 May 1951	192.6	25	1933	2,314.8	59.52
03 Sep 1951	3,390.0	26	1943	1,926.0	61.90
29 Mar 1953	1,905.2	27	1952	1,905.2	64.29
27 Jul 1953	3,734.0	28	1935	1,882.0	66.67
09 Aug 1954	3,420.0	29	1956	1,878.2	69.05
15 Jan 1956	3,494.0	30	1957	1,780.8	71.43
29 Aug 1956	1,878.2	31	1942	1,712.0	73.81
02 Oct 1957	1,780.8	32	1964	1,582.0	76.19
15 Mar 1959	3,062.0	33	1962	1,428.0	78.57
06 Mar 1960	5.1	34	1932	1,282.6	80.95
14 Apr 1961	60.2	35	1945	1,243.6	83.33
13 Apr 1962	2,632.0	36	1965	596.0	85.71
05 Apr 1963	1,428.0	37	1939	514.0	88.10
15 Jan 1964	10,088.0	38	1950	192.6	90.48
25 Mar 1965	1,582.0	39	1960	60.2	92.86
08 Sep 1965	596.0	40	1959	5.1*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,405.8	6,406.1	0.2	10,235.1	4,341.3
6,404.2	6,405.1	0.5	10,232.3	4,340.3
6,400.2	6,402.3	1.0	10,225.1	4,337.8
6,388.1	6,392.4	2.0	10,203.1	4,330.0
6,351.4	6,360.9	4.0	10,136.9	4,306.7
6,328.0	6,341.5	5.0	10,094.6	4,291.8
6,170.0	6,186.5	10.0	9,810.2	4,190.8
5,697.5	5,718.1	20.0	8,967.8	3,886.9
3,522.9	3,522.9	50.0	5,270.7	2,442.6
1,032.4	985.3	80.0	1,496.0	676.6
367.8	328.3	90.0	570.7	209.0
125.3	102.2	95.0	219.0	58.5
9.3	5.2	99.0	23.3	2.5

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.325	Historic Events	0
Standard Dev	0.610	High Outliers	0
Station Skew	-2.536	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.536	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,405.7	---	0.2	---	---
6,404.1	---	0.5	---	---
6,399.8	---	1.0	---	---
6,387.2	---	2.0	---	---
6,348.9	---	4.0	---	---
6,322.7	---	5.0	---	---
6,154.2	---	10.0	---	---
5,660.6	---	20.0	---	---
3,409.4	---	50.0	---	---
868.4	---	80.0	---	---
242.5	---	90.0	---	---
44.7	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682

Computed low outlier test value = 48.93

1 low outlier(s) identified below test value of 48.93

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.409	Historic Events	1
Standard Dev	0.450	High Outliers	0
Station Skew	-1.493	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.536	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 40,858.81

1 high outlier(s) identified above input threshold of 11,084

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and         *
*        comparison with similar data should be explored, *
*        if not incorporated in this analysis.            *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.392	Historic Events	1
Standard Dev	0.441	High Outliers	1
Station Skew	-1.536	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.536	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Events Analyzed		Ordered Events		
	FLOW	Analysis	FLOW	Weibull

Day Mon Year	cfs	Rank	Year	cfs	Plot Pos
01 Oct 1926	4,026.2	1	1928	11,084.0*	1.16
16 Sep 1927	4,348.0	2	1928	11,084.0	2.33
01 Jan 1928	11,084.0	3	1931	10,654.0	4.11
08 Apr 1929	11,084.0	4	1963	10,088.0	6.53
31 Jul 1929	7,850.0	5	1937	8,332.0	8.94
13 Aug 1930	4,334.0	6	1929	7,850.0	11.35
14 Feb 1932	10,654.0	7	1940	7,006.0	13.76
31 Aug 1932	1,282.6	8	1947	5,466.0	16.18
14 Sep 1933	2,314.8	9	1936	4,890.0	18.59
12 Apr 1935	2,616.0	10	1927	4,348.0	21.00
17 Apr 1936	1,882.0	11	1930	4,334.0	23.42
20 Feb 1937	4,890.0	12	1926	4,026.2	25.83
07 Mar 1938	8,332.0	13	1953	3,734.0	28.24
08 Apr 1939	2,604.0	14	1955	3,494.0	30.65
05 Mar 1940	514.0	15	1954	3,420.0	33.07
19 Mar 1941	7,006.0	16	1951	3,390.0	35.48
04 Oct 1941	2,842.6	17	1949	3,359.0	37.89
12 Mar 1943	1,712.0	18	1946	3,250.0	40.31
10 Apr 1944	1,926.0	19	1958	3,062.0	42.72
25 Apr 1945	2,346.0	20	1941	2,842.6	45.13
15 Aug 1945	1,243.6	21	1961	2,632.0	47.54
23 Sep 1946	3,250.0	22	1934	2,616.0	49.96
17 Oct 1947	5,466.0	23	1938	2,604.0	52.37
22 Mar 1949	2,600.0	24	1948	2,600.0	54.78
12 Aug 1949	3,359.0	25	1944	2,346.0	57.19
12 May 1951	192.6	26	1933	2,314.8	59.61
03 Sep 1951	3,390.0	27	1943	1,926.0	62.02
29 Mar 1953	1,905.2	28	1952	1,905.2	64.43
27 Jul 1953	3,734.0	29	1935	1,882.0	66.85
09 Aug 1954	3,420.0	30	1956	1,878.2	69.26
15 Jan 1956	3,494.0	31	1957	1,780.8	71.67
29 Aug 1956	1,878.2	32	1942	1,712.0	74.08
02 Oct 1957	1,780.8	33	1964	1,582.0	76.50
15 Mar 1959	3,062.0	34	1962	1,428.0	78.91
06 Mar 1960	5.1	35	1932	1,282.6	81.32
14 Apr 1961	60.2	36	1945	1,243.6	83.74
13 Apr 1962	2,632.0	37	1965	596.0	86.15
05 Apr 1963	1,428.0	38	1939	514.0	88.56
15 Jan 1964	10,088.0	39	1950	192.6	90.97
25 Mar 1965	1,582.0	40	1960	60.2	93.39
08 Sep 1965	596.0	41	1959	5.1*	95.80
02 Jul 1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.28
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
18,268.7	19,541.5	0.2	32,289.7	11,972.8
16,369.8	17,357.7	0.5	28,346.0	10,866.8
14,749.5	15,548.6	1.0	25,055.4	9,908.1
12,962.5	13,558.6	2.0	21,513.3	8,832.5
11,005.7	11,422.2	4.0	17,750.2	7,629.0
10,340.0	10,708.6	5.0	16,500.3	7,212.6

8,166.2	8,366.6	10.0	12,538.4	5,823.2
5,848.7	5,935.4	20.0	8,550.1	4,279.2
2,631.2	2,631.2	50.0	3,555.7	1,969.3
939.7	913.7	80.0	1,277.0	650.8
497.0	468.2	90.0	710.6	312.8
278.3	251.8	95.0	423.9	157.9
82.0	63.9	99.0	146.2	36.4

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.350	Historic Events	1
Standard Dev	0.488	High Outliers	1
Station Skew	-1.596	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.876	Missing Events	1
Adopted Skew	-0.876	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 6-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
23 Feb 1927	3,390.0	1	1928	9,556.7	2.38
18 Sep 1927	4,305.0	2	1931	9,305.0	4.76
08 Apr 1929	9,556.7	3	1963	8,978.3	7.14
01 Aug 1929	7,478.3	4	1929	7,478.3	9.52
13 Aug 1930	4,053.3	5	1937	7,305.0	11.90
15 Feb 1932	9,305.0	6	1940	6,228.3	14.29
01 Sep 1932	1,156.2	7	1947	4,636.0	16.67
15 Sep 1933	1,987.3	8	1936	4,536.7	19.05
12 Apr 1935	2,486.7	9	1927	4,305.0	21.43
17 Apr 1936	1,806.7	10	1930	4,053.3	23.81
20 Mar 1937	4,536.7	11	1926	3,390.0	26.19
07 Mar 1938	7,305.0	12	1941	3,383.8	28.57
09 Apr 1939	2,336.7	13	1954	3,373.3	30.95
06 Mar 1940	481.0	14	1953	3,191.8	33.33
20 Mar 1941	6,228.3	15	1955	3,052.8	35.71
05 Oct 1941	3,383.8	16	1958	2,978.3	38.10
13 Mar 1943	1,783.3	17	1949	2,882.5	40.48
11 Apr 1944	1,868.3	18	1951	2,880.0	42.86
25 Apr 1945	2,275.0	19	1946	2,776.7	45.24
16 Aug 1945	1,156.5	20	1961	2,528.3	47.62
24 Sep 1946	2,776.7	21	1948	2,508.3	50.00
18 Oct 1947	4,636.0	22	1934	2,486.7	52.38
22 Mar 1949	2,508.3	23	1938	2,336.7	54.76
13 Aug 1949	2,882.5	24	1944	2,275.0	57.14
13 May 1951	168.8	25	1933	1,987.3	59.52
04 Sep 1951	2,880.0	26	1943	1,868.3	61.90
30 Mar 1953	1,655.8	27	1935	1,806.7	64.29

28 Jul 1953	3,191.8	28	1942	1,783.3	66.67
10 Aug 1954	3,373.3	29	1956	1,689.2	69.05
16 Jan 1956	3,052.8	30	1952	1,655.8	71.43
30 Aug 1956	1,689.2	31	1957	1,552.3	73.81
03 Oct 1957	1,552.3	32	1964	1,472.8	76.19
16 Mar 1959	2,978.3	33	1962	1,430.0	78.57
06 Mar 1960	4.7	34	1945	1,156.5	80.95
15 Apr 1961	52.8	35	1932	1,156.2	83.33
13 Apr 1962	2,528.3	36	1965	504.7	85.71
06 Apr 1963	1,430.0	37	1939	481.0	88.10
15 Jan 1964	8,978.3	38	1950	168.8	90.48
25 Mar 1965	1,472.8	39	1960	52.8	92.86
09 Sep 1965	504.7	40	1959	4.7*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,783.5	5,783.7	0.2	9,226.7	3,921.5
5,782.4	5,783.0	0.5	9,224.7	3,920.7
5,779.5	5,781.0	1.0	9,219.4	3,918.9
5,770.2	5,773.5	2.0	9,202.7	3,913.0
5,741.3	5,748.8	4.0	9,150.5	3,894.5
5,722.4	5,733.3	5.0	9,116.5	3,882.4
5,591.9	5,605.5	10.0	8,882.0	3,798.9
5,187.7	5,205.3	20.0	8,162.3	3,538.7
3,245.7	3,245.7	50.0	4,860.4	2,249.1
955.0	911.2	80.0	1,384.0	626.2
338.6	302.0	90.0	525.3	192.5
114.4	93.2	95.0	200.1	53.4
8.3	4.5	99.0	20.8	2.2

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.288	Historic Events	0
Standard Dev	0.611	High Outliers	0
Station Skew	-2.574	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.574	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,783.5	---	0.2	---	---
5,782.3	---	0.5	---	---

5,779.1	---	1.0	---	---
5,769.6	---	2.0	---	---
5,739.2	---	4.0	---	---
5,718.1	---	5.0	---	---
5,578.4	---	10.0	---	---
5,155.3	---	20.0	---	---
3,142.2	---	50.0	---	---
802.6	---	80.0	---	---
222.5	---	90.0	---	---
40.4	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 44.62

1 low outlier(s) identified below test value of 44.62

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.370	Historic Events	1
Standard Dev	0.450	High Outliers	0
Station Skew	-1.600	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.574	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 37,292.53

0 high outlier(s) identified above input threshold of 9,556.7

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.362	Historic Events	1
Standard Dev	0.444	High Outliers	0
Station Skew	-1.597	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.574	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
23 Feb 1927	3,390.0	1	1928	9,556.7	1.16
18 Sep 1927	4,305.0	2	1928	9,556.7	2.94
01 Jan 1928	9,556.7	3	1931	9,305.0	5.32
08 Apr 1929	9,556.7	4	1963	8,978.3	7.70
01 Aug 1929	7,478.3	5	1929	7,478.3	10.08
13 Aug 1930	4,053.3	6	1937	7,305.0	12.46
15 Feb 1932	9,305.0	7	1940	6,228.3	14.85
01 Sep 1932	1,156.2	8	1947	4,636.0	17.23
15 Sep 1933	1,987.3	9	1936	4,536.7	19.61
12 Apr 1935	2,486.7	10	1927	4,305.0	21.99
17 Apr 1936	1,806.7	11	1930	4,053.3	24.38
20 Mar 1937	4,536.7	12	1926	3,390.0	26.76
07 Mar 1938	7,305.0	13	1941	3,383.8	29.14
09 Apr 1939	2,336.7	14	1954	3,373.3	31.52
06 Mar 1940	481.0	15	1953	3,191.8	33.91
20 Mar 1941	6,228.3	16	1955	3,052.8	36.29
05 Oct 1941	3,383.8	17	1958	2,978.3	38.67
13 Mar 1943	1,783.3	18	1949	2,882.5	41.05
11 Apr 1944	1,868.3	19	1951	2,880.0	43.43
25 Apr 1945	2,275.0	20	1946	2,776.7	45.82
16 Aug 1945	1,156.5	21	1961	2,528.3	48.20
24 Sep 1946	2,776.7	22	1948	2,508.3	50.58
18 Oct 1947	4,636.0	23	1934	2,486.7	52.96
22 Mar 1949	2,508.3	24	1938	2,336.7	55.35
13 Aug 1949	2,882.5	25	1944	2,275.0	57.73
13 May 1951	168.8	26	1933	1,987.3	60.11
04 Sep 1951	2,880.0	27	1943	1,868.3	62.49
30 Mar 1953	1,655.8	28	1935	1,806.7	64.88
28 Jul 1953	3,191.8	29	1942	1,783.3	67.26
10 Aug 1954	3,373.3	30	1956	1,689.2	69.64
16 Jan 1956	3,052.8	31	1952	1,655.8	72.02
30 Aug 1956	1,689.2	32	1957	1,552.3	74.40
03 Oct 1957	1,552.3	33	1964	1,472.8	76.79
16 Mar 1959	2,978.3	34	1962	1,430.0	79.17
06 Mar 1960	4.7	35	1945	1,156.5	81.55
15 Apr 1961	52.8	36	1932	1,156.2	83.93
13 Apr 1962	2,528.3	37	1965	504.7	86.32
06 Apr 1963	1,430.0	38	1939	481.0	88.70
15 Jan 1964	8,978.3	39	1950	168.8	91.08
25 Mar 1965	1,472.8	40	1960	52.8	93.46
09 Sep 1965	504.7	41	1959	4.7*	95.85
02 Jul 1966	---	42	1966	---	98.23

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 2.0488

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.292
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
17,074.7	18,234.7	0.2	30,228.7	11,172.4
15,333.0	16,239.6	0.5	26,606.0	10,159.2
13,837.5	14,575.3	1.0	23,563.2	9,275.7
12,179.6	12,732.9	2.0	20,269.4	8,279.6
10,354.9	10,743.7	4.0	16,751.2	7,159.7
9,732.2	10,077.0	5.0	15,578.7	6,771.0
7,692.4	7,880.6	10.0	11,850.0	5,470.5
5,509.0	5,590.7	20.0	8,080.3	4,019.6
2,468.5	2,468.5	50.0	3,345.3	1,842.9
872.8	848.3	80.0	1,189.1	602.6
457.9	431.1	90.0	656.9	287.0
254.4	229.9	95.0	389.1	143.6
73.5	57.0	99.0	132.0	32.4

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events		
Mean	3.320	Historic Events		1
Standard Dev	0.493	High Outliers	0	
Station Skew	-1.657	Low Outliers	1	
Regional Skew	-0.100	Zero Events	0	
Weighted Skew	-0.891	Missing Events	1	
Adopted Skew	-0.891	Systematic Events		41
		Historic Period		85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 7-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
24 Feb 1927	3,194.3	1	1928	8,475.7*	2.38
19 Sep 1927	4,501.4	2	1931	8,305.7	4.76
08 Apr 1929	8,475.7	3	1963	8,130.0	7.14
02 Aug 1929	6,898.6	4	1929	6,898.6	9.52
14 Aug 1930	3,698.6	5	1937	6,500.0	11.90
15 Feb 1932	8,305.7	6	1940	5,652.9	14.29
31 Aug 1932	1,043.1	7	1927	4,501.4	16.67
16 Sep 1933	1,732.0	8	1936	4,258.6	19.05
12 Apr 1935	2,375.7	9	1947	4,008.7	21.43
18 Apr 1936	1,748.6	10	1930	3,698.6	23.81
20 Mar 1937	4,258.6	11	1941	3,547.6	26.19

08 Mar 1938	6,500.0	12	1954	3,208.6	28.57
09 Apr 1939	2,106.4	13	1926	3,194.3	30.95
07 Mar 1940	449.4	14	1958	2,881.4	33.33
21 Mar 1941	5,652.9	15	1953	2,775.0	35.71
05 Oct 1941	3,547.6	16	1955	2,735.0	38.10
13 Mar 1943	1,758.6	17	1949	2,513.9	40.48
11 Apr 1944	1,808.6	18	1951	2,498.9	42.86
26 Apr 1945	2,152.9	19	1961	2,445.7	45.24
15 Aug 1945	1,061.3	20	1946	2,418.6	47.62
25 Sep 1946	2,418.6	21	1948	2,407.1	50.00
19 Oct 1947	4,008.7	22	1934	2,375.7	52.38
23 Mar 1949	2,407.1	23	1944	2,152.9	54.76
14 Aug 1949	2,513.9	24	1938	2,106.4	57.14
14 May 1951	149.0	25	1943	1,808.6	59.52
04 Sep 1951	2,498.9	26	1942	1,758.6	61.90
31 Mar 1953	1,500.4	27	1935	1,748.6	64.29
29 Jul 1953	2,775.0	28	1933	1,732.0	66.67
10 Aug 1954	3,208.6	29	1956	1,570.3	69.05
17 Jan 1956	2,735.0	30	1952	1,500.4	71.43
31 Aug 1956	1,570.3	31	1962	1,410.0	73.81
04 Oct 1957	1,369.1	32	1964	1,389.1	76.19
17 Mar 1959	2,881.4	33	1957	1,369.1	78.57
06 Mar 1960	4.3	34	1945	1,061.3	80.95
16 Apr 1961	46.3	35	1932	1,043.1	83.33
13 Apr 1962	2,445.7	36	1939	449.4	85.71
06 Apr 1963	1,410.0	37	1965	436.6	88.10
16 Jan 1964	8,130.0	38	1950	149.0	90.48
25 Mar 1965	1,389.1	39	1960	46.3	92.86
10 Sep 1965	436.6	40	1959	4.3*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,341.9	5,342.1	0.2	8,531.9	3,618.4
5,340.9	5,341.5	0.5	8,530.1	3,617.7
5,338.3	5,339.7	1.0	8,525.2	3,616.0
5,329.9	5,332.9	2.0	8,510.1	3,610.7
5,303.4	5,310.3	4.0	8,462.3	3,593.8
5,286.1	5,296.1	5.0	8,431.2	3,582.8
5,166.3	5,178.8	10.0	8,215.6	3,506.2
4,794.0	4,810.2	20.0	7,552.0	3,266.7
2,998.9	2,998.9	50.0	4,496.2	2,075.9
879.7	839.3	80.0	1,276.3	576.2
310.9	277.2	90.0	482.9	176.5
104.6	85.2	95.0	183.3	48.7
7.5	4.1	99.0	18.9	2.0

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.252	Historic Events	0
Standard Dev	0.612	High Outliers	0
Station Skew	-2.578	Low Outliers	0
Regional Skew	-0.100	Zero Events	0

Weighted Skew	---	Missing Events	1
Adopted Skew	-2.578	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,341.9	---	0.2	---	---
5,340.9	---	0.5	---	---
5,338.0	---	1.0	---	---
5,329.3	---	2.0	---	---
5,301.5	---	4.0	---	---
5,282.1	---	5.0	---	---
5,153.9	---	10.0	---	---
4,764.1	---	20.0	---	---
2,903.1	---	50.0	---	---
739.0	---	80.0	---	---
204.0	---	90.0	---	---
36.8	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 40.71

1 low outlier(s) identified below test value of 40.71

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.335	Historic Events	1
Standard Dev	0.452	High Outliers	0
Station Skew	-1.672	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.578	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 34,863.05

1 high outlier(s) identified above input threshold of 8,475.7

*
* Note - Collection of historical information and *

```
   *        comparison with similar data should be explored, *
   *        if not incorporated in this analysis.            *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                      and 1 historic event(s)


<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)
----------------------------------------------------------------
|        Log Transform:         |                              |
|          FLOW, cfs            |       Number of Events       |
|-------------------------------|------------------------------|
|  Mean                  3.319  |  Historic Events          1  |
|  Standard Dev          0.444  |  High Outliers         1     |
|  Station Skew         -1.695  |  Low Outliers          1     |
|  Regional Skew        -0.100  |  Zero Events           0     |
|  Weighted Skew           ---  |  Missing Events        1     |
|  Adopted Skew         -2.578  |  Systematic Events       41  |
|                               |  Historic Period         85  |
|-------------------------------|------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)
--------------------------------------------------------------------
|     Events Analyzed          |          Ordered Events             |
|                     FLOW     |       Analysis       FLOW  Weibull  |
|  Day Mon Year        cfs     |  Rank     Year        cfs  Plot Pos |
|------------------------------|-------------------------------------|
|   24 Feb 1927     3,194.3    |    1       1928     8,475.7*   1.16  |
|   19 Sep 1927     4,501.4    |    2       1928     8,475.7    2.33  |
|   01 Jan 1928     8,475.7    |    3       1931     8,305.7    4.11  |
|   08 Apr 1929     8,475.7    |    4       1963     8,130.0    6.53  |
|   02 Aug 1929     6,898.6    |    5       1929     6,898.6    8.94  |
|   14 Aug 1930     3,698.6    |    6       1937     6,500.0   11.35  |
|   15 Feb 1932     8,305.7    |    7       1940     5,652.9   13.76  |
|   31 Aug 1932     1,043.1    |    8       1927     4,501.4   16.18  |
|   16 Sep 1933     1,732.0    |    9       1936     4,258.6   18.59  |
|   12 Apr 1935     2,375.7    |   10       1947     4,008.7   21.00  |
|   18 Apr 1936     1,748.6    |   11       1930     3,698.6   23.42  |
|   20 Mar 1937     4,258.6    |   12       1941     3,547.6   25.83  |
|   08 Mar 1938     6,500.0    |   13       1954     3,208.6   28.24  |
|   09 Apr 1939     2,106.4    |   14       1926     3,194.3   30.65  |
|   07 Mar 1940       449.4    |   15       1958     2,881.4   33.07  |
|   21 Mar 1941     5,652.9    |   16       1953     2,775.0   35.48  |
|   05 Oct 1941     3,547.6    |   17       1955     2,735.0   37.89  |
|   13 Mar 1943     1,758.6    |   18       1949     2,513.9   40.31  |
|   11 Apr 1944     1,808.6    |   19       1951     2,498.9   42.72  |
|   26 Apr 1945     2,152.9    |   20       1961     2,445.7   45.13  |
|   15 Aug 1945     1,061.3    |   21       1946     2,418.6   47.54  |
|   25 Sep 1946     2,418.6    |   22       1948     2,407.1   49.96  |
|   19 Oct 1947     4,008.7    |   23       1934     2,375.7   52.37  |
|   23 Mar 1949     2,407.1    |   24       1944     2,152.9   54.78  |
|   14 Aug 1949     2,513.9    |   25       1938     2,106.4   57.19  |
|   14 May 1951       149.0    |   26       1943     1,808.6   59.61  |
|   04 Sep 1951     2,498.9    |   27       1942     1,758.6   62.02  |
|   31 Mar 1953     1,500.4    |   28       1935     1,748.6   64.43  |
|   29 Jul 1953     2,775.0    |   29       1933     1,732.0   66.85  |
|   10 Aug 1954     3,208.6    |   30       1956     1,570.3   69.26  |
|   17 Jan 1956     2,735.0    |   31       1952     1,500.4   71.67  |
|   31 Aug 1956     1,570.3    |   32       1962     1,410.0   74.08  |
|   04 Oct 1957     1,369.1    |   33       1964     1,389.1   76.50  |
```

17 Mar 1959	2,881.4	34	1957	1,369.1	78.91
06 Mar 1960	4.3	35	1945	1,061.3	81.32
16 Apr 1961	46.3	36	1932	1,043.1	83.74
13 Apr 1962	2,445.7	37	1939	449.4	86.15
06 Apr 1963	1,410.0	38	1965	436.6	88.56
16 Jan 1964	8,130.0	39	1950	149.0	90.97
25 Mar 1965	1,389.1	40	1960	46.3	93.39
10 Sep 1965	436.6	41	1959	4.3*	95.80
02 Jul 1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew = 0.311
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
15,102.7	16,084.7	0.2	26,630.0	9,906.5
13,614.9	14,390.0	0.5	23,548.3	9,038.5
12,326.0	12,962.4	1.0	20,934.6	8,275.3
10,885.6	11,366.8	2.0	18,080.9	7,408.2
9,287.5	9,628.7	4.0	15,005.7	6,426.0
8,739.2	9,042.8	5.0	13,974.7	6,083.4
6,933.0	7,099.8	10.0	10,676.2	4,931.0
4,983.1	5,056.2	20.0	7,310.5	3,635.1
2,240.9	2,240.9	50.0	3,038.1	1,672.7
790.8	768.5	80.0	1,077.5	546.0
413.5	389.1	90.0	593.3	259.0
228.7	206.5	95.0	350.1	128.9
65.3	50.5	99.0	117.6	28.7

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.277	Historic Events	1
Standard Dev	0.493	High Outliers	1
Station Skew	-1.748	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.911	Missing Events	1
Adopted Skew	-0.911	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 8-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
25	Feb	1927	3,042.5	1	1928	7,648.8	2.38
19	Sep	1927	4,522.5	2	1931	7,517.5	4.76
08	Apr	1929	7,648.8	3	1963	7,400.0	7.14
03	Aug	1929	6,433.8	4	1929	6,433.8	9.52
15	Aug	1930	3,373.8	5	1937	5,838.8	11.90
15	Feb	1932	7,517.5	6	1940	5,208.8	14.29
31	Aug	1932	1,024.6	7	1927	4,522.5	16.67
17	Sep	1933	1,534.2	8	1936	4,017.5	19.05
12	Apr	1935	2,285.0	9	1947	3,525.8	21.43
19	Apr	1936	1,692.5	10	1930	3,373.8	23.81
21	Mar	1937	4,017.5	11	1941	3,335.4	26.19
09	Mar	1938	5,838.8	12	1926	3,042.5	28.57
10	Apr	1939	1,930.6	13	1954	2,966.2	30.95
08	Mar	1940	422.0	14	1958	2,733.8	33.33
22	Mar	1941	5,208.8	15	1955	2,482.1	35.71
06	Oct	1941	3,335.4	16	1953	2,455.9	38.10
14	Mar	1943	1,705.0	17	1961	2,350.0	40.48
11	Apr	1944	1,760.0	18	1948	2,316.2	42.86
27	Apr	1945	2,061.2	19	1934	2,285.0	45.24
15	Aug	1945	1,034.4	20	1949	2,258.8	47.62
26	Sep	1946	2,138.8	21	1951	2,212.2	50.00
20	Oct	1947	3,525.8	22	1946	2,138.8	52.38
23	Mar	1949	2,316.2	23	1944	2,061.2	54.76
12	Aug	1949	2,258.8	24	1938	1,930.6	57.14
15	May	1951	132.9	25	1943	1,760.0	59.52
05	Sep	1951	2,212.2	26	1942	1,705.0	61.90
01	Apr	1953	1,389.9	27	1935	1,692.5	64.29
30	Jul	1953	2,455.9	28	1956	1,552.8	66.67
11	Aug	1954	2,966.2	29	1933	1,534.2	69.05
18	Jan	1956	2,482.1	30	1952	1,389.9	71.43
01	Sep	1956	1,552.8	31	1962	1,387.5	73.81
04	Oct	1957	1,229.2	32	1964	1,319.6	76.19
17	Mar	1959	2,733.8	33	1957	1,229.2	78.57
19	Apr	1960	1.9	34	1945	1,034.4	80.95
17	Apr	1961	40.7	35	1932	1,024.6	83.33
13	Apr	1962	2,350.0	36	1939	422.0	85.71
07	Apr	1963	1,387.5	37	1965	384.0	88.10
17	Jan	1964	7,400.0	38	1950	132.9	90.48
26	Mar	1965	1,319.6	39	1960	40.7	92.86
11	Sep	1965	384.0	40	1959	1.9*	95.24
02	Jul	1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,600.4	4,600.4	0.2	7,450.7	3,060.4
4,600.3	4,600.4	0.5	7,450.5	3,060.3
4,600.0	4,600.2	1.0	7,449.9	3,060.1
4,598.3	4,598.9	2.0	7,446.8	3,059.0

4,591.2	4,593.1	4.0	7,434.0	3,054.6
4,585.8	4,588.9	5.0	7,424.1	3,051.1
4,538.1	4,543.1	10.0	7,337.5	3,021.0
4,336.7	4,345.6	20.0	6,973.7	2,893.3
2,925.8	2,925.8	50.0	4,516.0	1,976.9
840.7	798.7	80.0	1,246.2	540.8
270.7	238.1	90.0	429.9	149.8
80.1	63.5	95.0	145.4	35.6
4.0	2.0	99.0	10.9	0.9

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.212	Historic Events	0
Standard Dev	0.652	High Outliers	0
Station Skew	-2.894	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.894	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,600.4	---	0.2	---	---
4,600.3	---	0.5	---	---
4,599.9	---	1.0	---	---
4,598.1	---	2.0	---	---
4,590.6	---	4.0	---	---
4,584.2	---	5.0	---	---
4,531.5	---	10.0	---	---
4,316.8	---	20.0	---	---
2,836.8	---	50.0	---	---
695.3	---	80.0	---	---
169.0	---	90.0	---	---
24.5	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 29.1

1 low outlier(s) identified below test value of 29.1

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Log Transform:	

FLOW, cfs		Number of Events	
Mean	3.303	Historic Events	1
Standard Dev	0.454	High Outliers	0
Station Skew	-1.754	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.894	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 32,673.16

0 high outlier(s) identified above input threshold of 7,648.8

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.295	Historic Events	1
Standard Dev	0.449	High Outliers	0
Station Skew	-1.744	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.894	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
25 Feb 1927	3,042.5	1	1928	7,648.8	1.16
19 Sep 1927	4,522.5	2	1928	7,648.8	2.94
01 Jan 1928	7,648.8	3	1931	7,517.5	5.32
08 Apr 1929	7,648.8	4	1963	7,400.0	7.70
03 Aug 1929	6,433.8	5	1929	6,433.8	10.08
15 Aug 1930	3,373.8	6	1937	5,838.8	12.46
15 Feb 1932	7,517.5	7	1940	5,208.8	14.85
31 Aug 1932	1,024.6	8	1927	4,522.5	17.23
17 Sep 1933	1,534.2	9	1936	4,017.5	19.61
12 Apr 1935	2,285.0	10	1947	3,525.8	21.99
19 Apr 1936	1,692.5	11	1930	3,373.8	24.38
21 Mar 1937	4,017.5	12	1941	3,335.4	26.76
09 Mar 1938	5,838.8	13	1926	3,042.5	29.14
10 Apr 1939	1,930.6	14	1954	2,966.2	31.52
08 Mar 1940	422.0	15	1958	2,733.8	33.91
22 Mar 1941	5,208.8	16	1955	2,482.1	36.29
06 Oct 1941	3,335.4	17	1953	2,455.9	38.67

14 Mar 1943	1,705.0	18	1961	2,350.0	41.05
11 Apr 1944	1,760.0	19	1948	2,316.2	43.43
27 Apr 1945	2,061.2	20	1934	2,285.0	45.82
15 Aug 1945	1,034.4	21	1949	2,258.8	48.20
26 Sep 1946	2,138.8	22	1951	2,212.2	50.58
20 Oct 1947	3,525.8	23	1946	2,138.8	52.96
23 Mar 1949	2,316.2	24	1944	2,061.2	55.35
12 Aug 1949	2,258.8	25	1938	1,930.6	57.73
15 May 1951	132.9	26	1943	1,760.0	60.11
05 Sep 1951	2,212.2	27	1942	1,705.0	62.49
01 Apr 1953	1,389.9	28	1935	1,692.5	64.88
30 Jul 1953	2,455.9	29	1956	1,552.8	67.26
11 Aug 1954	2,966.2	30	1933	1,534.2	69.64
18 Jan 1956	2,482.1	31	1952	1,389.9	72.02
01 Sep 1956	1,552.8	32	1962	1,387.5	74.40
04 Oct 1957	1,229.2	33	1964	1,319.6	76.79
17 Mar 1959	2,733.8	34	1957	1,229.2	79.17
19 Apr 1960	1.9	35	1945	1,034.4	81.55
17 Apr 1961	40.7	36	1932	1,024.6	83.93
13 Apr 1962	2,350.0	37	1939	422.0	86.32
07 Apr 1963	1,387.5	38	1965	384.0	88.70
17 Jan 1964	7,400.0	39	1950	132.9	91.08
26 Mar 1965	1,319.6	40	1960	40.7	93.46
11 Sep 1965	384.0	41	1959	1.9*	95.85
02 Jul 1966	---	42	1966	---	98.23

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 2.0488

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew =	0.32
Mean-square error of regional skew =	0.302

<< Frequency Curve >>

LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
14,376.7	15,300.9	0.2	25,396.8	9,415.3
12,972.3	13,704.1	0.5	22,482.8	8,597.1
11,751.9	12,354.6	1.0	20,003.5	7,875.5
10,384.9	10,841.7	2.0	17,289.3	7,053.9
8,864.4	9,189.2	4.0	14,357.0	6,121.1
8,341.9	8,631.3	5.0	13,372.3	5,795.2
6,618.5	6,777.7	10.0	10,217.5	4,697.7
4,754.5	4,824.4	20.0	6,992.3	3,461.4
2,130.8	2,130.8	50.0	2,894.8	1,587.5
746.6	725.4	80.0	1,019.3	514.4
388.2	365.1	90.0	558.4	242.5
213.6	192.6	95.0	327.9	119.9
60.2	46.5	99.0	109.0	26.3

<< Synthetic Statistics >>

LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (8-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.254	Historic Events	1
Standard Dev	0.496	High Outliers	0
Station Skew	-1.789	Low Outliers	1

Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.920	Missing Events	1
Adopted Skew	-0.920	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 9-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
26	Feb	1927	2,923.3	1	1928	7,001.1*	2.38
20	Sep	1927	4,467.8	2	1931	6,898.9	4.76
09	Apr	1929	7,001.1	3	1963	6,824.4	7.14
04	Aug	1929	6,031.1	4	1929	6,031.1	9.52
16	Aug	1930	3,071.4	5	1937	5,292.2	11.90
16	Feb	1932	6,898.9	6	1940	4,868.9	14.29
31	Aug	1932	1,029.7	7	1927	4,467.8	16.67
18	Sep	1933	1,377.1	8	1936	4,218.9	19.05
12	Apr	1935	2,211.1	9	1947	3,145.1	21.43
20	Apr	1936	1,626.7	10	1930	3,071.4	23.81
17	Feb	1937	4,218.9	11	1941	3,070.8	26.19
10	Mar	1938	5,292.2	12	1926	2,923.3	28.57
10	Apr	1939	1,791.1	13	1954	2,810.0	30.95
09	Mar	1940	394.0	14	1958	2,617.8	33.33
23	Mar	1941	4,868.9	15	1955	2,258.8	35.71
07	Oct	1941	3,070.8	16	1961	2,247.8	38.10
15	Mar	1943	1,626.0	17	1948	2,241.1	40.48
11	Apr	1944	1,705.6	18	1934	2,211.1	42.86
28	Apr	1945	2,036.7	19	1953	2,200.3	45.24
16	Aug	1945	999.6	20	1949	2,063.3	47.62
27	Sep	1946	1,917.8	21	1944	2,036.7	50.00
21	Oct	1947	3,145.1	22	1951	1,982.2	52.38
23	Mar	1949	2,241.1	23	1946	1,917.8	54.76
13	Aug	1949	2,063.3	24	1938	1,791.1	57.14
16	May	1951	119.4	25	1943	1,705.6	59.52
06	Sep	1951	1,982.2	26	1935	1,626.7	61.90
02	Apr	1953	1,300.3	27	1942	1,626.0	64.29
31	Jul	1953	2,200.3	28	1956	1,450.0	66.67
12	Aug	1954	2,810.0	29	1933	1,377.1	69.05
19	Jan	1956	2,258.8	30	1962	1,362.2	71.43
02	Sep	1956	1,450.0	31	1952	1,300.3	73.81
05	Oct	1957	1,113.8	32	1964	1,245.0	76.19
18	Mar	1959	2,617.8	33	1957	1,113.8	78.57
19	Apr	1960	1.8	34	1932	1,029.7	80.95
17	Apr	1961	36.2	35	1945	999.6	83.33
14	Apr	1962	2,247.8	36	1939	394.0	85.71
08	Apr	1963	1,362.2	37	1965	343.4	88.10
18	Jan	1964	6,824.4	38	1950	119.4	90.48
27	Mar	1965	1,245.0	39	1960	36.2	92.86
12	Sep	1965	343.4	40	1959	1.8*	95.24
02	Jul	1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary

frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,350.5	4,350.5	0.2	7,052.7	2,893.1
4,350.4	4,350.5	0.5	7,052.5	2,893.0
4,350.0	4,350.2	1.0	7,051.8	2,892.8
4,348.1	4,348.8	2.0	7,048.4	2,891.6
4,340.7	4,342.7	4.0	7,034.9	2,886.9
4,335.1	4,338.3	5.0	7,024.6	2,883.3
4,286.6	4,291.7	10.0	6,936.5	2,852.7
4,087.4	4,096.2	20.0	6,576.4	2,726.5
2,736.9	2,736.9	50.0	4,223.2	1,849.5
783.0	743.9	80.0	1,160.7	503.4
252.6	222.3	90.0	401.4	139.7
75.1	59.6	95.0	136.3	33.3
3.8	1.9	99.0	10.3	0.9

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.184	Historic Events	0
Standard Dev	0.652	High Outliers	0
Station Skew	-2.871	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.871	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,350.5	---	0.2	---	---
4,350.4	---	0.5	---	---
4,349.9	---	1.0	---	---
4,348.0	---	2.0	---	---
4,340.1	---	4.0	---	---
4,333.4	---	5.0	---	---
4,280.0	---	10.0	---	---
4,068.1	---	20.0	---	---
2,653.0	---	50.0	---	---
647.7	---	80.0	---	---
158.0	---	90.0	---	---
23.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

```
 Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
                          Computed low outlier test value = 27.31

            1 low outlier(s) identified below test value of 27.31

Based on statistics after 0 zero events and 1 missing events were deleted.

     Statistics and frequency curve adjusted for 1 low outlier(s)
```

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.274	Historic Events	1
Standard Dev	0.457	High Outliers	0
Station Skew	-1.808	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.871	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

```
 Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
                     Computed high outlier test value = 31,168.33

    1 high outlier(s) identified above input threshold of 7,001.1

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and           *
   *        comparison with similar data should be explored,   *
   *        if not incorporated in this analysis.              *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                         and 1 historic event(s)
```

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.259	Historic Events	1
Standard Dev	0.450	High Outliers	1
Station Skew	-1.820	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-2.871	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Events Analyzed				Ordered Events			
			FLOW		Analysis	FLOW	Weibull
Day	Mon	Year	cfs	Rank	Year	cfs	Plot Pos
26	Feb	1927	2,923.3	1	1928	7,001.1*	1.16
20	Sep	1927	4,467.8	2	1928	7,001.1	2.33
01	Jan	1928	7,001.1	3	1931	6,898.9	4.11
09	Apr	1929	7,001.1	4	1963	6,824.4	6.53
04	Aug	1929	6,031.1	5	1929	6,031.1	8.94
16	Aug	1930	3,071.4	6	1937	5,292.2	11.35
16	Feb	1932	6,898.9	7	1940	4,868.9	13.76
31	Aug	1932	1,029.7	8	1927	4,467.8	16.18
18	Sep	1933	1,377.1	9	1936	4,218.9	18.59
12	Apr	1935	2,211.1	10	1947	3,145.1	21.00
20	Apr	1936	1,626.7	11	1930	3,071.4	23.42
17	Feb	1937	4,218.9	12	1941	3,070.8	25.83
10	Mar	1938	5,292.2	13	1926	2,923.3	28.24
10	Apr	1939	1,791.1	14	1954	2,810.0	30.65
09	Mar	1940	394.0	15	1958	2,617.8	33.07
23	Mar	1941	4,868.9	16	1955	2,258.8	35.48
07	Oct	1941	3,070.8	17	1961	2,247.8	37.89
15	Mar	1943	1,626.0	18	1948	2,241.1	40.31
11	Apr	1944	1,705.6	19	1934	2,211.1	42.72
28	Apr	1945	2,036.7	20	1953	2,200.3	45.13
16	Aug	1945	999.6	21	1949	2,063.3	47.54
27	Sep	1946	1,917.8	22	1944	2,036.7	49.96
21	Oct	1947	3,145.1	23	1951	1,982.2	52.37
23	Mar	1949	2,241.1	24	1946	1,917.8	54.78
13	Aug	1949	2,063.3	25	1938	1,791.1	57.19
16	May	1951	119.4	26	1943	1,705.6	59.61
06	Sep	1951	1,982.2	27	1935	1,626.7	62.02
02	Apr	1953	1,300.3	28	1942	1,626.0	64.43
31	Jul	1953	2,200.3	29	1956	1,450.0	66.85
12	Aug	1954	2,810.0	30	1933	1,377.1	69.26
19	Jan	1956	2,258.8	31	1962	1,362.2	71.67
02	Sep	1956	1,450.0	32	1952	1,300.3	74.08
05	Oct	1957	1,113.8	33	1964	1,245.0	76.50
18	Mar	1959	2,617.8	34	1957	1,113.8	78.91
19	Apr	1960	1.8	35	1932	1,029.7	81.32
17	Apr	1961	36.2	36	1945	999.6	83.74
14	Apr	1962	2,247.8	37	1939	394.0	86.15
08	Apr	1963	1,362.2	38	1965	343.4	88.56
18	Jan	1964	6,824.4	39	1950	119.4	90.97
27	Mar	1965	1,245.0	40	1960	36.2	93.39
12	Sep	1965	343.4	41	1959	1.8*	95.80
02	Jul	1966	---	42	1966	---	98.21

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.075

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew =	0.335
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,025.9	13,840.4	0.2	22,934.8	8,549.0
11,781.7	12,430.4	0.5	20,361.8	7,822.4
10,694.7	11,231.8	1.0	18,159.9	7,178.3

9,471.1	9,880.3	2.0	15,736.6	6,441.6
8,103.4	8,396.0	4.0	13,104.1	5,601.3
7,631.8	7,893.0	5.0	12,216.8	5,306.8
6,070.6	6,215.0	10.0	9,362.9	4,311.6
4,372.8	4,436.5	20.0	6,427.7	3,184.8
1,966.7	1,966.7	50.0	2,671.2	1,465.8
689.5	669.9	80.0	940.9	475.3
358.2	336.8	90.0	515.0	223.8
196.8	177.4	95.0	302.0	110.5
55.2	42.5	99.0	99.9	24.0

<< Synthetic Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (9-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.218	Historic Events	1
Standard Dev	0.496	High Outliers	1
Station Skew	-1.856	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.932	Missing Events	1
Adopted Skew	-0.932	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 10-day Maximum values

Note: Data is missing for all or part of 9 years in analysis period.

Warning: 1 events occur in first 15 days of analysis year for 10-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
27 Feb 1927	2,803.0	1	1963	6,537.0*	2.38
21 Sep 1927	4,212.0	2	1928	6,430.0*	4.76
09 Apr 1929	6,430.0	3	1931	6,367.0	7.14
05 Aug 1929	5,784.0	4	1929	5,784.0	9.52
16 Aug 1930	2,816.3	5	1937	4,840.0	11.90
17 Feb 1932	6,367.0	6	1940	4,602.0	14.29
31 Aug 1932	1,025.3	7	1936	4,301.0	16.67
19 Sep 1933	1,248.1	8	1927	4,212.0	19.05
12 Apr 1935	2,154.0	9	1947	2,838.6	21.43
21 Apr 1936	1,549.0	10	1930	2,816.3	23.81
18 Feb 1937	4,301.0	11	1941	2,812.7	26.19
11 Mar 1938	4,840.0	12	1926	2,803.0	28.57
09 Apr 1939	1,677.0	13	1954	2,677.0	30.95
09 Mar 1940	370.1	14	1958	2,474.0	33.33
24 Mar 1941	4,602.0	15	1948	2,181.0	35.71
08 Oct 1941	2,812.7	16	1961	2,161.0	38.10
16 Mar 1943	1,562.8	17	1934	2,154.0	40.48
12 Apr 1944	1,631.1	18	1955	2,065.0	42.86

29 Apr 1945	1,989.0	19	1953	1,990.7	45.24
16 Aug 1945	963.2	20	1944	1,989.0	47.62
28 Sep 1946	1,739.0	21	1949	1,887.2	50.00
22 Oct 1947	2,838.6	22	1951	1,794.6	52.38
24 Mar 1949	2,181.0	23	1946	1,739.0	54.76
14 Aug 1949	1,887.2	24	1938	1,677.0	57.14
17 May 1951	108.3	25	1943	1,631.1	59.52
07 Sep 1951	1,794.6	26	1942	1,562.8	61.90
03 Apr 1953	1,229.2	27	1935	1,549.0	64.29
01 Aug 1953	1,990.7	28	1956	1,366.6	66.67
13 Aug 1954	2,677.0	29	1962	1,351.0	69.05
20 Jan 1956	2,065.0	30	1933	1,248.1	71.43
03 Sep 1956	1,366.6	31	1952	1,229.2	73.81
06 Oct 1957	1,016.4	32	1964	1,180.1	76.19
19 Mar 1959	2,474.0	33	1932	1,025.3	78.57
11 Jun 1959	0.1	34	1957	1,016.4	80.95
17 Apr 1961	32.6	35	1945	963.2	83.33
14 Apr 1962	2,161.0	36	1939	370.1	85.71
09 Apr 1963	1,351.0	37	1965	310.8	88.10
21 Jan 1964	6,537.0	38	1950	108.3	90.48
27 Mar 1965	1,180.1	39	1960	32.6	92.86
13 Sep 1965	310.8	40	1959	0.1*	95.24
02 Jul 1966	---	41	1966	---	97.62

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,545.2	3,545.2	0.2	6,215.4	2,168.9
3,545.2	3,545.2	0.5	6,215.4	2,168.9
3,545.2	3,545.2	1.0	6,215.4	2,168.9
3,545.2	3,545.2	2.0	6,215.2	2,168.8
3,545.1	3,545.1	4.0	6,215.1	2,168.8
3,545.1	3,545.1	5.0	6,215.0	2,168.8
3,543.2	3,543.4	10.0	6,211.5	2,167.7
3,520.4	3,521.4	20.0	6,167.3	2,154.2
2,889.1	2,889.1	50.0	4,964.1	1,777.1
823.7	771.8	80.0	1,335.3	490.7
194.9	163.3	90.0	336.9	98.2
36.3	26.1	95.0	74.8	13.6
0.4	0.2	99.0	1.7	0.1

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.127	Historic Events	0
Standard Dev	0.807	High Outliers	0
Station Skew	-3.813	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-3.813	Systematic Events	41

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,545.2	---	0.2	---	---
3,545.2	---	0.5	---	---
3,545.2	---	1.0	---	---
3,545.2	---	2.0	---	---
3,545.1	---	4.0	---	---
3,545.0	---	5.0	---	---
3,542.5	---	10.0	---	---
3,515.7	---	20.0	---	---
2,820.8	---	50.0	---	---
646.9	---	80.0	---	---
101.8	---	90.0	---	---
6.6	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 40 events, 10 percent outlier test deviate K(N) = 2.682
Computed low outlier test value = 9.18

1 low outlier(s) identified below test value of 9.18

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.247	Historic Events	1
Standard Dev	0.460	High Outliers	0
Station Skew	-1.844	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-3.813	Systematic Events	41
		Historic Period	85

<< High Outlier Test >>

Based on 39 events, 10 percent outlier test deviate K(N) = 2.671
Computed high outlier test value = 29,814.15

2 high outlier(s) identified above input threshold of 6,430

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 2 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.224	Historic Events	1
Standard Dev	0.451	High Outliers	2
Station Skew	-1.879	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-3.813	Systematic Events	41
		Historic Period	85

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
27 Feb 1927	2,803.0	1	1963	6,537.0*	1.16
21 Sep 1927	4,212.0	2	1928	6,430.0*	2.33
01 Jan 1928	6,430.0	3	1928	6,430.0	3.49
09 Apr 1929	6,430.0	4	1931	6,367.0	5.29
05 Aug 1929	5,784.0	5	1929	5,784.0	7.74
16 Aug 1930	2,816.3	6	1937	4,840.0	10.18
17 Feb 1932	6,367.0	7	1940	4,602.0	12.63
31 Aug 1932	1,025.3	8	1936	4,301.0	15.07
19 Sep 1933	1,248.1	9	1927	4,212.0	17.52
12 Apr 1935	2,154.0	10	1947	2,838.6	19.96
21 Apr 1936	1,549.0	11	1930	2,816.3	22.41
18 Feb 1937	4,301.0	12	1941	2,812.7	24.85
11 Mar 1938	4,840.0	13	1926	2,803.0	27.30
09 Apr 1939	1,677.0	14	1954	2,677.0	29.74
09 Mar 1940	370.1	15	1958	2,474.0	32.19
24 Mar 1941	4,602.0	16	1948	2,181.0	34.63
08 Oct 1941	2,812.7	17	1961	2,161.0	37.08
16 Mar 1943	1,562.8	18	1934	2,154.0	39.52
12 Apr 1944	1,631.1	19	1955	2,065.0	41.96
29 Apr 1945	1,989.0	20	1953	1,990.7	44.41
16 Aug 1945	963.2	21	1944	1,989.0	46.85
28 Sep 1946	1,739.0	22	1949	1,887.2	49.30
22 Oct 1947	2,838.6	23	1951	1,794.6	51.74
24 Mar 1949	2,181.0	24	1946	1,739.0	54.19
14 Aug 1949	1,887.2	25	1938	1,677.0	56.63
17 May 1951	108.3	26	1943	1,631.1	59.08
07 Sep 1951	1,794.6	27	1942	1,562.8	61.52
03 Apr 1953	1,229.2	28	1935	1,549.0	63.97
01 Aug 1953	1,990.7	29	1956	1,366.6	66.41
13 Aug 1954	2,677.0	30	1962	1,351.0	68.86
20 Jan 1956	2,065.0	31	1933	1,248.1	71.30
03 Sep 1956	1,366.6	32	1952	1,229.2	73.75
06 Oct 1957	1,016.4	33	1964	1,180.1	76.19
19 Mar 1959	2,474.0	34	1932	1,025.3	78.64
11 Jun 1959	0.1	35	1957	1,016.4	81.08
17 Apr 1961	32.6	36	1945	963.2	83.53
14 Apr 1962	2,161.0	37	1939	370.1	85.97
09 Apr 1963	1,351.0	38	1965	310.8	88.42
21 Jan 1964	6,537.0	39	1950	108.3	90.86
27 Mar 1965	1,180.1	40	1960	32.6	93.31

13 Sep 1965	310.8	41	1959	0.1*	95.75
02 Jul 1966	---	42	1966	---	98.20

Note: Plotting positions based on historic period (H) = 85
Number of historic events plus high outliers (Z) = 3
Weighting factor for systematic events (W) = 2.1026

* Outlier

<< Skew Weighting >>

Based on 85 events, mean-square error of station skew =	0.347
Mean-square error of regional skew =	0.302

<< Frequency Curve >>

LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,883.0	12,611.7	0.2	20,866.6	7,812.9
10,765.9	11,348.6	0.5	18,562.8	7,159.2
9,786.4	10,270.5	1.0	16,583.2	6,577.8
8,680.0	9,050.2	2.0	14,396.7	5,910.7
7,439.0	7,704.8	4.0	12,012.3	5,147.2
7,010.1	7,247.7	5.0	11,206.6	4,879.1
5,586.7	5,718.5	10.0	8,607.9	3,970.8
4,032.6	4,091.0	20.0	5,923.6	2,938.6
1,819.2	1,819.2	50.0	2,469.8	1,356.6
638.7	620.5	80.0	871.0	440.6
331.7	311.9	90.0	476.7	207.5
182.1	164.2	95.0	279.4	102.3
51.0	39.3	99.0	92.3	22.2

<< Synthetic Statistics >>

LCR at Grand Falls 09401000-LCR at Grand Falls-FLOW (10-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.183	Historic Events	1
Standard Dev	0.495	High Outliers	2
Station Skew	-1.904	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.940	Missing Events	1
Adopted Skew	-0.940	Systematic Events	41
		Historic Period	85

Note: No ordinates specified for graphical frequency curve

Volume-Duration Analysis
16 Sep 2011 05:02 PM

--- Input Data ---

Analysis Name: Chevelon near Winslow 09397500
Description:

Data Set Name: Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR Winslow\Analysis\Volume_Frequency_Analysi/Chevelon at Winslow/FLOW//1DAY/09397500/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency_Analysis\VolumeFrequencyAnalysisResults\Chevelon_near__Winslow_09397500\Chevelon_near__Winslow_09397500.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency_Analysis\VolumeFrequencyAnalysisResults\Chevelon_near__Winslow_09397500\Chevelon_near__Winslow_09397500.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 30 Apr 1947
Record End Date: 09 Aug 1985

User-Specified Durations
Duration: 1 day
Duration: 2 days
Duration: 3 days
Duration: 4 days
Duration: 5 days
Duration: 6 days
Duration: 7 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 4.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0
Frequency: 80.0
Frequency: 90.0
Frequency: 95.0
Frequency: 99.0

Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1923
Historic Period End Year: 1985

  1-day Historic Events
  Year: 1956   Value: 6,860

  2-day Historic Events
  Year: 1956   Value: 5,260

  3-day Historic Events
  Year: 1956   Value: 4,150

  4-day Historic Events
  Year: 1956   Value: 3,438

  5-day Historic Events
  Year: 1956   Value: 2,865

  6-day Historic Events
  Year: 1956   Value: 2,444

  7-day Historic Events
  Year: 1956   Value: 2,143

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

==
Statistical Analysis of 1-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Apr 1948	635.0	1	1956	6,860.0*	2.50
20 Mar 1949	993.0	2	1951	6,390.0	5.00
28 Feb 1950	568.0	3	1983	5,650.0	7.50
04 May 1951	386.0	4	1964	5,560.0	10.00
18 Jan 1952	6,390.0	5	1953	5,240.0	12.50
11 Mar 1953	567.0	6	1966	4,830.0	15.00
23 Mar 1954	5,240.0	7	1970	4,480.0	17.50
14 Mar 1955	152.0	8	1965	4,280.0	20.00
23 Aug 1955	417.0	9	1968	4,090.0	22.50

09 Jan 1957	6,860.0	10	1980	3,270.0	25.00
23 Mar 1958	1,320.0	11	1958	1,810.0	27.50
28 Sep 1958	1,810.0	12	1961	1,330.0	30.00
25 Dec 1959	1,130.0	13	1957	1,320.0	32.50
04 Apr 1961	382.0	14	1967	1,140.0	35.00
13 Feb 1962	1,330.0	15	1959	1,130.0	37.50
24 Mar 1963	189.0	16	1948	993.0	40.00
12 Apr 1964	729.0	17	1973	838.0	42.50
07 Jan 1965	5,560.0	18	1963	729.0	45.00
30 Dec 1965	4,280.0	19	1978	663.0	47.50
07 Dec 1966	4,830.0	20	1972	650.0	50.00
02 Apr 1968	1,140.0	21	1947	635.0	52.50
26 Jan 1969	4,090.0	22	1949	568.0	55.00
17 Mar 1970	288.0	23	1952	567.0	57.50
06 Sep 1970	4,480.0	24	1984	540.0	60.00
31 May 1972	---	25	1982	515.0	62.50
17 Mar 1973	650.0	26	1976	483.0	65.00
12 Apr 1974	838.0	27	1955	417.0	67.50
15 Apr 1975	389.0	28	1979	391.0	70.00
25 Sep 1975	150.0	29	1974	389.0	72.50
06 Nov 1976	483.0	30	1950	386.0	75.00
31 May 1978	---	31	1960	382.0	77.50
17 Mar 1979	663.0	32	1969	288.0	80.00
11 Mar 1980	391.0	33	1962	189.0	82.50
30 Dec 1980	3,270.0	34	1954	152.0	85.00
31 May 1982	---	35	1975	150.0	87.50
24 Mar 1983	515.0	36	1985	---	90.00
08 Dec 1983	5,650.0	37	1981	---	92.50
26 Feb 1985	540.0	38	1977	---	95.00
09 Aug 1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
41,642.9	60,561.9	0.2	111,832.6	21,066.0
26,900.1	35,466.7	0.5	65,313.7	14,515.9
18,902.9	23,351.0	1.0	42,372.5	10,730.4
12,959.2	15,136.2	2.0	26,722.4	7,750.7
8,600.7	9,573.5	4.0	16,249.6	5,426.5
7,471.4	8,201.0	5.0	13,712.3	4,796.6
4,651.7	4,926.1	10.0	7,782.7	3,149.7
2,671.7	2,749.5	20.0	4,071.2	1,897.0
979.8	979.8	50.0	1,355.8	705.0
387.0	377.9	80.0	546.1	252.8
245.0	234.5	90.0	359.5	148.3
170.5	159.2	95.0	260.0	96.3
89.4	78.1	99.0	147.8	44.1

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.014	Historic Events	0
Standard Dev	0.500	High Outliers	0
Station Skew	0.273	Low Outliers	0
Regional Skew	-0.100	Zero Events	0

Weighted Skew	---	Missing Events	4
Adopted Skew	0.273	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
39,628.2	---	0.2	---	---
25,505.5	---	0.5	---	---
17,862.4	---	1.0	---	---
12,186.4	---	2.0	---	---
8,039.3	---	4.0	---	---
6,972.0	---	5.0	---	---
4,298.8	---	10.0	---	---
2,426.1	---	20.0	---	---
831.9	---	50.0	---	---
257.4	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 50.05

0 low outlier(s) identified below test value of 50.05

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 21,296.46

1 high outlier(s) identified above input threshold of 6,860

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis.

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.020	Historic Events	1
Standard Dev	0.500	High Outliers	1
Station Skew	0.258	Low Outliers	0
Regional Skew	-0.100	Zero Events	0

Weighted Skew	---	Missing Events	4
Adopted Skew	0.273	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05	Apr	1948	635.0	1	1956	6,860.0*	1.56
20	Mar	1949	993.0	2	1956	6,860.0	3.12
28	Feb	1950	568.0	3	1951	6,390.0	5.16
04	May	1951	386.0	4	1983	5,650.0	7.67
18	Jan	1952	6,390.0	5	1964	5,560.0	10.18
11	Mar	1953	567.0	6	1953	5,240.0	12.69
23	Mar	1954	5,240.0	7	1966	4,830.0	15.19
14	Mar	1955	152.0	8	1970	4,480.0	17.70
23	Aug	1955	417.0	9	1965	4,280.0	20.21
01	Jan	1956	6,860.0	10	1968	4,090.0	22.72
09	Jan	1957	6,860.0	11	1980	3,270.0	25.23
23	Mar	1958	1,320.0	12	1958	1,810.0	27.73
28	Sep	1958	1,810.0	13	1961	1,330.0	30.24
25	Dec	1959	1,130.0	14	1957	1,320.0	32.75
04	Apr	1961	382.0	15	1967	1,140.0	35.26
13	Feb	1962	1,330.0	16	1959	1,130.0	37.77
24	Mar	1963	189.0	17	1948	993.0	40.28
12	Apr	1964	729.0	18	1973	838.0	42.78
07	Jan	1965	5,560.0	19	1963	729.0	45.29
30	Dec	1965	4,280.0	20	1978	663.0	47.80
07	Dec	1966	4,830.0	21	1972	650.0	50.31
02	Apr	1968	1,140.0	22	1947	635.0	52.82
26	Jan	1969	4,090.0	23	1949	568.0	55.32
17	Mar	1970	288.0	24	1952	567.0	57.83
06	Sep	1970	4,480.0	25	1984	540.0	60.34
31	May	1972	---	26	1982	515.0	62.85
17	Mar	1973	650.0	27	1976	483.0	65.36
12	Apr	1974	838.0	28	1955	417.0	67.87
15	Apr	1975	389.0	29	1979	391.0	70.37
25	Sep	1975	150.0	30	1974	389.0	72.88
06	Nov	1976	483.0	31	1950	386.0	75.39
31	May	1978	---	32	1960	382.0	77.90
17	Mar	1979	663.0	33	1969	288.0	80.41
11	Mar	1980	391.0	34	1962	189.0	82.92
30	Dec	1980	3,270.0	35	1954	152.0	85.42
31	May	1982	---	36	1975	150.0	87.93
24	Mar	1983	515.0	37	1985	---	90.44
08	Dec	1983	5,650.0	38	1981	---	92.95
26	Feb	1985	540.0	39	1977	---	95.46
09	Aug	1985	---	40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.094
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
35,584.2	48,499.1	0.2	90,291.4	18,428.7
23,582.0	29,731.0	0.5	54,810.1	12,934.1
16,854.2	20,163.5	1.0	36,514.4	9,674.2
11,719.9	13,391.1	2.0	23,574.8	7,053.7
7,860.9	8,630.6	4.0	14,616.1	4,969.7
6,845.3	7,428.8	5.0	12,396.9	4,398.0
4,276.0	4,499.3	10.0	7,113.5	2,888.6
2,440.7	2,505.0	20.0	3,719.7	1,726.8
858.2	858.2	50.0	1,189.9	617.8
312.6	305.2	80.0	442.3	204.7
187.0	178.7	90.0	276.0	113.0
123.2	114.8	95.0	189.9	69.1
57.3	49.5	99.0	97.0	27.7

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.944	Historic Events	1
Standard Dev	0.531	High Outliers	1
Station Skew	0.193	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.123	Missing Events	4
Adopted Skew	0.123	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
35,662.5	48,612.8	0.2	90,541.4	18,461.7
23,629.2	29,793.9	0.5	54,948.7	12,955.1
16,885.1	20,202.3	1.0	36,599.3	9,688.5
11,739.1	13,414.0	2.0	23,624.3	7,062.9
7,872.1	8,643.3	4.0	14,643.0	4,975.2
6,854.6	7,439.2	5.0	12,418.5	4,402.6
4,280.6	4,504.2	10.0	7,123.7	2,890.9
2,442.5	2,506.9	20.0	3,723.6	1,727.6
858.2	858.2	50.0	1,190.2	617.7
312.4	305.0	80.0	442.1	204.5
186.8	178.5	90.0	275.7	112.9
123.0	114.6	95.0	189.7	69.0
57.2	49.4	99.0	96.8	27.6

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 2-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Events Analyzed				Ordered Events			
			FLOW		Analysis	FLOW	Weibull
Day	Mon	Year	cfs	Rank	Year	cfs	Plot Pos
05	Apr	1948	613.0	1	1956	5,260.0*	2.50
20	Mar	1949	919.0	2	1951	5,115.0	5.00
01	Mar	1950	456.0	3	1964	3,995.0	7.50
05	May	1951	315.0	4	1965	3,540.0	10.00
19	Jan	1952	5,115.0	5	1968	3,445.0	12.50
12	Mar	1953	520.0	6	1983	3,281.0	15.00
24	Mar	1954	3,145.0	7	1953	3,145.0	17.50
14	Mar	1955	150.0	8	1980	2,940.0	20.00
23	Aug	1955	403.0	9	1966	2,915.0	22.50
10	Jan	1957	5,260.0	10	1970	2,615.0	25.00
23	Mar	1958	1,250.0	11	1957	1,250.0	27.50
29	Sep	1958	1,161.5	12	1961	1,165.0	30.00
26	Dec	1959	1,013.5	13	1958	1,161.5	32.50
04	Apr	1961	365.0	14	1959	1,013.5	35.00
14	Feb	1962	1,165.0	15	1967	941.0	37.50
25	Mar	1963	168.0	16	1948	919.0	40.00
12	Apr	1964	704.5	17	1973	797.5	42.50
08	Jan	1965	3,995.0	18	1963	704.5	45.00
31	Dec	1965	3,540.0	19	1947	613.0	47.50
08	Dec	1966	2,915.0	20	1972	588.0	50.00
02	Apr	1968	941.0	21	1978	531.0	52.50
27	Jan	1969	3,445.0	22	1984	520.0	55.00
18	Mar	1970	279.5	23	1952	520.0	57.50
07	Sep	1970	2,615.0	24	1949	456.0	60.00
31	May	1972	---	25	1982	431.5	62.50
17	Mar	1973	588.0	26	1955	403.0	65.00
26	Mar	1974	797.5	27	1979	390.5	67.50
15	Apr	1975	354.0	28	1976	386.5	70.00
05	Apr	1976	130.5	29	1960	365.0	72.50
06	Nov	1976	386.5	30	1974	354.0	75.00
31	May	1978	---	31	1950	315.0	77.50
18	Mar	1979	531.0	32	1969	279.5	80.00
12	Mar	1980	390.5	33	1962	168.0	82.50
30	Dec	1980	2,940.0	34	1954	150.0	85.00
31	May	1982	---	35	1975	130.5	87.50
24	Mar	1983	431.5	36	1985	---	90.00
09	Dec	1983	3,281.0	37	1981	---	92.50
26	Feb	1985	520.0	38	1977	---	95.00
09	Aug	1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
22,998.7	31,704.9	0.2	55,467.0	12,517.1
15,780.7	20,026.8	0.5	34,903.5	9,077.4
11,623.7	13,959.7	1.0	23,996.2	6,984.3
8,366.2	9,577.9	2.0	16,064.4	5,259.3
5,841.2	6,416.9	4.0	10,391.6	3,847.0
5,160.6	5,601.6	5.0	8,950.1	3,450.8
3,393.7	3,570.2	10.0	5,424.5	2,378.2
2,068.9	2,122.7	20.0	3,042.4	1,512.6
834.0	834.0	50.0	1,122.6	617.8
353.1	345.3	80.0	483.6	239.4
229.7	220.3	90.0	326.3	144.9
162.6	152.3	95.0	239.8	96.0
87.1	76.3	99.0	139.0	45.1

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.936	Historic Events	0
Standard Dev	0.457	High Outliers	0
Station Skew	0.198	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.198	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
22,036.4	---	0.2	---	---
15,069.2	---	0.5	---	---
11,064.3	---	1.0	---	---
7,928.2	---	2.0	---	---
5,504.3	---	4.0	---	---
4,854.2	---	5.0	---	---
3,163.0	---	10.0	---	---
1,896.9	---	20.0	---	---
717.7	---	50.0	---	---
240.6	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628

Computed low outlier test value = 54.36

0 low outlier(s) identified below test value of 54.36

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 13,712.9

1 high outlier(s) identified above input threshold of 5,260

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.942	Historic Events	1
Standard Dev	0.458	High Outliers	1
Station Skew	0.189	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.198	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Events Analyzed Day	Mon	Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05	Apr	1948	613.0	1	1956	5,260.0*	1.56
20	Mar	1949	919.0	2	1956	5,260.0	3.12
01	Mar	1950	456.0	3	1951	5,115.0	5.16
05	May	1951	315.0	4	1964	3,995.0	7.67
19	Jan	1952	5,115.0	5	1965	3,540.0	10.18
12	Mar	1953	520.0	6	1968	3,445.0	12.69
24	Mar	1954	3,145.0	7	1983	3,281.0	15.19
14	Mar	1955	150.0	8	1953	3,145.0	17.70
23	Aug	1955	403.0	9	1980	2,940.0	20.21
01	Jan	1956	5,260.0	10	1966	2,915.0	22.72
10	Jan	1957	5,260.0	11	1970	2,615.0	25.23
23	Mar	1958	1,250.0	12	1957	1,250.0	27.73
29	Sep	1958	1,161.5	13	1961	1,165.0	30.24
26	Dec	1959	1,013.5	14	1958	1,161.5	32.75
04	Apr	1961	365.0	15	1959	1,013.5	35.26
14	Feb	1962	1,165.0	16	1967	941.0	37.77

25 Mar 1963	168.0	17	1948	919.0	40.28
12 Apr 1964	704.5	18	1973	797.5	42.78
08 Jan 1965	3,995.0	19	1963	704.5	45.29
31 Dec 1965	3,540.0	20	1947	613.0	47.80
08 Dec 1966	2,915.0	21	1972	588.0	50.31
02 Apr 1968	941.0	22	1978	531.0	52.82
27 Jan 1969	3,445.0	23	1984	520.0	55.32
18 Mar 1970	279.5	24	1952	520.0	57.83
07 Sep 1970	2,615.0	25	1949	456.0	60.34
31 May 1972	---	26	1982	431.5	62.85
17 Mar 1973	588.0	27	1955	403.0	65.36
26 Mar 1974	797.5	28	1979	390.5	67.87
15 Apr 1975	354.0	29	1976	386.5	70.37
05 Apr 1976	130.5	30	1960	365.0	72.88
06 Nov 1976	386.5	31	1974	354.0	75.39
31 May 1978	---	32	1950	315.0	77.90
18 Mar 1979	531.0	33	1969	279.5	80.41
12 Mar 1980	390.5	34	1962	168.0	82.92
30 Dec 1980	2,940.0	35	1954	150.0	85.42
31 May 1982	---	36	1975	130.5	87.93
24 Mar 1983	431.5	37	1985	---	90.44
09 Dec 1983	3,281.0	38	1981	---	92.95
26 Feb 1985	520.0	39	1977	---	95.46
09 Aug 1985	---	40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew =	0.09
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
20,678.0	27,114.8	0.2	47,829.9	11,424.5
14,404.9	17,657.6	0.5	30,854.3	8,368.3
10,710.8	12,546.1	1.0	21,566.4	6,475.8
7,763.9	8,736.8	2.0	14,641.3	4,894.4
5,442.6	5,914.5	4.0	9,572.0	3,583.8
4,810.7	5,174.9	5.0	8,264.6	3,213.3
3,156.6	3,303.8	10.0	5,026.8	2,205.0
1,904.6	1,949.8	20.0	2,802.9	1,387.0
735.6	735.6	50.0	992.6	544.6
289.7	283.3	80.0	398.0	196.6
179.4	171.9	90.0	256.4	113.0
121.2	113.4	95.0	180.5	71.2
58.7	51.0	99.0	95.5	29.9

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events		
Mean	2.873	Historic Events		1
Standard Dev	0.486	High Outliers	1	
Station Skew	0.126	Low Outliers	0	
Regional Skew	-0.100	Zero Events	0	

Weighted Skew	0.074	Missing Events	4
Adopted Skew	0.074	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
30,228.4	41,205.4	0.2	76,745.2	15,648.6
20,028.7	25,254.0	0.5	46,575.9	10,981.0
14,312.2	17,124.0	1.0	31,022.5	8,212.2
9,950.4	11,370.0	2.0	20,024.6	5,986.7
6,672.6	7,326.3	4.0	12,411.7	4,217.1
5,810.1	6,305.6	5.0	10,526.2	3,731.8
3,628.4	3,817.9	10.0	6,038.2	2,450.4
2,070.3	2,124.9	20.0	3,156.2	1,464.4
727.4	727.4	50.0	1,008.8	523.5
264.8	258.5	80.0	374.7	173.3
158.3	151.3	90.0	233.7	95.7
104.3	97.1	95.0	160.8	58.5
48.5	41.9	99.0	82.1	23.4

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 3-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Apr 1948	583.7	1	1956	4,150.0*	2.50
20 Mar 1949	874.7	2	1951	3,681.3	5.00
01 Mar 1950	405.3	3	1964	2,935.7	7.50
06 May 1951	253.3	4	1968	2,796.7	10.00
20 Jan 1952	3,681.3	5	1965	2,526.7	12.50
13 Mar 1953	467.3	6	1983	2,317.0	15.00
25 Mar 1954	2,180.0	7	1980	2,200.0	17.50
15 Mar 1955	148.3	8	1953	2,180.0	20.00
24 Aug 1955	378.7	9	1966	2,143.7	22.50
11 Jan 1957	4,150.0	10	1970	1,921.3	25.00
24 Mar 1958	1,080.3	11	1957	1,080.3	27.50
30 Sep 1958	859.0	12	1961	1,013.0	30.00

23 Mar 1960	824.3	13	1967	904.7	32.50
04 Apr 1961	346.0	14	1948	874.7	35.00
15 Feb 1962	1,013.0	15	1958	859.0	37.50
25 Mar 1963	157.3	16	1959	824.3	40.00
13 Apr 1964	676.3	17	1973	779.0	42.50
08 Jan 1965	2,935.7	18	1963	676.3	45.00
01 Jan 1966	2,526.7	19	1947	583.7	47.50
08 Dec 1966	2,143.7	20	1972	557.0	50.00
02 Apr 1968	904.7	21	1978	527.3	52.50
28 Jan 1969	2,796.7	22	1984	503.7	55.00
18 Mar 1970	267.3	23	1952	467.3	57.50
07 Sep 1970	1,921.3	24	1949	405.3	60.00
31 May 1972	---	25	1979	387.0	62.50
18 Mar 1973	557.0	26	1955	378.7	65.00
27 Mar 1974	779.0	27	1982	374.0	67.50
16 Apr 1975	338.7	28	1976	350.0	70.00
05 Apr 1976	118.7	29	1960	346.0	72.50
07 Nov 1976	350.0	30	1974	338.7	75.00
31 May 1978	---	31	1969	267.3	77.50
17 Mar 1979	527.3	32	1950	253.3	80.00
13 Mar 1980	387.0	33	1962	157.3	82.50
31 Dec 1980	2,200.0	34	1954	148.3	85.00
31 May 1982	---	35	1975	118.7	87.50
25 Mar 1983	374.0	36	1985	---	90.00
10 Dec 1983	2,317.0	37	1981	---	92.50
27 Feb 1985	503.7	38	1977	---	95.00
09 Aug 1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,241.8	17,306.1	0.2	28,784.2	7,733.1
9,648.0	11,787.8	0.5	19,508.3	5,900.2
7,446.4	8,696.1	1.0	14,206.9	4,723.7
5,623.7	6,312.1	2.0	10,089.8	3,706.4
4,127.7	4,476.1	4.0	6,937.2	2,830.7
3,707.8	3,980.7	5.0	6,096.2	2,576.1
2,572.3	2,688.6	10.0	3,940.0	1,861.2
1,661.5	1,699.6	20.0	2,364.3	1,248.0
732.6	732.6	50.0	961.4	557.5
330.3	323.4	80.0	440.0	231.8
219.7	211.1	90.0	303.1	144.0
157.6	147.9	95.0	225.5	96.9
85.5	74.9	99.0	132.2	46.2

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.872	Historic Events	0
Standard Dev	0.417	High Outliers	0
Station Skew	0.099	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.099	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,774.5	---	0.2	---	---
9,278.2	---	0.5	---	---
7,139.3	---	1.0	---	---
5,370.1	---	2.0	---	---
3,920.7	---	4.0	---	---
3,515.0	---	5.0	---	---
2,417.3	---	10.0	---	---
1,537.5	---	20.0	---	---
638.4	---	50.0	---	---
229.6	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 59.67

0 low outlier(s) identified below test value of 59.67

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 9,281.16

1 high outlier(s) identified above input threshold of 4,150

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.877	Historic Events	1
Standard Dev	0.418	High Outliers	1
Station Skew	0.097	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.099	Systematic Events	39
		Historic Period	63

|-----------------------------|------------------------------|

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Events Analyzed			Ordered Events			
Day Mon Year	FLOW cfs		Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Apr 1948	583.7		1	1956	4,150.0*	1.56
20 Mar 1949	874.7		2	1956	4,150.0	3.12
01 Mar 1950	405.3		3	1951	3,681.3	5.16
06 May 1951	253.3		4	1964	2,935.7	7.67
20 Jan 1952	3,681.3		5	1968	2,796.7	10.18
13 Mar 1953	467.3		6	1965	2,526.7	12.69
25 Mar 1954	2,180.0		7	1983	2,317.0	15.19
15 Mar 1955	148.3		8	1980	2,200.0	17.70
24 Aug 1955	378.7		9	1953	2,180.0	20.21
01 Jan 1956	4,150.0		10	1966	2,143.7	22.72
11 Jan 1957	4,150.0		11	1970	1,921.3	25.23
24 Mar 1958	1,080.3		12	1957	1,080.3	27.73
30 Sep 1958	859.0		13	1961	1,013.0	30.24
23 Mar 1960	824.3		14	1967	904.7	32.75
04 Apr 1961	346.0		15	1948	874.7	35.26
15 Feb 1962	1,013.0		16	1958	859.0	37.77
25 Mar 1963	157.3		17	1959	824.3	40.28
13 Apr 1964	676.3		18	1973	779.0	42.78
08 Jan 1965	2,935.7		19	1963	676.3	45.29
01 Jan 1966	2,526.7		20	1947	583.7	47.80
08 Dec 1966	2,143.7		21	1972	557.0	50.31
02 Apr 1968	904.7		22	1978	527.3	52.82
28 Jan 1969	2,796.7		23	1984	503.7	55.32
18 Mar 1970	267.3		24	1952	467.3	57.83
07 Sep 1970	1,921.3		25	1949	405.3	60.34
31 May 1972	---		26	1979	387.0	62.85
18 Mar 1973	557.0		27	1955	378.7	65.36
27 Mar 1974	779.0		28	1982	374.0	67.87
16 Apr 1975	338.7		29	1976	350.0	70.37
05 Apr 1976	118.7		30	1960	346.0	72.88
07 Nov 1976	350.0		31	1974	338.7	75.39
31 May 1978	---		32	1969	267.3	77.90
17 Mar 1979	527.3		33	1950	253.3	80.41
13 Mar 1980	387.0		34	1962	157.3	82.92
31 Dec 1980	2,200.0		35	1954	148.3	85.42
31 May 1982	---		36	1975	118.7	87.93
25 Mar 1983	374.0		37	1985	---	90.44
10 Dec 1983	2,317.0		38	1981	---	92.95
27 Feb 1985	503.7		39	1977	---	95.46
09 Aug 1985	---		40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew =	0.085
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,533.8	15,813.3	0.2	26,529.8	7,366.7
9,176.2	10,937.8	0.5	18,181.8	5,630.3
7,095.7	8,139.5	1.0	13,328.2	4,506.2
5,358.6	5,940.1	2.0	9,508.3	3,528.6
3,922.6	4,220.0	4.0	6,548.3	2,683.0
3,518.0	3,751.9	5.0	5,753.0	2,436.6
2,421.4	2,521.2	10.0	3,702.9	1,744.6
1,541.0	1,573.6	20.0	2,196.1	1,152.3
650.0	650.0	50.0	855.5	493.8
274.6	269.0	80.0	367.3	192.7
175.2	168.3	90.0	243.1	114.6
120.9	113.4	95.0	174.5	74.0
60.3	52.7	99.0	94.9	32.2

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.813	Historic Events	1
Standard Dev	0.445	High Outliers	1
Station Skew	0.037	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.007	Missing Events	4
Adopted Skew	0.007	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
26,376.1	35,954.2	0.2	66,964.7	13,654.4
17,476.2	22,035.7	0.5	40,640.2	9,581.6
12,488.3	14,941.7	1.0	27,069.0	7,165.7
8,682.3	9,921.0	2.0	17,472.6	5,223.7
5,822.3	6,392.6	4.0	10,830.0	3,679.7
5,069.7	5,502.0	5.0	9,184.8	3,256.2
3,166.0	3,331.4	10.0	5,268.7	2,138.1
1,806.5	1,854.1	20.0	2,754.0	1,277.8
634.7	634.7	50.0	880.3	456.8
231.0	225.6	80.0	327.0	151.2
138.2	132.1	90.0	203.9	83.5
91.0	84.7	95.0	140.3	51.0
42.3	36.5	99.0	71.6	20.4

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

|-----------------------------|-----------------------------|

Note: No ordinates specified for graphical frequency curve

==
Statistical Analysis of 4-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Apr 1948	563.2	1	1956	3,437.5*	2.50
20 Mar 1949	859.2	2	1951	2,871.5	5.00
02 Mar 1950	372.8	3	1968	2,347.5	7.50
06 May 1951	214.5	4	1964	2,326.8	10.00
21 Jan 1952	2,871.5	5	1965	1,945.0	12.50
13 Mar 1953	437.2	6	1983	1,800.5	15.00
26 Mar 1954	1,679.0	7	1980	1,735.8	17.50
15 Mar 1955	147.0	8	1966	1,732.8	20.00
25 Aug 1955	349.5	9	1953	1,679.0	22.50
11 Jan 1957	3,437.5	10	1970	1,516.0	25.00
25 Mar 1958	916.8	11	1957	916.8	27.50
30 Sep 1958	684.8	12	1961	906.0	30.00
14 Mar 1960	780.2	13	1967	898.0	32.50
05 Apr 1961	328.2	14	1948	859.2	35.00
16 Feb 1962	906.0	15	1959	780.2	37.50
26 Mar 1963	146.5	16	1973	756.5	40.00
13 Apr 1964	632.0	17	1958	684.8	42.50
09 Jan 1965	2,326.8	18	1963	632.0	45.00
02 Jan 1966	1,945.0	19	1947	563.2	47.50
09 Dec 1966	1,732.8	20	1972	539.2	50.00
02 Apr 1968	898.0	21	1978	510.2	52.50
29 Jan 1969	2,347.5	22	1984	473.5	55.00
19 Mar 1970	252.8	23	1952	437.2	57.50
08 Sep 1970	1,516.0	24	1979	376.5	60.00
31 May 1972	---	25	1949	372.8	62.50
18 Mar 1973	539.2	26	1955	349.5	65.00
27 Mar 1974	756.5	27	1960	328.2	67.50
17 Apr 1975	304.0	28	1982	318.5	70.00
05 Apr 1976	108.5	29	1974	304.0	72.50
07 Nov 1976	299.8	30	1976	299.8	75.00
31 May 1978	---	31	1969	252.8	77.50
17 Mar 1979	510.2	32	1950	214.5	80.00
13 Mar 1980	376.5	33	1954	147.0	82.50
01 Jan 1981	1,735.8	34	1962	146.5	85.00
31 May 1982	---	35	1975	108.5	87.50
26 Mar 1983	318.5	36	1985	---	90.00
11 Dec 1983	1,800.5	37	1981	---	92.50
28 Feb 1985	473.5	38	1977	---	95.00
09 Aug 1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>

Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,900.2	11,195.3	0.2	18,039.1	5,448.7
6,768.7	8,048.6	0.5	12,891.7	4,310.7
5,400.2	6,182.5	1.0	9,780.3	3,549.7
4,219.3	4,670.1	2.0	7,242.1	2,867.3
3,207.2	3,446.5	4.0	5,196.6	2,256.9
2,914.3	3,105.1	5.0	4,631.0	2,074.6
2,097.9	2,183.0	10.0	3,128.8	1,548.5
1,409.2	1,438.6	20.0	1,965.5	1,076.1
658.4	658.4	50.0	850.9	509.5
307.8	301.5	80.0	403.1	220.7
206.9	198.8	90.0	280.3	138.7
149.0	139.9	95.0	209.3	93.8
80.5	70.4	99.0	122.5	44.5

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.819	Historic Events	0
Standard Dev	0.393	High Outliers	0
Station Skew	0.002	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.002	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,628.0	---	0.2	---	---
6,541.9	---	0.5	---	---
5,204.0	---	1.0	---	---
4,050.7	---	2.0	---	---
3,063.3	---	4.0	---	---
2,777.8	---	5.0	---	---
1,982.5	---	10.0	---	---
1,312.0	---	20.0	---	---
578.2	---	50.0	---	---
215.9	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 61.24

0 low outlier(s) identified below test value of 61.24

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 7,083.36

1 high outlier(s) identified above input threshold of 3,437.5

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.824	Historic Events	1
Standard Dev	0.394	High Outliers	1
Station Skew	0.007	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	0.002	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Events Analyzed: Day Mon Year	FLOW cfs	Ordered Events: Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Apr 1948	563.2	1	1956	3,437.5*	1.56
20 Mar 1949	859.2	2	1956	3,437.5	3.12
02 Mar 1950	372.8	3	1951	2,871.5	5.16
06 May 1951	214.5	4	1968	2,347.5	7.67
21 Jan 1952	2,871.5	5	1964	2,326.8	10.18
13 Mar 1953	437.2	6	1965	1,945.0	12.69
26 Mar 1954	1,679.0	7	1983	1,800.5	15.19
15 Mar 1955	147.0	8	1980	1,735.8	17.70
25 Aug 1955	349.5	9	1966	1,732.8	20.21
01 Jan 1956	3,437.5	10	1953	1,679.0	22.72
11 Jan 1957	3,437.5	11	1970	1,516.0	25.23
25 Mar 1958	916.8	12	1957	916.8	27.73
30 Sep 1958	684.8	13	1961	906.0	30.24
14 Mar 1960	780.2	14	1967	898.0	32.75
05 Apr 1961	328.2	15	1948	859.2	35.26
16 Feb 1962	906.0	16	1959	780.2	37.77
26 Mar 1963	146.5	17	1973	756.5	40.28
13 Apr 1964	632.0	18	1958	684.8	42.78
09 Jan 1965	2,326.8	19	1963	632.0	45.29

02 Jan 1966	1,945.0	20	1947	563.2	47.80
09 Dec 1966	1,732.8	21	1972	539.2	50.31
02 Apr 1968	898.0	22	1978	510.2	52.82
29 Jan 1969	2,347.5	23	1984	473.5	55.32
19 Mar 1970	252.8	24	1952	437.2	57.83
08 Sep 1970	1,516.0	25	1979	376.5	60.34
31 May 1972	---	26	1949	372.8	62.85
18 Mar 1973	539.2	27	1955	349.5	65.36
27 Mar 1974	756.5	28	1960	328.2	67.87
17 Apr 1975	304.0	29	1982	318.5	70.37
05 Apr 1976	108.5	30	1974	304.0	72.88
07 Nov 1976	299.8	31	1976	299.8	75.39
31 May 1978	---	32	1969	252.8	77.90
17 Mar 1979	510.2	33	1950	214.5	80.41
13 Mar 1980	376.5	34	1954	147.0	82.92
01 Jan 1981	1,735.8	35	1962	146.5	85.42
31 May 1982	---	36	1975	108.5	87.93
26 Mar 1983	318.5	37	1985	---	90.44
11 Dec 1983	1,800.5	38	1981	---	92.95
28 Feb 1985	473.5	39	1977	---	95.46
09 Aug 1985	---	40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.086
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,741.0	10,726.7	0.2	17,442.3	5,351.7
6,630.4	7,747.1	0.5	12,482.0	4,216.1
5,271.4	5,957.9	1.0	9,464.1	3,455.7
4,097.2	4,494.1	2.0	6,991.2	2,774.0
3,091.0	3,302.2	4.0	4,992.5	2,165.3
2,800.1	2,968.6	5.0	4,439.2	1,983.8
1,991.1	2,065.9	10.0	2,970.0	1,462.1
1,313.1	1,338.7	20.0	1,835.5	997.8
585.9	585.9	50.0	759.7	452.1
257.8	252.6	80.0	339.1	184.6
166.9	160.5	90.0	227.5	111.6
116.2	109.1	95.0	164.6	72.8
58.5	51.1	99.0	90.3	32.0

<< Adjusted Statistics >>

Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.764	Historic Events	1
Standard Dev	0.420	High Outliers	1
Station Skew	-0.051	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.061	Missing Events	4
Adopted Skew	-0.061	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
23,511.2	32,048.9	0.2	59,691.1	12,171.3
15,578.0	19,642.2	0.5	36,226.0	8,540.9
11,131.8	13,318.7	1.0	24,128.8	6,387.3
7,739.2	8,843.4	2.0	15,574.8	4,656.4
5,189.9	5,698.3	4.0	9,653.6	3,280.0
4,519.0	4,904.4	5.0	8,187.1	2,902.5
2,822.1	2,969.5	10.0	4,696.4	1,905.9
1,610.3	1,652.7	20.0	2,454.8	1,139.0
565.8	565.8	50.0	784.7	407.2
205.9	201.1	80.0	291.4	134.8
123.1	117.7	90.0	181.8	74.4
81.1	75.5	95.0	125.1	45.5
37.7	32.6	99.0	63.8	18.2

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Apr 1948	542.0	1	1956	2,865.2	2.50
20 Mar 1949	828.8	2	1951	2,349.8	5.00
03 Mar 1950	357.4	3	1968	1,978.0	7.50
07 May 1951	187.4	4	1964	1,921.4	10.00
22 Jan 1952	2,349.8	5	1965	1,586.0	12.50
14 Mar 1953	404.8	6	1983	1,476.0	15.00
27 Mar 1954	1,377.6	7	1966	1,436.2	17.50
15 Mar 1955	145.8	8	1980	1,433.2	20.00
26 Aug 1955	312.6	9	1953	1,377.6	22.50
12 Jan 1957	2,865.2	10	1970	1,232.8	25.00
26 Mar 1958	809.8	11	1967	886.8	27.50
29 Sep 1958	647.8	12	1961	854.0	30.00
25 Mar 1960	782.2	13	1948	828.8	32.50
05 Apr 1961	302.2	14	1957	809.8	35.00
10 Apr 1962	854.0	15	1959	782.2	37.50

27 Mar 1963	134.6	16	1973	724.2	40.00
14 Apr 1964	603.8	17	1958	647.8	42.50
10 Jan 1965	1,921.4	18	1963	603.8	45.00
03 Jan 1966	1,586.0	19	1947	542.0	47.50
10 Dec 1966	1,436.2	20	1972	527.2	50.00
02 Apr 1968	886.8	21	1978	488.0	52.50
30 Jan 1969	1,978.0	22	1984	443.8	55.00
20 Mar 1970	226.8	23	1952	404.8	57.50
09 Sep 1970	1,232.8	24	1979	367.2	60.00
31 May 1972	---	25	1949	357.4	62.50
18 Mar 1973	527.2	26	1955	312.6	65.00
27 Mar 1974	724.2	27	1960	302.2	67.50
18 Apr 1975	271.0	28	1976	279.4	70.00
05 Apr 1976	103.4	29	1982	274.8	72.50
25 Mar 1977	279.4	30	1974	271.0	75.00
31 May 1978	---	31	1969	226.8	77.50
18 Mar 1979	488.0	32	1950	187.4	80.00
14 Mar 1980	367.2	33	1954	145.8	82.50
02 Jan 1981	1,433.2	34	1962	134.6	85.00
31 May 1982	---	35	1975	103.4	87.50
27 Mar 1983	274.8	36	1985	---	90.00
12 Dec 1983	1,476.0	37	1981	---	92.50
01 Mar 1985	443.8	38	1977	---	95.00
09 Aug 1985	---	39	1971	---	97.50

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,400.7	7,786.8	0.2	12,250.8	4,071.6
5,052.6	5,868.1	0.5	9,168.3	3,324.4
4,148.6	4,668.5	1.0	7,206.6	2,805.0
3,337.7	3,650.1	2.0	5,531.9	2,323.1
2,614.2	2,787.6	4.0	4,117.4	1,876.3
2,398.9	2,539.3	5.0	3,713.3	1,739.5
1,781.5	1,846.7	10.0	2,604.4	1,334.4
1,236.0	1,259.6	20.0	1,699.3	955.1
604.4	604.4	50.0	772.6	473.4
289.3	283.5	80.0	374.2	210.7
195.2	187.6	90.0	261.1	133.0
140.4	131.7	95.0	194.8	89.8
74.9	65.1	99.0	112.7	41.8

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.775	Historic Events	0
Standard Dev	0.375	High Outliers	0
Station Skew	-0.104	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.104	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,231.2	---	0.2	---	---
4,904.5	---	0.5	---	---
4,015.5	---	1.0	---	---
3,219.1	---	2.0	---	---
2,508.6	---	4.0	---	---
2,296.9	---	5.0	---	---
1,691.2	---	10.0	---	---
1,156.4	---	20.0	---	---
533.7	---	50.0	---	---
203.7	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 61.63

0 low outlier(s) identified below test value of 61.63

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 5,752.31

0 high outlier(s) identified above input threshold of 2,865.2

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.787	Historic Events	1
Standard Dev	0.380	High Outliers	0
Station Skew	-0.086	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.104	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06	Apr	1948	542.0	1	1956	2,865.2	1.56
20	Mar	1949	828.8	2	1956	2,865.2	3.59
03	Mar	1950	357.4	3	1951	2,349.8	6.07
07	May	1951	187.4	4	1968	1,978.0	8.55
22	Jan	1952	2,349.8	5	1964	1,921.4	11.04
14	Mar	1953	404.8	6	1965	1,586.0	13.52
27	Mar	1954	1,377.6	7	1983	1,476.0	16.01
15	Mar	1955	145.8	8	1966	1,436.2	18.49
26	Aug	1955	312.6	9	1980	1,433.2	20.97
01	Jan	1956	2,865.2	10	1953	1,377.6	23.46
12	Jan	1957	2,865.2	11	1970	1,232.8	25.94
26	Mar	1958	809.8	12	1967	886.8	28.43
29	Sep	1958	647.8	13	1961	854.0	30.91
25	Mar	1960	782.2	14	1948	828.8	33.39
05	Apr	1961	302.2	15	1957	809.8	35.88
10	Apr	1962	854.0	16	1959	782.2	38.36
27	Mar	1963	134.6	17	1973	724.2	40.85
14	Apr	1964	603.8	18	1958	647.8	43.33
10	Jan	1965	1,921.4	19	1963	603.8	45.81
03	Jan	1966	1,586.0	20	1947	542.0	48.30
10	Dec	1966	1,436.2	21	1972	527.2	50.78
02	Apr	1968	886.8	22	1978	488.0	53.27
30	Jan	1969	1,978.0	23	1984	443.8	55.75
20	Mar	1970	226.8	24	1952	404.8	58.23
09	Sep	1970	1,232.8	25	1979	367.2	60.72
31	May	1972	---	26	1949	357.4	63.20
18	Mar	1973	527.2	27	1955	312.6	65.69
27	Mar	1974	724.2	28	1960	302.2	68.17
18	Apr	1975	271.0	29	1976	279.4	70.65
05	Apr	1976	103.4	30	1982	274.8	73.14
25	Mar	1977	279.4	31	1974	271.0	75.62
31	May	1978	---	32	1969	226.8	78.10
18	Mar	1979	488.0	33	1950	187.4	80.59
14	Mar	1980	367.2	34	1954	145.8	83.07
02	Jan	1981	1,433.2	35	1962	134.6	85.56
31	May	1982	---	36	1975	103.4	88.04
27	Mar	1983	274.8	37	1985	---	90.52
12	Dec	1983	1,476.0	38	1981	---	93.01
01	Mar	1985	443.8	39	1977	---	95.49
09	Aug	1985	---	40	1971	---	97.98

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 1.5897

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.091
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,848.9	8,232.3	0.2	13,149.9	4,305.4
5,333.2	6,140.0	0.5	9,716.4	3,468.5

4,326.9	4,837.8	1.0	7,551.3	2,892.8
3,433.6	3,737.7	2.0	5,720.4	2,364.0
2,646.2	2,813.1	4.0	4,191.4	1,879.7
2,414.0	2,548.7	5.0	3,758.4	1,732.8
1,755.4	1,816.9	10.0	2,582.1	1,302.6
1,185.1	1,206.9	20.0	1,639.7	908.2
546.8	546.8	50.0	703.6	425.6
245.1	240.3	80.0	319.6	177.5
159.3	153.2	90.0	215.2	107.8
110.9	104.1	95.0	155.7	70.3
55.4	48.2	99.0	84.8	30.6

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.729	Historic Events	1
Standard Dev	0.407	High Outliers	0
Station Skew	-0.140	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.131	Missing Events	4
Adopted Skew	-0.131	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,715.1	29,600.6	0.2	55,131.1	11,241.5
14,387.9	18,141.6	0.5	33,458.5	7,888.4
10,281.4	12,301.3	1.0	22,285.5	5,899.4
7,148.0	8,167.9	2.0	14,385.0	4,300.6
4,793.4	5,263.0	4.0	8,916.2	3,029.4
4,173.8	4,529.7	5.0	7,561.7	2,680.8
2,606.5	2,742.7	10.0	4,337.6	1,760.3
1,487.3	1,526.5	20.0	2,267.3	1,052.0
522.6	522.6	50.0	724.7	376.1
190.2	185.7	80.0	269.2	124.5
113.7	108.7	90.0	167.9	68.7
74.9	69.8	95.0	115.5	42.0
34.8	30.1	99.0	59.0	16.8

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 6-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Events Analyzed			FLOW	Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07	Apr	1948	524.7	1	1956	2,444.5*	2.50
14	Apr	1949	778.8	2	1951	1,992.2	5.00
04	Mar	1950	336.3	3	1968	1,698.3	7.50
08	May	1951	164.3	4	1964	1,634.5	10.00
23	Jan	1952	1,992.2	5	1965	1,341.7	12.50
15	Mar	1953	377.3	6	1983	1,252.5	15.00
28	Mar	1954	1,179.8	7	1966	1,221.8	17.50
16	Mar	1955	144.3	8	1980	1,221.2	20.00
25	Aug	1955	302.5	9	1953	1,179.8	22.50
13	Jan	1957	2,444.5	10	1970	1,034.8	25.00
27	Mar	1958	736.8	11	1967	863.3	27.50
30	Sep	1958	582.2	12	1961	841.8	30.00
26	Mar	1960	765.3	13	1948	778.8	32.50
06	Apr	1961	284.5	14	1959	765.3	35.00
11	Apr	1962	841.8	15	1957	736.8	37.50
28	Mar	1963	124.2	16	1973	682.7	40.00
15	Apr	1964	581.2	17	1958	582.2	42.50
11	Jan	1965	1,634.5	18	1963	581.2	45.00
04	Jan	1966	1,341.7	19	1947	524.7	47.50
11	Dec	1966	1,221.8	20	1972	512.5	50.00
02	Apr	1968	863.3	21	1978	467.2	52.50
31	Jan	1969	1,698.3	22	1984	428.2	55.00
20	Mar	1970	207.2	23	1952	377.3	57.50
10	Sep	1970	1,034.8	24	1979	351.5	60.00
31	May	1972	---	25	1949	336.3	62.50
19	Mar	1973	512.5	26	1955	302.5	65.00
27	Mar	1974	682.7	27	1960	284.5	67.50
19	Apr	1975	245.5	28	1976	267.7	70.00
05	Apr	1976	105.2	29	1982	259.8	72.50
25	Mar	1977	267.7	30	1974	245.5	75.00
31	May	1978	---	31	1969	207.2	77.50
18	Mar	1979	467.2	32	1950	164.3	80.00
15	Mar	1980	351.5	33	1954	144.3	82.50
03	Jan	1981	1,221.2	34	1962	124.2	85.00
31	May	1982	---	35	1975	105.2	87.50
15	Mar	1983	259.8	36	1985	---	90.00
13	Dec	1983	1,252.5	37	1981	---	92.50
02	Mar	1985	428.2	38	1977	---	95.00
09	Aug	1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,926.7	5,854.0	0.2	9,014.1	3,230.5
3,994.1	4,561.1	0.5	6,971.7	2,697.9
3,348.3	3,721.3	1.0	5,622.1	2,317.0
2,752.3	2,983.4	2.0	4,430.8	1,954.6
2,204.4	2,337.0	4.0	3,388.9	1,609.4

2,037.9	2,146.6	5.0	3,083.9	1,501.7
1,550.0	1,602.1	10.0	2,225.9	1,176.5
1,103.4	1,123.0	20.0	1,496.7	862.1
561.0	561.0	50.0	709.9	444.3
275.4	270.0	80.0	352.2	203.5
187.2	180.0	90.0	247.5	129.6
135.1	126.8	95.0	185.2	87.8
72.0	62.4	99.0	107.2	40.8

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.738	Historic Events	0
Standard Dev	0.359	High Outliers	0
Station Skew	-0.180	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.180	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,810.8	---	0.2	---	---
3,889.2	---	0.5	---	---
3,251.3	---	1.0	---	---
2,663.6	---	2.0	---	---
2,122.9	---	4.0	---	---
1,958.0	---	5.0	---	---
1,476.8	---	10.0	---	---
1,036.5	---	20.0	---	---
498.0	---	50.0	---	---
195.2	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 62.5

0 low outlier(s) identified below test value of 62.5

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 4,792.9

1 high outlier(s) identified above input threshold of 2,444.5

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.743	Historic Events	1
Standard Dev	0.360	High Outliers	1
Station Skew	-0.167	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.180	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07 Apr 1948	524.7	1	1956	2,444.5*	1.56
14 Apr 1949	778.8	2	1956	2,444.5	3.12
04 Mar 1950	336.3	3	1951	1,992.2	5.16
08 May 1951	164.3	4	1968	1,698.3	7.67
23 Jan 1952	1,992.2	5	1964	1,634.5	10.18
15 Mar 1953	377.3	6	1965	1,341.7	12.69
28 Mar 1954	1,179.8	7	1983	1,252.5	15.19
16 Mar 1955	144.3	8	1966	1,221.8	17.70
25 Aug 1955	302.5	9	1980	1,221.2	20.21
01 Jan 1956	2,444.5	10	1953	1,179.8	22.72
13 Jan 1957	2,444.5	11	1970	1,034.8	25.23
27 Mar 1958	736.8	12	1967	863.3	27.73
30 Sep 1958	582.2	13	1961	841.8	30.24
26 Mar 1960	765.3	14	1948	778.8	32.75
06 Apr 1961	284.5	15	1959	765.3	35.26
11 Apr 1962	841.8	16	1957	736.8	37.77
28 Mar 1963	124.2	17	1973	682.7	40.28
15 Apr 1964	581.2	18	1958	582.2	42.78
11 Jan 1965	1,634.5	19	1963	581.2	45.29
04 Jan 1966	1,341.7	20	1947	524.7	47.80
11 Dec 1966	1,221.8	21	1972	512.5	50.31
02 Apr 1968	863.3	22	1978	467.2	52.82
31 Jan 1969	1,698.3	23	1984	428.2	55.32
20 Mar 1970	207.2	24	1952	377.3	57.83
10 Sep 1970	1,034.8	25	1979	351.5	60.34
31 May 1972	---	26	1949	336.3	62.85
19 Mar 1973	512.5	27	1955	302.5	65.36
27 Mar 1974	682.7	28	1960	284.5	67.87
19 Apr 1975	245.5	29	1976	267.7	70.37
05 Apr 1976	105.2	30	1982	259.8	72.88

25 Mar 1977	267.7	31	1974	245.5	75.39
31 May 1978	---	32	1969	207.2	77.90
18 Mar 1979	467.2	33	1950	164.3	80.41
15 Mar 1980	351.5	34	1954	144.3	82.92
03 Jan 1981	1,221.2	35	1962	124.2	85.42
31 May 1982	---	36	1975	105.2	87.93
15 Mar 1983	259.8	37	1985	---	90.44
13 Dec 1983	1,252.5	38	1981	---	92.95
02 Mar 1985	428.2	39	1977	---	95.46
09 Aug 1985	---	40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.096
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,113.6	6,018.5	0.2	9,365.9	3,321.5
4,091.4	4,639.0	0.5	7,152.8	2,738.7
3,391.3	3,748.6	1.0	5,705.4	2,326.5
2,752.1	2,971.3	2.0	4,440.6	1,938.4
2,171.5	2,295.9	4.0	3,347.3	1,573.3
1,996.8	2,098.3	5.0	3,030.1	1,460.4
1,490.1	1,538.0	10.0	2,146.7	1,123.5
1,035.3	1,052.9	20.0	1,409.3	804.2
500.5	500.5	50.0	636.0	394.7
232.4	228.0	80.0	298.9	171.1
153.1	147.4	90.0	203.8	105.6
107.6	101.1	95.0	148.7	69.6
54.3	47.3	99.0	81.8	30.7

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.687	Historic Events	1
Standard Dev	0.386	High Outliers	1
Station Skew	-0.221	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.192	Missing Events	4
Adopted Skew	-0.192	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
19,717.2	26,877.3	0.2	50,059.0	10,207.2

13,064.2	16,472.6	0.5	30,380.3	7,162.7
9,335.5	11,169.5	1.0	20,235.2	5,356.6
6,490.4	7,416.4	2.0	13,061.5	3,905.0
4,352.4	4,778.8	4.0	8,095.9	2,750.7
3,789.8	4,113.0	5.0	6,866.0	2,434.1
2,366.7	2,490.3	10.0	3,938.6	1,598.3
1,350.4	1,386.0	20.0	2,058.7	955.2
474.5	474.5	50.0	658.0	341.5
172.7	168.6	80.0	244.4	113.1
103.3	98.7	90.0	152.4	62.4
68.0	63.3	95.0	104.9	38.2
31.6	27.3	99.0	53.5	15.3

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

===
Statistical Analysis of 7-day Maximum values
===

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Apr 1948	516.7	1	1956	2,143.1*	2.50
15 Apr 1949	782.1	2	1951	1,734.0	5.00
05 Mar 1950	317.0	3	1968	1,497.6	7.50
09 May 1951	145.7	4	1964	1,422.4	10.00
21 Jan 1952	1,734.0	5	1965	1,164.3	12.50
16 Mar 1953	359.0	6	1980	1,096.4	15.00
29 Mar 1954	1,044.4	7	1983	1,088.4	17.50
17 Mar 1955	139.9	8	1966	1,061.6	20.00
26 Aug 1955	282.9	9	1953	1,044.4	22.50
14 Jan 1957	2,143.1	10	1970	890.9	25.00
28 Mar 1958	688.4	11	1967	826.4	27.50
01 Oct 1958	517.0	12	1961	822.3	30.00
15 Mar 1960	743.7	13	1948	782.1	32.50
07 Apr 1961	264.3	14	1959	743.7	35.00
11 Apr 1962	822.3	15	1957	688.4	37.50
29 Mar 1963	114.9	16	1973	648.0	40.00
16 Apr 1964	559.9	17	1963	559.9	42.50
12 Jan 1965	1,422.4	18	1958	517.0	45.00
05 Jan 1966	1,164.3	19	1947	516.7	47.50
12 Dec 1966	1,061.6	20	1972	505.1	50.00
02 Apr 1968	826.4	21	1978	441.1	52.50
29 Jan 1969	1,497.6	22	1984	430.3	55.00
21 Mar 1970	190.0	23	1952	359.0	57.50
11 Sep 1970	890.9	24	1979	336.7	60.00
31 May 1972	---	25	1949	317.0	62.50
20 Mar 1973	505.1	26	1955	282.9	65.00

28 Mar 1974	648.0	27	1960	264.3	67.50
19 Apr 1975	226.7	28	1976	255.0	70.00
05 Apr 1976	106.9	29	1982	251.1	72.50
25 Mar 1977	255.0	30	1974	226.7	75.00
31 May 1978	---	31	1969	190.0	77.50
18 Mar 1979	441.1	32	1950	145.7	80.00
16 Mar 1980	336.7	33	1954	139.9	82.50
04 Jan 1981	1,096.4	34	1962	114.9	85.00
31 May 1982	---	35	1975	106.9	87.50
16 Mar 1983	251.1	36	1985	---	90.00
14 Dec 1983	1,088.4	37	1981	---	92.50
03 Mar 1985	430.3	38	1977	---	95.00
09 Aug 1985	---	39	1971	---	97.50

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,000.2	4,664.3	0.2	7,075.0	2,683.1
3,312.7	3,732.5	0.5	5,617.7	2,281.5
2,823.4	3,107.0	1.0	4,623.5	1,987.2
2,360.7	2,541.0	2.0	3,720.6	1,700.9
1,924.2	2,030.7	4.0	2,907.4	1,421.8
1,789.2	1,877.4	5.0	2,664.3	1,333.4
1,386.3	1,429.7	10.0	1,966.4	1,061.9
1,006.3	1,023.2	20.0	1,352.8	792.0
526.3	526.3	50.0	661.5	419.9
262.5	257.4	80.0	333.1	195.9
179.0	172.1	90.0	234.7	125.2
129.1	121.1	95.0	175.7	84.8
68.3	59.1	99.0	101.0	39.1

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.707	Historic Events	0
Standard Dev	0.348	High Outliers	0
Station Skew	-0.252	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.252	Systematic Events	39

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,915.5	---	0.2	---	---
3,233.7	---	0.5	---	---
2,748.6	---	1.0	---	---

2,290.6	---	2.0	---	---
1,858.2	---	4.0	---	---
1,723.7	---	5.0	---	---
1,324.5	---	10.0	---	---
948.2	---	20.0	---	---
468.9	---	50.0	---	---
186.5	---	80.0	---	---
---	---	90.0	---	---
---	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed low outlier test value = 62.08

0 low outlier(s) identified below test value of 62.08

Based on statistics after 0 zero events and 4 missing events were deleted.

<< High Outlier Test >>

Based on 35 events, 10 percent outlier test deviate K(N) = 2.628
Computed high outlier test value = 4,172.94

1 high outlier(s) identified above input threshold of 2,143.1

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis.

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.711	Historic Events	1
Standard Dev	0.349	High Outliers	1
Station Skew	-0.236	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	4
Adopted Skew	-0.252	Systematic Events	39
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06	Apr	1948	516.7	1	1956	2,143.1*	1.56
15	Apr	1949	782.1	2	1956	2,143.1	3.12
05	Mar	1950	317.0	3	1951	1,734.0	5.16
09	May	1951	145.7	4	1968	1,497.6	7.67
21	Jan	1952	1,734.0	5	1964	1,422.4	10.18
16	Mar	1953	359.0	6	1965	1,164.3	12.69
29	Mar	1954	1,044.4	7	1980	1,096.4	15.19
17	Mar	1955	139.9	8	1983	1,088.4	17.70
26	Aug	1955	282.9	9	1966	1,061.6	20.21
01	Jan	1956	2,143.1	10	1953	1,044.4	22.72
14	Jan	1957	2,143.1	11	1970	890.9	25.23
28	Mar	1958	688.4	12	1967	826.4	27.73
01	Oct	1958	517.0	13	1961	822.3	30.24
15	Mar	1960	743.7	14	1948	782.1	32.75
07	Apr	1961	264.3	15	1959	743.7	35.26
11	Apr	1962	822.3	16	1957	688.4	37.77
29	Mar	1963	114.9	17	1973	648.0	40.28
16	Apr	1964	559.9	18	1963	559.9	42.78
12	Jan	1965	1,422.4	19	1958	517.0	45.29
05	Jan	1966	1,164.3	20	1947	516.7	47.80
12	Dec	1966	1,061.6	21	1972	505.1	50.31
02	Apr	1968	826.4	22	1978	441.1	52.82
29	Jan	1969	1,497.6	23	1984	430.3	55.32
21	Mar	1970	190.0	24	1952	359.0	57.83
11	Sep	1970	890.9	25	1979	336.7	60.34
31	May	1972	---	26	1949	317.0	62.85
20	Mar	1973	505.1	27	1955	282.9	65.36
28	Mar	1974	648.0	28	1960	264.3	67.87
19	Apr	1975	226.7	29	1976	255.0	70.37
05	Apr	1976	106.9	30	1982	251.1	72.88
25	Mar	1977	255.0	31	1974	226.7	75.39
31	May	1978	---	32	1969	190.0	77.90
18	Mar	1979	441.1	33	1950	145.7	80.41
16	Mar	1980	336.7	34	1954	139.9	82.92
04	Jan	1981	1,096.4	35	1962	114.9	85.42
31	May	1982	---	36	1975	106.9	87.93
16	Mar	1983	251.1	37	1985	---	90.44
14	Dec	1983	1,088.4	38	1981	---	92.95
03	Mar	1985	430.3	39	1977	---	95.46
09	Aug	1985	---	40	1971	---	97.96

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.6053

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew =	0.101
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,238.4	4,920.7	0.2	7,550.0	2,806.2
3,451.0	3,874.5	0.5	5,890.3	2,348.7
2,900.0	3,182.1	1.0	4,777.2	2,018.8
2,387.0	2,563.7	2.0	3,782.7	1,702.7
1,911.6	2,014.1	4.0	2,902.7	1,399.9

1,766.4	1,850.8	5.0	2,643.1	1,305.1
1,339.3	1,380.0	10.0	1,908.2	1,018.3
946.6	962.0	20.0	1,277.8	740.4
469.7	469.7	50.0	593.1	373.0
221.8	217.6	80.0	283.2	164.8
146.9	141.4	90.0	194.0	102.3
103.4	97.2	95.0	141.8	67.6
52.1	45.4	99.0	78.0	29.7

<< Adjusted Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.657	Historic Events	1
Standard Dev	0.375	High Outliers	1
Station Skew	-0.291	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.243	Missing Events	4
Adopted Skew	-0.243	Systematic Events	39
		Historic Period	63

<< User Frequency Curve >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
18,384.4	25,060.4	0.2	46,675.0	9,517.2
12,181.1	15,359.0	0.5	28,326.6	6,678.5
8,704.4	10,414.5	1.0	18,867.3	4,994.5
6,051.6	6,915.0	2.0	12,178.6	3,641.0
4,058.2	4,455.7	4.0	7,548.6	2,564.8
3,533.6	3,835.0	5.0	6,401.9	2,269.6
2,206.7	2,322.0	10.0	3,672.3	1,490.3
1,259.1	1,292.3	20.0	1,919.5	890.6
442.4	442.4	50.0	613.6	318.4
161.0	157.2	80.0	227.9	105.4
96.3	92.0	90.0	142.1	58.2
63.4	59.1	95.0	97.8	35.6
29.5	25.5	99.0	49.9	14.2

<< User Statistics >>
Chevelon near Winslow 09397500-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.531		
User Skew	0.123		

Note: No ordinates specified for graphical frequency curve

```
--------------------------
Volume-Duration Analysis
  16 Sep 2011   05:08 PM
--------------------------


--- Input Data ---

Analysis Name: Chevelon near Winslow 09398000
Description:

Data Set Name: Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR
Winslow\Analysis\Volume_Frequency_Analysi/Chevelon at
Winslow/FLOW//1DAY/09398000/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Chevelon_near_Winslow_09398000\Che
velon_near_Winslow_09398000.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Chevelon_near_Winslow_09398000\Che
velon_near_Winslow_09398000.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 01 Jan 1924
Record End Date:   31 Dec 1974


User-Specified Durations
   Duration:   1 day
   Duration:   2 days
   Duration:   3 days
   Duration:   4 days
   Duration:   5 days
   Duration:   6 days
   Duration:   7 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
   Frequency: 0.2
   Frequency: 0.5
   Frequency: 1.0
   Frequency: 2.0
   Frequency: 4.0
   Frequency: 5.0
   Frequency: 10.0
   Frequency: 20.0
   Frequency: 50.0
   Frequency: 80.0
   Frequency: 90.0
   Frequency: 95.0
   Frequency: 99.0
```

Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1874
Historic Period End Year: 1977

  1-day Historic Events
  Year: 1951   Value: 10,200

  2-day Historic Events
  Year: 1951   Value: 6,190

  3-day Historic Events
  Year: 1951   Value: 4,433

  4-day Historic Events
  Year: 1951   Value: 3,483

  5-day Historic Events
  Year: 1951   Value: 2,878

  6-day Historic Events
  Year: 1951   Value: 2,446

  7-day Historic Events
  Year: 1951   Value: 2,128

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

==
Statistical Analysis of 1-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
04 Dec 1924	3,600.0	1	1951	10,200.0*	1.92
25 Apr 1926	1,060.0	2	1965	6,750.0	3.85
28 Feb 1927	948.0	3	1964	5,940.0	5.77
02 Apr 1928	1,020.0	4	1971	5,650.0	7.69
05 Apr 1929	3,670.0	5	1937	5,040.0	9.62
27 Mar 1930	417.0	6	1956	3,940.0	11.54
19 Mar 1931	456.0	7	1928	3,670.0	13.46
10 Feb 1932	2,280.0	8	1924	3,600.0	15.38
03 May 1933	432.0	9	1966	3,040.0	17.31

20 Sep 1933	126.0	10	1970	2,950.0	19.23	
31 May 1935	---	11	1953	2,840.0	21.15	
12 Apr 1936	950.0	12	1968	2,590.0	23.08	
16 Feb 1937	1,170.0	13	1931	2,280.0	25.00	
04 Mar 1938	5,040.0	14	1959	1,780.0	26.92	
05 Apr 1939	987.0	15	1957	1,420.0	28.85	
28 Feb 1940	375.0	16	1940	1,320.0	30.77	
15 Mar 1941	1,320.0	17	1936	1,170.0	32.69	
06 Apr 1942	876.0	18	1961	1,110.0	34.62	
07 Mar 1943	832.0	19	1967	1,100.0	36.54	
07 Apr 1944	916.0	20	1944	1,060.0	38.46	
20 Apr 1945	1,060.0	21	1925	1,060.0	40.38	
09 Apr 1946	230.0	22	1927	1,020.0	42.31	
25 Nov 1946	919.0	23	1938	987.0	44.23	
05 Apr 1948	616.0	24	1935	950.0	46.15	
20 Mar 1949	800.0	25	1926	948.0	48.08	
01 Mar 1950	478.0	26	1946	919.0	50.00	
05 May 1951	260.0	27	1943	916.0	51.92	
19 Jan 1952	10,200.0	28	1941	876.0	53.85	
12 Mar 1953	555.0	29	1942	832.0	55.77	
24 Mar 1954	2,840.0	30	1948	800.0	57.69	
17 Mar 1955	136.0	31	1958	758.0	59.62	
24 Aug 1955	605.0	32	1963	745.0	61.54	
09 Jan 1957	3,940.0	33	1947	616.0	63.46	
23 Mar 1958	1,420.0	34	1955	605.0	65.38	
29 Sep 1958	758.0	35	1952	555.0	67.31	
26 Dec 1959	1,780.0	36	1949	478.0	69.23	
05 Apr 1961	362.0	37	1930	456.0	71.15	
14 Feb 1962	1,110.0	38	1932	432.0	73.08	
08 Sep 1962	245.0	39	1974	420.0	75.00	
12 Apr 1964	745.0	40	1929	417.0	76.92	
08 Jan 1965	5,940.0	41	1939	375.0	78.85	
31 Dec 1965	6,750.0	42	1960	362.0	80.77	
08 Dec 1966	3,040.0	43	1950	260.0	82.69	
02 Apr 1968	1,100.0	44	1962	245.0	84.62	
27 Jan 1969	2,590.0	45	1945	230.0	86.54	
19 Mar 1970	197.0	46	1969	197.0	88.46	
06 Sep 1970	2,950.0	47	1954	136.0	90.38	
27 Dec 1971	5,650.0	48	1933	126.0	92.31	
18 Jul 1972	27.0	49	1972	27.0	94.23	
31 Jul 1973	24.0	50	1973	24.0*	96.15	
07 Aug 1974	420.0	51	1934	---	98.08	

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,599.8	15,049.4	0.2	25,590.3	8,442.4
11,226.5	12,197.6	0.5	20,443.3	7,123.4
9,458.0	10,148.0	1.0	16,734.7	6,116.5
7,732.1	8,185.6	2.0	13,236.5	5,109.4
6,070.2	6,345.4	4.0	10,000.5	4,111.2
5,552.8	5,783.6	5.0	9,023.6	3,793.4
4,014.0	4,124.6	10.0	6,219.6	2,823.4
2,603.6	2,644.5	20.0	3,813.2	1,890.4
1,000.1	1,000.1	50.0	1,353.3	744.4
321.1	313.5	80.0	440.3	221.1
164.5	156.5	90.0	237.2	103.7
90.9	83.8	95.0	139.1	52.3
27.1	22.2	99.0	47.7	12.6

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.945	Historic Events	0
Standard Dev	0.549	High Outliers	0
Station Skew	-0.603	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.603	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,546.0	---	0.2	---	---
11,173.8	---	0.5	---	---
9,406.2	---	1.0	---	---
7,683.1	---	2.0	---	---
6,023.3	---	4.0	---	---
5,505.3	---	5.0	---	---
3,969.5	---	10.0	---	---
2,564.2	---	20.0	---	---
968.9	---	50.0	---	---
293.7	---	80.0	---	---
137.4	---	90.0	---	---
62.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 26.69

1 low outlier(s) identified below test value of 26.69

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.998	Historic Events	1
Standard Dev	0.521	High Outliers	0
Station Skew	-0.264	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.603	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 49 events, 10 percent outlier test deviate K(N) = 2.76
Computed high outlier test value = 27,264.01

1 high outlier(s) identified above input threshold of 10,200

* Note - Collection of historical information and
comparison with similar data should be explored,
if not incorporated in this analysis.

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.977	Historic Events	1
Standard Dev	0.502	High Outliers	1
Station Skew	-0.338	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.603	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
04 Dec 1924	3,600.0	1	1951	10,200.0*	0.95
25 Apr 1926	1,060.0	2	1951	10,200.0	1.90
28 Feb 1927	948.0	3	1965	6,750.0	3.35
02 Apr 1928	1,020.0	4	1964	5,940.0	5.30
05 Apr 1929	3,670.0	5	1971	5,650.0	7.24
27 Mar 1930	417.0	6	1937	5,040.0	9.18
19 Mar 1931	456.0	7	1956	3,940.0	11.12
10 Feb 1932	2,280.0	8	1928	3,670.0	13.07
03 May 1933	432.0	9	1924	3,600.0	15.01
20 Sep 1933	126.0	10	1966	3,040.0	16.95
31 May 1935	---	11	1970	2,950.0	18.90
12 Apr 1936	950.0	12	1953	2,840.0	20.84
16 Feb 1937	1,170.0	13	1968	2,590.0	22.78
04 Mar 1938	5,040.0	14	1931	2,280.0	24.72
05 Apr 1939	987.0	15	1959	1,780.0	26.67
28 Feb 1940	375.0	16	1957	1,420.0	28.61
15 Mar 1941	1,320.0	17	1940	1,320.0	30.55
06 Apr 1942	876.0	18	1936	1,170.0	32.50
07 Mar 1943	832.0	19	1961	1,110.0	34.44
07 Apr 1944	916.0	20	1967	1,100.0	36.38
20 Apr 1945	1,060.0	21	1944	1,060.0	38.32

09 Apr 1946	230.0	22	1925	1,060.0	40.27
25 Nov 1946	919.0	23	1927	1,020.0	42.21
05 Apr 1948	616.0	24	1938	987.0	44.15
20 Mar 1949	800.0	25	1935	950.0	46.10
01 Mar 1950	478.0	26	1926	948.0	48.04
01 Jan 1951	10,200.0	27	1946	919.0	49.98
05 May 1951	260.0	28	1943	916.0	51.92
19 Jan 1952	10,200.0	29	1941	876.0	53.87
12 Mar 1953	555.0	30	1942	832.0	55.81
24 Mar 1954	2,840.0	31	1948	800.0	57.75
17 Mar 1955	136.0	32	1958	758.0	59.70
24 Aug 1955	605.0	33	1963	745.0	61.64
09 Jan 1957	3,940.0	34	1947	616.0	63.58
23 Mar 1958	1,420.0	35	1955	605.0	65.52
29 Sep 1958	758.0	36	1952	555.0	67.47
26 Dec 1959	1,780.0	37	1949	478.0	69.41
05 Apr 1961	362.0	38	1930	456.0	71.35
14 Feb 1962	1,110.0	39	1932	432.0	73.30
08 Sep 1962	245.0	40	1974	420.0	75.24
12 Apr 1964	745.0	41	1929	417.0	77.18
08 Jan 1965	5,940.0	42	1939	375.0	79.12
31 Dec 1965	6,750.0	43	1960	362.0	81.07
08 Dec 1966	3,040.0	44	1950	260.0	83.01
02 Apr 1968	1,100.0	45	1962	245.0	84.95
27 Jan 1969	2,590.0	46	1945	230.0	86.90
19 Mar 1970	197.0	47	1969	197.0	88.84
06 Sep 1970	2,950.0	48	1954	136.0	90.78
27 Dec 1971	5,650.0	49	1933	126.0	92.72
18 Jul 1972	27.0	50	1972	27.0	94.67
31 Jul 1973	24.0	51	1973	24.0*	96.61
07 Aug 1974	420.0	52	1934	---	98.55

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.067
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
17,509.1	20,223.9	0.2	33,736.6	10,722.6
13,423.6	15,023.1	0.5	24,692.4	8,484.6
10,705.9	11,726.0	1.0	18,945.5	6,945.9
8,300.4	8,907.0	2.0	14,077.6	5,540.0
6,198.4	6,529.6	4.0	10,029.5	4,266.4
5,584.7	5,851.7	5.0	8,890.9	3,884.4
3,869.4	3,987.8	10.0	5,834.3	2,784.2
2,434.4	2,474.6	20.0	3,456.6	1,812.8
945.3	945.3	50.0	1,246.2	719.3
338.8	332.0	80.0	454.0	239.5
191.7	184.2	90.0	268.2	125.9
117.8	110.4	95.0	172.7	71.8
45.2	39.1	99.0	73.9	23.5

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.951	Historic Events	1
Standard Dev	0.511	High Outliers	1
Station Skew	-0.331	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.289	Missing Events	1
Adopted Skew	-0.289	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
17,542.5	20,264.9	0.2	33,814.7	10,739.8
13,446.5	15,050.0	0.5	24,743.5	8,496.7
10,722.3	11,744.7	1.0	18,980.9	6,954.8
8,311.6	8,919.4	2.0	14,100.9	5,546.2
6,205.4	6,537.2	4.0	10,043.7	4,270.4
5,590.7	5,858.1	5.0	8,902.8	3,887.8
3,872.6	3,991.1	10.0	5,840.5	2,786.0
2,435.7	2,475.9	20.0	3,459.1	1,813.5
945.3	945.3	50.0	1,246.4	719.2
338.6	331.8	80.0	453.9	239.3
191.6	184.1	90.0	268.0	125.7
117.7	110.3	95.0	172.6	71.7
45.2	39.0	99.0	73.9	23.4

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 2-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Dec 1924	1,863.5	1	1951	6,190.0*	1.92
26 Apr 1926	1,060.0	2	1964	4,600.0	3.85
01 Mar 1927	810.0	3	1965	4,075.0	5.77
02 Apr 1928	980.0	4	1971	3,545.0	7.69
05 Apr 1929	2,545.0	5	1956	3,280.0	9.62

27 Mar 1930	399.5	6	1937	3,050.0	11.54
20 Mar 1931	449.0	7	1966	2,565.0	13.46
11 Feb 1932	1,755.0	8	1928	2,545.0	15.38
04 May 1933	405.0	9	1968	2,425.0	17.31
21 Sep 1933	87.0	10	1970	2,230.0	19.23
31 May 1935	---	11	1953	2,165.0	21.15
13 Apr 1936	908.5	12	1924	1,863.5	23.08
09 Feb 1937	1,040.0	13	1931	1,755.0	25.00
05 Mar 1938	3,050.0	14	1959	1,251.0	26.92
05 Apr 1939	854.5	15	1940	1,125.5	28.85
29 Feb 1940	372.5	16	1957	1,101.5	30.77
15 Mar 1941	1,125.5	17	1925	1,060.0	32.69
06 Apr 1942	717.0	18	1944	1,050.0	34.62
12 Mar 1943	800.5	19	1967	1,048.0	36.54
07 Apr 1944	904.5	20	1936	1,040.0	38.46
20 Apr 1945	1,050.0	21	1927	980.0	40.38
09 Apr 1946	215.0	22	1961	964.0	42.31
26 Nov 1946	740.5	23	1935	908.5	44.23
06 Apr 1948	607.0	24	1943	904.5	46.15
21 Mar 1949	800.0	25	1938	854.5	48.08
02 Mar 1950	406.5	26	1926	810.0	50.00
06 May 1951	255.0	27	1942	800.5	51.92
20 Jan 1952	6,190.0	28	1948	800.0	53.85
13 Mar 1953	494.5	29	1958	748.5	55.77
24 Mar 1954	2,165.0	30	1946	740.5	57.69
17 Mar 1955	134.0	31	1963	737.0	59.62
24 Aug 1955	600.0	32	1941	717.0	61.54
10 Jan 1957	3,280.0	33	1947	607.0	63.46
24 Mar 1958	1,101.5	34	1955	600.0	65.38
29 Sep 1958	748.5	35	1952	494.5	67.31
27 Dec 1959	1,251.0	36	1930	449.0	69.23
05 Apr 1961	347.0	37	1949	406.5	71.15
10 Apr 1962	964.0	38	1932	405.0	73.08
26 Mar 1963	187.5	39	1929	399.5	75.00
13 Apr 1964	737.0	40	1939	372.5	76.92
08 Jan 1965	4,600.0	41	1960	347.0	78.85
31 Dec 1965	4,075.0	42	1950	255.0	80.77
08 Dec 1966	2,565.0	43	1974	231.0	82.69
03 Apr 1968	1,048.0	44	1945	215.0	84.62
28 Jan 1969	2,425.0	45	1962	187.5	86.54
20 Mar 1970	185.5	46	1969	185.5	88.46
07 Sep 1970	2,230.0	47	1954	134.0	90.38
28 Dec 1971	3,545.0	48	1933	87.0	92.31
18 Jul 1972	25.0	49	1972	25.0*	94.23
01 Aug 1973	20.5	50	1973	20.5*	96.15
08 Aug 1974	231.0	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,679.3	7,056.1	0.2	11,361.3	4,448.3
5,975.9	6,270.6	0.5	9,981.2	4,027.6
5,372.8	5,612.8	1.0	8,821.2	3,661.5
4,705.7	4,885.5	2.0	7,565.9	3,250.2
3,974.2	4,100.3	4.0	6,226.6	2,790.1
3,725.5	3,837.2	5.0	5,780.8	2,631.1
2,914.7	2,975.2	10.0	4,366.7	2,102.5
2,055.8	2,081.8	20.0	2,944.9	1,520.5
886.1	886.1	50.0	1,181.5	671.3
297.2	290.0	80.0	399.4	209.9

150.7	143.1	90.0	213.1	97.4
81.2	74.4	95.0	122.1	47.6
21.9	17.6	99.0	38.6	10.2

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.871	Historic Events	0
Standard Dev	0.517	High Outliers	0
Station Skew	-0.899	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.899	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,664.0	---	0.2	---	---
5,958.5	---	0.5	---	---
5,353.4	---	1.0	---	---
4,685.3	---	2.0	---	---
3,952.0	---	4.0	---	---
3,701.4	---	5.0	---	---
2,888.6	---	10.0	---	---
2,029.4	---	20.0	---	---
860.4	---	50.0	---	---
271.5	---	80.0	---	---
124.9	---	90.0	---	---
54.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 27.46

2 low outlier(s) identified below test value of 27.46

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.952	Historic Events	1
Standard Dev	0.434	High Outliers	0
Station Skew	-0.082	Low Outliers	2
Regional Skew	-0.100	Zero Events	0

Weighted Skew	---	Missing Events	1
Adopted Skew	-0.899	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 14,022.68

1 high outlier(s) identified above input threshold of 6,190

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis. *

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.934	Historic Events	1
Standard Dev	0.418	High Outliers	1
Station Skew	-0.137	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.899	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Dec 1924	1,863.5	1	1951	6,190.0*	0.95
26 Apr 1926	1,060.0	2	1951	6,190.0	1.90
01 Mar 1927	810.0	3	1964	4,600.0	3.35
02 Apr 1928	980.0	4	1965	4,075.0	5.30
05 Apr 1929	2,545.0	5	1971	3,545.0	7.24
27 Mar 1930	399.5	6	1956	3,280.0	9.18
20 Mar 1931	449.0	7	1937	3,050.0	11.12
11 Feb 1932	1,755.0	8	1966	2,565.0	13.07
04 May 1933	405.0	9	1928	2,545.0	15.01
21 Sep 1933	87.0	10	1968	2,425.0	16.95
31 May 1935	---	11	1970	2,230.0	18.90
13 Apr 1936	908.5	12	1953	2,165.0	20.84
09 Feb 1937	1,040.0	13	1924	1,863.5	22.78
05 Mar 1938	3,050.0	14	1931	1,755.0	24.72
05 Apr 1939	854.5	15	1959	1,251.0	26.67
29 Feb 1940	372.5	16	1940	1,125.5	28.61
15 Mar 1941	1,125.5	17	1957	1,101.5	30.55

06 Apr 1942	717.0	18	1925	1,060.0	32.50
12 Mar 1943	800.5	19	1944	1,050.0	34.44
07 Apr 1944	904.5	20	1967	1,048.0	36.38
20 Apr 1945	1,050.0	21	1936	1,040.0	38.32
09 Apr 1946	215.0	22	1927	980.0	40.27
26 Nov 1946	740.5	23	1961	964.0	42.21
06 Apr 1948	607.0	24	1935	908.5	44.15
21 Mar 1949	800.0	25	1943	904.5	46.10
02 Mar 1950	406.5	26	1938	854.5	48.04
01 Jan 1951	6,190.0	27	1926	810.0	49.98
06 May 1951	255.0	28	1942	800.5	51.92
20 Jan 1952	6,190.0	29	1948	800.0	53.87
13 Mar 1953	494.5	30	1958	748.5	55.81
24 Mar 1954	2,165.0	31	1946	740.5	57.75
17 Mar 1955	134.0	32	1963	737.0	59.70
24 Aug 1955	600.0	33	1941	717.0	61.64
10 Jan 1957	3,280.0	34	1947	607.0	63.58
24 Mar 1958	1,101.5	35	1955	600.0	65.52
29 Sep 1958	748.5	36	1952	494.5	67.47
27 Dec 1959	1,251.0	37	1930	449.0	69.41
05 Apr 1961	347.0	38	1949	406.5	71.35
10 Apr 1962	964.0	39	1932	405.0	73.30
26 Mar 1963	187.5	40	1929	399.5	75.24
13 Apr 1964	737.0	41	1939	372.5	77.18
08 Jan 1965	4,600.0	42	1960	347.0	79.12
31 Dec 1965	4,075.0	43	1950	255.0	81.07
08 Dec 1966	2,565.0	44	1974	231.0	83.01
03 Apr 1968	1,048.0	45	1945	215.0	84.95
28 Jan 1969	2,425.0	46	1962	187.5	86.90
20 Mar 1970	185.5	47	1969	185.5	88.84
07 Sep 1970	2,230.0	48	1954	134.0	90.78
28 Dec 1971	3,545.0	49	1933	87.0	92.72
18 Jul 1972	25.0	50	1972	25.0*	94.67
01 Aug 1973	20.5	51	1973	20.5*	96.61
08 Aug 1974	231.0	52	1934	---	98.55

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew =	0.058
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,699.1	13,524.9	0.2	21,005.7	7,567.4
8,994.9	10,054.5	0.5	15,417.1	6,006.5
7,219.3	7,887.1	1.0	11,911.2	4,947.2
5,659.6	6,054.6	2.0	8,961.4	3,986.9
4,301.2	4,516.2	4.0	6,512.6	3,120.5
3,904.3	4,077.3	5.0	5,822.2	2,860.6
2,789.7	2,867.8	10.0	3,956.4	2,109.5
1,842.2	1,869.3	20.0	2,475.3	1,436.7
812.6	812.6	50.0	1,025.3	644.8
346.9	341.3	80.0	444.5	258.6
219.4	212.6	90.0	290.9	154.1
149.3	141.9	95.0	205.4	98.9
71.2	63.7	99.0	106.5	41.7

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.900	Historic Events	1
Standard Dev	0.431	High Outliers	1
Station Skew	-0.147	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.140	Missing Events	1
Adopted Skew	-0.140	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
15,593.7	18,013.6	0.2	30,058.2	9,546.7
11,952.7	13,378.0	0.5	21,994.7	7,552.8
9,531.1	10,440.0	1.0	16,872.3	6,182.2
7,388.2	7,928.5	2.0	12,534.4	4,930.1
5,516.1	5,811.0	4.0	8,927.9	3,796.0
4,969.6	5,207.3	5.0	7,913.8	3,455.9
3,442.4	3,547.8	10.0	5,191.7	2,476.5
2,165.1	2,200.9	20.0	3,074.8	1,612.0
840.3	840.3	50.0	1,107.9	639.3
301.0	295.0	80.0	403.4	212.7
170.3	163.6	90.0	238.2	111.8
104.6	98.0	95.0	153.4	63.7
40.2	34.7	99.0	65.7	20.8

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 3-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Dec 1924	1,284.3	1	1951	4,433.3*	1.92

26 Apr 1926	1,053.3	2	1964	3,383.3	3.85
01 Mar 1927	727.0	3	1956	3,350.0	5.77
03 Apr 1928	961.7	4	1965	3,156.7	7.69
06 Apr 1929	2,050.0	5	1971	2,577.3	9.62
27 Mar 1930	402.7	6	1937	2,346.7	11.54
20 Mar 1931	442.0	7	1968	2,146.7	13.46
12 Feb 1932	1,422.7	8	1928	2,050.0	15.38
04 May 1933	379.3	9	1966	1,906.7	17.31
22 Sep 1933	65.3	10	1953	1,673.3	19.23
31 May 1935	---	11	1970	1,634.0	21.15
14 Apr 1936	877.0	12	1931	1,422.7	23.08
19 Mar 1937	907.3	13	1924	1,284.3	25.00
04 Mar 1938	2,346.7	14	1925	1,053.3	26.92
24 Mar 1939	784.0	15	1940	1,039.7	28.85
01 Mar 1940	359.0	16	1944	1,007.0	30.77
16 Mar 1941	1,039.7	17	1967	978.0	32.69
06 Apr 1942	669.7	18	1959	963.7	34.62
08 Mar 1943	704.7	19	1927	961.7	36.54
08 Apr 1944	869.3	20	1961	947.7	38.46
21 Apr 1945	1,007.0	21	1957	941.0	40.38
10 Apr 1946	193.3	22	1936	907.3	42.31
27 Nov 1946	580.7	23	1935	877.0	44.23
06 Apr 1948	580.0	24	1943	869.3	46.15
21 Mar 1949	778.0	25	1938	784.0	48.08
02 Mar 1950	378.7	26	1948	778.0	50.00
07 May 1951	221.3	27	1926	727.0	51.92
21 Jan 1952	4,433.3	28	1942	704.7	53.85
14 Mar 1953	438.7	29	1963	691.7	55.77
25 Mar 1954	1,673.3	30	1941	669.7	57.69
18 Mar 1955	129.0	31	1958	650.3	59.62
25 Aug 1955	590.7	32	1955	590.7	61.54
11 Jan 1957	3,350.0	33	1946	580.7	63.46
25 Mar 1958	941.0	34	1947	580.0	65.38
30 Sep 1958	650.3	35	1930	442.0	67.31
28 Dec 1959	963.7	36	1952	438.7	69.23
05 Apr 1961	324.0	37	1929	402.7	71.15
10 Apr 1962	947.7	38	1932	379.3	73.08
27 Mar 1963	170.3	39	1949	378.7	75.00
14 Apr 1964	691.7	40	1939	359.0	76.92
09 Jan 1965	3,383.3	41	1960	324.0	78.85
01 Jan 1966	3,156.7	42	1950	221.3	80.77
09 Dec 1966	1,906.7	43	1945	193.3	82.69
03 Apr 1968	978.0	44	1962	170.3	84.62
28 Jan 1969	2,146.7	45	1969	164.7	86.54
20 Mar 1970	164.7	46	1974	155.8	88.46
08 Sep 1970	1,634.0	47	1954	129.0	90.38
29 Dec 1971	2,577.3	48	1933	65.3	92.31
19 Jul 1972	19.1	49	1972	19.1*	94.23
02 Aug 1973	15.7	50	1973	15.7*	96.15
09 Aug 1974	155.8	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,174.9	4,296.4	0.2	6,723.6	2,882.6
3,918.3	4,027.3	0.5	6,248.1	2,722.5
3,668.4	3,769.1	1.0	5,790.4	2,565.3
3,358.7	3,443.5	2.0	5,231.0	2,368.4
2,977.1	3,045.0	4.0	4,554.9	2,122.5
2,836.9	2,900.2	5.0	4,310.3	2,031.2

2,341.1	2,379.1	10.0	3,463.1	1,702.8
1,746.2	1,764.8	20.0	2,489.2	1,296.4
805.7	805.7	50.0	1,073.7	612.4
270.1	263.3	80.0	361.2	192.2
132.6	125.4	90.0	186.8	86.0
68.2	62.1	95.0	102.8	39.9
16.1	12.7	99.0	29.0	7.3

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.809	Historic Events	0
Standard Dev	0.512	High Outliers	0
Station Skew	-1.163	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.163	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,169.5	---	0.2	---	---
3,911.2	---	0.5	---	---
3,659.6	---	1.0	---	---
3,348.5	---	2.0	---	---
2,964.7	---	4.0	---	---
2,822.5	---	5.0	---	---
2,323.5	---	10.0	---	---
1,726.3	---	20.0	---	---
783.0	---	50.0	---	---
245.7	---	80.0	---	---
108.4	---	90.0	---	---
43.8	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 24.63

2 low outlier(s) identified below test value of 24.63

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	2.890	Historic Events	1
Standard Dev	0.416	High Outliers	0
Station Skew	-0.319	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.163	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 10,840.9

1 high outlier(s) identified above input threshold of 4,433.3

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and             *
*        comparison with similar data should be explored,     *
*        if not incorporated in this analysis.                *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.874	Historic Events	1
Standard Dev	0.403	High Outliers	1
Station Skew	-0.370	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.163	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06 Dec 1924	1,284.3	1	1951	4,433.3*	0.95
26 Apr 1926	1,053.3	2	1951	4,433.3	1.90
01 Mar 1927	727.0	3	1964	3,383.3	3.35
03 Apr 1928	961.7	4	1956	3,350.0	5.30
06 Apr 1929	2,050.0	5	1965	3,156.7	7.24
27 Mar 1930	402.7	6	1971	2,577.3	9.18
20 Mar 1931	442.0	7	1937	2,346.7	11.12
12 Feb 1932	1,422.7	8	1968	2,146.7	13.07
04 May 1933	379.3	9	1928	2,050.0	15.01
22 Sep 1933	65.3	10	1966	1,906.7	16.95
31 May 1935	---	11	1953	1,673.3	18.90
14 Apr 1936	877.0	12	1970	1,634.0	20.84
19 Mar 1937	907.3	13	1931	1,422.7	22.78

04 Mar 1938	2,346.7	14	1924	1,284.3	24.72
24 Mar 1939	784.0	15	1925	1,053.3	26.67
01 Mar 1940	359.0	16	1940	1,039.7	28.61
16 Mar 1941	1,039.7	17	1944	1,007.0	30.55
06 Apr 1942	669.7	18	1967	978.0	32.50
08 Mar 1943	704.7	19	1959	963.7	34.44
08 Apr 1944	869.3	20	1927	961.7	36.38
21 Apr 1945	1,007.0	21	1961	947.7	38.32
10 Apr 1946	193.3	22	1957	941.0	40.27
27 Nov 1946	580.7	23	1936	907.3	42.21
06 Apr 1948	580.0	24	1935	877.0	44.15
21 Mar 1949	778.0	25	1943	869.3	46.10
02 Mar 1950	378.7	26	1938	784.0	48.04
01 Jan 1951	4,433.3	27	1948	778.0	49.98
07 May 1951	221.3	28	1926	727.0	51.92
21 Jan 1952	4,433.3	29	1942	704.7	53.87
14 Mar 1953	438.7	30	1963	691.7	55.81
25 Mar 1954	1,673.3	31	1941	669.7	57.75
18 Mar 1955	129.0	32	1958	650.3	59.70
25 Aug 1955	590.7	33	1955	590.7	61.64
11 Jan 1957	3,350.0	34	1946	580.7	63.58
25 Mar 1958	941.0	35	1947	580.0	65.52
30 Sep 1958	650.3	36	1930	442.0	67.47
28 Dec 1959	963.7	37	1952	438.7	69.41
05 Apr 1961	324.0	38	1929	402.7	71.35
10 Apr 1962	947.7	39	1932	379.3	73.30
27 Mar 1963	170.3	40	1949	378.7	75.24
14 Apr 1964	691.7	41	1939	359.0	77.18
09 Jan 1965	3,383.3	42	1960	324.0	79.12
01 Jan 1966	3,156.7	43	1950	221.3	81.07
09 Dec 1966	1,906.7	44	1945	193.3	83.01
03 Apr 1968	978.0	45	1962	170.3	84.95
28 Jan 1969	2,146.7	46	1969	164.7	86.90
20 Mar 1970	164.7	47	1974	155.8	88.84
08 Sep 1970	1,634.0	48	1954	129.0	90.78
29 Dec 1971	2,577.3	49	1933	65.3	92.72
19 Jul 1972	19.1	50	1972	19.1*	94.67
02 Aug 1973	15.7	51	1973	15.7*	96.61
09 Aug 1974	155.8	52	1934	---	98.55

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.07
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
7,546.9	8,442.2	0.2	12,800.3	5,081.4
6,131.5	6,695.5	0.5	10,030.7	4,231.1
5,133.0	5,513.5	1.0	8,146.6	3,615.2
4,198.8	4,439.2	2.0	6,444.9	3,023.7
3,330.5	3,471.0	4.0	4,925.4	2,457.4
3,065.2	3,181.3	5.0	4,475.0	2,280.5
2,286.1	2,341.8	10.0	3,196.1	1,747.4
1,574.8	1,595.7	20.0	2,097.9	1,237.4
730.5	730.5	50.0	916.0	584.3
314.5	309.3	80.0	399.5	236.9
196.3	189.9	90.0	258.4	139.1

130.9	124.0	95.0	179.2	87.2
58.8	52.0	99.0	88.2	34.2

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.841	Historic Events	1
Standard Dev	0.418	High Outliers	1
Station Skew	-0.382	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.329	Missing Events	1
Adopted Skew	-0.329	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,610.1	15,722.1	0.2	26,234.6	8,332.3
10,432.2	11,676.2	0.5	19,196.8	6,592.0
8,318.7	9,111.9	1.0	14,726.0	5,395.7
6,448.4	6,919.9	2.0	10,939.9	4,302.9
4,814.4	5,071.8	4.0	7,792.2	3,313.1
4,337.4	4,544.9	5.0	6,907.1	3,016.3
3,004.5	3,096.4	10.0	4,531.2	2,161.5
1,889.7	1,920.9	20.0	2,683.7	1,407.0
733.4	733.4	50.0	967.0	558.0
262.7	257.5	80.0	352.1	185.7
148.6	142.8	90.0	207.9	97.5
91.3	85.6	95.0	133.9	55.6
35.1	30.3	99.0	57.3	18.2

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

===
Statistical Analysis of 4-day Maximum values
===

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Events Analyzed	Ordered Events

Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07 Dec 1924	994.0	1	1951	3,483.2*	1.92
26 Apr 1926	1,036.0	2	1956	2,765.0	3.85
12 Mar 1927	680.0	3	1964	2,652.0	5.77
04 Apr 1928	952.5	4	1965	2,515.5	7.69
06 Apr 1929	1,722.5	5	1937	2,055.0	9.62
28 Mar 1930	390.8	6	1971	2,012.5	11.54
21 Mar 1931	429.8	7	1968	1,815.0	13.46
12 Feb 1932	1,192.5	8	1928	1,722.5	15.38
05 May 1933	346.0	9	1966	1,501.5	17.31
23 Sep 1933	50.2	10	1953	1,335.5	19.23
31 May 1935	---	11	1970	1,272.8	21.15
14 Apr 1936	854.2	12	1931	1,192.5	23.08
14 Apr 1937	862.8	13	1925	1,036.0	25.00
04 Mar 1938	2,055.0	14	1924	994.0	26.92
25 Mar 1939	732.0	15	1944	990.5	28.85
02 Mar 1940	342.0	16	1967	973.0	30.77
17 Mar 1941	907.5	17	1927	952.5	32.69
06 Apr 1942	647.2	18	1961	947.0	34.62
13 Mar 1943	642.5	19	1959	925.0	36.54
08 Apr 1944	830.2	20	1940	907.5	38.46
22 Apr 1945	990.5	21	1936	862.8	40.38
11 Apr 1946	166.8	22	1935	854.2	42.31
28 Nov 1946	476.5	23	1943	830.2	44.23
07 Apr 1948	562.2	24	1957	811.2	46.15
21 Mar 1949	772.5	25	1948	772.5	48.08
03 Mar 1950	354.8	26	1938	732.0	50.00
08 May 1951	188.5	27	1926	680.0	51.92
21 Jan 1952	3,483.2	28	1963	665.8	53.85
14 Mar 1953	408.0	29	1941	647.2	55.77
26 Mar 1954	1,335.5	30	1942	642.5	57.69
19 Mar 1955	119.5	31	1947	562.2	59.62
26 Aug 1955	547.5	32	1958	557.0	61.54
12 Jan 1957	2,765.0	33	1955	547.5	63.46
26 Mar 1958	811.2	34	1946	476.5	65.38
01 Oct 1958	557.0	35	1930	429.8	67.31
14 Mar 1960	925.0	36	1952	408.0	69.23
06 Apr 1961	307.0	37	1929	390.8	71.15
10 Apr 1962	947.0	38	1949	354.8	73.08
28 Mar 1963	154.0	39	1932	346.0	75.00
14 Apr 1964	665.8	40	1939	342.0	76.92
10 Jan 1965	2,652.0	41	1960	307.0	78.85
02 Jan 1966	2,515.5	42	1950	188.5	80.77
10 Dec 1966	1,501.5	43	1945	166.8	82.69
03 Apr 1968	973.0	44	1962	154.0	84.62
29 Jan 1969	1,815.0	45	1969	152.8	86.54
21 Mar 1970	152.8	46	1954	119.5	88.46
09 Sep 1970	1,272.8	47	1974	117.7	90.38
30 Dec 1971	2,012.5	48	1933	50.2	92.31
20 Jul 1972	15.7	49	1972	15.7*	94.23
03 Aug 1973	12.6	50	1973	12.6*	96.15
10 Aug 1974	117.7	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,992.2	3,038.2	0.2	4,662.0	2,109.7
2,883.5	2,930.0	0.5	4,467.8	2,040.0

2,765.1	2,813.1	1.0	4,257.8	1,963.8
2,603.1	2,648.0	2.0	3,973.2	1,858.7
2,382.4	2,422.6	4.0	3,590.5	1,714.2
2,295.8	2,335.0	5.0	3,442.0	1,656.9
1,966.9	1,992.6	10.0	2,887.8	1,437.0
1,528.4	1,542.3	20.0	2,174.5	1,135.9
742.2	742.2	50.0	990.7	564.2
248.0	241.5	80.0	331.1	177.2
118.3	111.6	90.0	166.6	76.9
58.6	52.9	95.0	88.6	34.0
12.4	9.5	99.0	22.6	5.5

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.757	Historic Events	0
Standard Dev	0.512	High Outliers	0
Station Skew	-1.370	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.370	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,989.9	---	0.2	---	---
2,880.2	---	0.5	---	---
2,760.6	---	1.0	---	---
2,597.5	---	2.0	---	---
2,374.7	---	4.0	---	---
2,286.4	---	5.0	---	---
1,954.2	---	10.0	---	---
1,512.5	---	20.0	---	---
721.7	---	50.0	---	---
224.8	---	80.0	---	---
95.6	---	90.0	---	---
36.4	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 21.93

2 low outlier(s) identified below test value of 21.93

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.839	Historic Events	1
Standard Dev	0.406	High Outliers	0
Station Skew	-0.567	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.370	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 9,078.43

1 high outlier(s) identified above input threshold of 3,483.2

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis. *

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.824	Historic Events	1
Standard Dev	0.395	High Outliers	1
Station Skew	-0.619	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.370	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07 Dec 1924	994.0	1	1951	3,483.2*	0.95
26 Apr 1926	1,036.0	2	1951	3,483.2	1.90
12 Mar 1927	680.0	3	1956	2,765.0	3.35
04 Apr 1928	952.5	4	1964	2,652.0	5.30
06 Apr 1929	1,722.5	5	1965	2,515.5	7.24
28 Mar 1930	390.8	6	1937	2,055.0	9.18
21 Mar 1931	429.8	7	1971	2,012.5	11.12
12 Feb 1932	1,192.5	8	1968	1,815.0	13.07
05 May 1933	346.0	9	1928	1,722.5	15.01

23 Sep 1933	50.2	10	1966	1,501.5	16.95	
31 May 1935	---	11	1953	1,335.5	18.90	
14 Apr 1936	854.2	12	1970	1,272.8	20.84	
14 Apr 1937	862.8	13	1931	1,192.5	22.78	
04 Mar 1938	2,055.0	14	1925	1,036.0	24.72	
25 Mar 1939	732.0	15	1924	994.0	26.67	
02 Mar 1940	342.0	16	1944	990.5	28.61	
17 Mar 1941	907.5	17	1967	973.0	30.55	
06 Apr 1942	647.2	18	1927	952.5	32.50	
13 Mar 1943	642.5	19	1961	947.0	34.44	
08 Apr 1944	830.2	20	1959	925.0	36.38	
22 Apr 1945	990.5	21	1940	907.5	38.32	
11 Apr 1946	166.8	22	1936	862.8	40.27	
28 Nov 1946	476.5	23	1935	854.2	42.21	
07 Apr 1948	562.2	24	1943	830.2	44.15	
21 Mar 1949	772.5	25	1957	811.2	46.10	
03 Mar 1950	354.8	26	1948	772.5	48.04	
01 Jan 1951	3,483.2	27	1938	732.0	49.98	
08 May 1951	188.5	28	1926	680.0	51.92	
21 Jan 1952	3,483.2	29	1963	665.8	53.87	
14 Mar 1953	408.0	30	1941	647.2	55.81	
26 Mar 1954	1,335.5	31	1942	642.5	57.75	
19 Mar 1955	119.5	32	1947	562.2	59.70	
26 Aug 1955	547.5	33	1958	557.0	61.64	
12 Jan 1957	2,765.0	34	1955	547.5	63.58	
26 Mar 1958	811.2	35	1946	476.5	65.52	
01 Oct 1958	557.0	36	1930	429.8	67.47	
14 Mar 1960	925.0	37	1952	408.0	69.41	
06 Apr 1961	307.0	38	1929	390.8	71.35	
10 Apr 1962	947.0	39	1949	354.8	73.30	
28 Mar 1963	154.0	40	1932	346.0	75.24	
14 Apr 1964	665.8	41	1939	342.0	77.18	
10 Jan 1965	2,652.0	42	1960	307.0	79.12	
02 Jan 1966	2,515.5	43	1950	188.5	81.07	
10 Dec 1966	1,501.5	44	1945	166.8	83.01	
03 Apr 1968	973.0	45	1962	154.0	84.95	
29 Jan 1969	1,815.0	46	1969	152.8	86.90	
21 Mar 1970	152.8	47	1954	119.5	88.84	
09 Sep 1970	1,272.8	48	1974	117.7	90.78	
30 Dec 1971	2,012.5	49	1933	50.2	92.72	
20 Jul 1972	15.7	50	1972	15.7*	94.67	
03 Aug 1973	12.6	51	1973	12.6*	96.61	
10 Aug 1974	117.7	52	1934	---	98.55	

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew =	0.086
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,322.1	5,795.7	0.2	8,662.2	3,686.4
4,524.2	4,846.5	0.5	7,162.5	3,192.8
3,921.1	4,153.4	1.0	6,060.9	2,811.7
3,321.5	3,477.9	2.0	4,996.9	2,424.7
2,728.6	2,826.4	4.0	3,979.4	2,032.3
2,539.6	2,622.6	5.0	3,663.4	1,904.8
1,960.6	2,002.7	10.0	2,723.5	1,505.2

1,395.7	1,412.5	20.0	1,855.7	1,098.5
669.3	669.3	50.0	838.6	536.6
285.5	280.6	80.0	361.8	215.9
174.2	168.1	90.0	229.0	123.6
112.9	106.5	95.0	154.9	74.9
46.9	40.8	99.0	71.2	26.8

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.790	Historic Events	1
Standard Dev	0.414	High Outliers	1
Station Skew	-0.640	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.521	Missing Events	1
Adopted Skew	-0.521	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,104.0	13,982.4	0.2	23,331.6	7,410.3
9,277.8	10,384.2	0.5	17,072.6	5,862.6
7,398.2	8,103.7	1.0	13,096.5	4,798.7
5,734.8	6,154.2	2.0	9,729.4	3,826.8
4,281.6	4,510.6	4.0	6,930.0	2,946.5
3,857.5	4,042.0	5.0	6,142.8	2,682.5
2,672.0	2,753.8	10.0	4,029.8	1,922.3
1,680.6	1,708.3	20.0	2,386.7	1,251.3
652.2	652.2	50.0	860.0	496.2
233.6	229.0	80.0	313.2	165.1
132.2	127.0	90.0	184.9	86.7
81.2	76.1	95.0	119.1	49.5
31.2	26.9	99.0	51.0	16.2

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
08 Dec 1924	819.6	1	1951	2,877.6*	1.92
27 Apr 1926	1,017.6	2	1956	2,320.6	3.85
13 Mar 1927	638.2	3	1964	2,179.2	5.77
05 Apr 1928	937.0	4	1965	2,090.4	7.69
07 Apr 1929	1,518.2	5	1937	1,856.0	9.62
28 Mar 1930	381.0	6	1971	1,658.2	11.54
22 Mar 1931	417.4	7	1968	1,529.2	13.46
13 Feb 1932	1,052.8	8	1928	1,518.2	15.38
06 May 1933	312.8	9	1966	1,235.0	17.31
24 Sep 1933	41.0	10	1953	1,104.8	19.23
31 May 1935	---	11	1931	1,052.8	21.15
15 Apr 1936	824.0	12	1970	1,034.2	23.08
14 Apr 1937	845.8	13	1925	1,017.6	25.00
05 Mar 1938	1,856.0	14	1944	969.4	26.92
26 Mar 1939	685.0	15	1967	968.0	28.85
03 Mar 1940	323.0	16	1927	937.0	30.77
18 Mar 1941	800.6	17	1959	936.2	32.69
07 Apr 1942	622.6	18	1961	934.8	34.62
11 Mar 1943	621.2	19	1936	845.8	36.54
09 Apr 1944	802.6	20	1935	824.0	38.46
23 Apr 1945	969.4	21	1924	819.6	40.38
12 Apr 1946	144.8	22	1943	802.6	42.31
29 Nov 1946	405.8	23	1940	800.6	44.23
07 Apr 1948	541.8	24	1948	760.6	46.15
21 Mar 1949	760.6	25	1957	726.2	48.08
04 Mar 1950	343.4	26	1938	685.0	50.00
09 May 1951	163.2	27	1926	638.2	51.92
22 Jan 1952	2,877.6	28	1963	635.0	53.85
15 Mar 1953	378.0	29	1941	622.6	55.77
27 Mar 1954	1,104.8	30	1942	621.2	57.69
19 Mar 1955	112.2	31	1947	541.8	59.62
27 Aug 1955	493.8	32	1958	505.6	61.54
13 Jan 1957	2,320.6	33	1955	493.8	63.46
27 Mar 1958	726.2	34	1930	417.4	65.38
30 Sep 1958	505.6	35	1946	405.8	67.31
14 Mar 1960	936.2	36	1929	381.0	69.23
07 Apr 1961	282.2	37	1952	378.0	71.15
10 Apr 1962	934.8	38	1949	343.4	73.08
29 Mar 1963	140.0	39	1939	323.0	75.00
15 Apr 1964	635.0	40	1932	312.8	76.92
11 Jan 1965	2,179.2	41	1960	282.2	78.85
03 Jan 1966	2,090.4	42	1950	163.2	80.77
11 Dec 1966	1,235.0	43	1945	144.8	82.69
03 Apr 1968	968.0	44	1962	140.0	84.62
30 Jan 1969	1,529.2	45	1969	139.4	86.54
22 Mar 1970	139.4	46	1954	112.2	88.46
10 Sep 1970	1,034.2	47	1974	94.8	90.38
30 Dec 1971	1,658.2	48	1933	41.0	92.31
20 Jul 1972	13.4	49	1972	13.4*	94.23
04 Aug 1973	10.6	50	1973	10.6*	96.15
11 Aug 1974	94.8	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve	Expected Probability	Percent Chance	Confidence Limits 0.05	Confidence Limits 0.95

FLOW, cfs		Exceedance	FLOW, cfs	
2,407.8	2,430.7	0.2	3,689.3	1,714.8
2,349.1	2,374.3	0.5	3,586.5	1,676.6
2,279.8	2,308.0	1.0	3,465.7	1,631.4
2,178.0	2,206.3	2.0	3,289.5	1,564.7
2,029.0	2,056.5	4.0	3,034.2	1,466.2
1,967.8	1,995.5	5.0	2,930.3	1,425.4
1,723.4	1,742.7	10.0	2,521.6	1,261.2
1,372.9	1,384.2	20.0	1,953.3	1,020.0
688.0	688.0	50.0	920.6	522.6
229.0	222.8	80.0	305.7	163.8
107.1	100.7	90.0	150.9	69.5
51.6	46.4	95.0	78.3	29.8
10.1	7.6	99.0	18.7	4.3

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.714	Historic Events	0
Standard Dev	0.513	High Outliers	0
Station Skew	-1.504	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.504	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,406.6	---	0.2	---	---
2,347.2	---	0.5	---	---
2,277.0	---	1.0	---	---
2,174.3	---	2.0	---	---
2,023.6	---	4.0	---	---
1,960.9	---	5.0	---	---
1,713.4	---	10.0	---	---
1,359.6	---	20.0	---	---
669.3	---	50.0	---	---
207.0	---	80.0	---	---
85.8	---	90.0	---	---
31.4	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 19.63

2 low outlier(s) identified below test value of 19.63

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

```
<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)
-----------------------------------------------------------------
|        Log Transform:          |                                |
|          FLOW, cfs             |        Number of Events        |
|--------------------------------|--------------------------------|
|  Mean                  2.796   |  Historic Events           1   |
|  Standard Dev          0.402   |  High Outliers          0      |
|  Station Skew         -0.765   |  Low Outliers           2      |
|  Regional Skew        -0.100   |  Zero Events            0      |
|  Weighted Skew           ---   |  Missing Events         1      |
|  Adopted Skew         -1.504   |  Systematic Events        51   |
|                                |  Historic Period         104   |
|--------------------------------|--------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
                      Computed high outlier test value = 8,019.23

    1 high outlier(s) identified above input threshold of 2,877.6

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 
   * Note - Collection of historical information and          *
   *        comparison with similar data should be explored,  *
   *        if not incorporated in this analysis.             *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                        and 1 historic event(s)


<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)
-----------------------------------------------------------------
|        Log Transform:          |                                |
|          FLOW, cfs             |        Number of Events        |
|--------------------------------|--------------------------------|
|  Mean                  2.782   |  Historic Events           1   |
|  Standard Dev          0.393   |  High Outliers          1      |
|  Station Skew         -0.811   |  Low Outliers           2      |
|  Regional Skew        -0.100   |  Zero Events            0      |
|  Weighted Skew           ---   |  Missing Events         1      |
|  Adopted Skew         -1.504   |  Systematic Events        51   |
|                                |  Historic Period         104   |
|--------------------------------|--------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)
---------------------------------------------------------------------
|     Events Analyzed        |             Ordered Events             |
|                     FLOW   |        Analysis       FLOW   Weibull   |
| Day Mon Year         cfs   |  Rank     Year         cfs   Plot Pos  |
|----------------------------|----------------------------------------|
|  08 Dec 1924       819.6   |    1      1951     2,877.6*    0.95    |
|  27 Apr 1926     1,017.6   |    2      1951     2,877.6     1.90    |
|  13 Mar 1927       638.2   |    3      1956     2,320.6     3.35    |
|  05 Apr 1928       937.0   |    4      1964     2,179.2     5.30    |
|  07 Apr 1929     1,518.2   |    5      1965     2,090.4     7.24    |
```

28 Mar 1930	381.0	6	1937	1,856.0	9.18
22 Mar 1931	417.4	7	1971	1,658.2	11.12
13 Feb 1932	1,052.8	8	1968	1,529.2	13.07
06 May 1933	312.8	9	1928	1,518.2	15.01
24 Sep 1933	41.0	10	1966	1,235.0	16.95
31 May 1935	---	11	1953	1,104.8	18.90
15 Apr 1936	824.0	12	1931	1,052.8	20.84
14 Apr 1937	845.8	13	1970	1,034.2	22.78
05 Mar 1938	1,856.0	14	1925	1,017.6	24.72
26 Mar 1939	685.0	15	1944	969.4	26.67
03 Mar 1940	323.0	16	1967	968.0	28.61
18 Mar 1941	800.6	17	1927	937.0	30.55
07 Apr 1942	622.6	18	1959	936.2	32.50
11 Mar 1943	621.2	19	1961	934.8	34.44
09 Apr 1944	802.6	20	1936	845.8	36.38
23 Apr 1945	969.4	21	1935	824.0	38.32
12 Apr 1946	144.8	22	1924	819.6	40.27
29 Nov 1946	405.8	23	1943	802.6	42.21
07 Apr 1948	541.8	24	1940	800.6	44.15
21 Mar 1949	760.6	25	1948	760.6	46.10
04 Mar 1950	343.4	26	1957	726.2	48.04
01 Jan 1951	2,877.6	27	1938	685.0	49.98
09 May 1951	163.2	28	1926	638.2	51.92
22 Jan 1952	2,877.6	29	1963	635.0	53.87
15 Mar 1953	378.0	30	1941	622.6	55.81
27 Mar 1954	1,104.8	31	1942	621.2	57.75
19 Mar 1955	112.2	32	1947	541.8	59.70
27 Aug 1955	493.8	33	1958	505.6	61.64
13 Jan 1957	2,320.6	34	1955	493.8	63.58
27 Mar 1958	726.2	35	1930	417.4	65.52
30 Sep 1958	505.6	36	1946	405.8	67.47
14 Mar 1960	936.2	37	1929	381.0	69.41
07 Apr 1961	282.2	38	1952	378.0	71.35
10 Apr 1962	934.8	39	1949	343.4	73.30
29 Mar 1963	140.0	40	1939	323.0	75.24
15 Apr 1964	635.0	41	1932	312.8	77.18
11 Jan 1965	2,179.2	42	1960	282.2	79.12
03 Jan 1966	2,090.4	43	1950	163.2	81.07
11 Dec 1966	1,235.0	44	1945	144.8	83.01
03 Apr 1968	968.0	45	1962	140.0	84.95
30 Jan 1969	1,529.2	46	1969	139.4	86.90
22 Mar 1970	139.4	47	1954	112.2	88.84
10 Sep 1970	1,034.2	48	1974	94.8	90.78
30 Dec 1971	1,658.2	49	1933	41.0	92.72
20 Jul 1972	13.4	50	1972	13.4*	94.67
04 Aug 1973	10.6	51	1973	10.6*	96.61
11 Aug 1974	94.8	52	1934	---	98.55

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.101
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,199.7	4,499.0	0.2	6,683.3	2,952.7
3,671.1	3,886.4	0.5	5,711.9	2,620.3
3,251.1	3,414.0	1.0	4,958.3	2,351.4

2,814.8	2,929.5	2.0	4,194.6	2,067.0
2,363.6	2,439.0	4.0	3,427.7	1,766.2
2,215.5	2,280.6	5.0	3,181.6	1,665.8
1,747.3	1,781.7	10.0	2,424.9	1,341.7
1,268.7	1,283.1	20.0	1,689.9	997.1
618.7	618.7	50.0	776.9	495.5
260.1	255.4	80.0	329.7	196.6
155.3	149.6	90.0	204.6	109.8
98.1	92.2	95.0	135.3	64.6
38.1	32.8	99.0	58.7	21.3

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.746	Historic Events	1
Standard Dev	0.417	High Outliers	1
Station Skew	-0.845	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.658	Missing Events	1
Adopted Skew	-0.658	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,943.8	12,642.1	0.2	21,095.1	6,699.9
8,388.5	9,388.8	0.5	15,436.1	5,300.6
6,689.0	7,326.9	1.0	11,841.1	4,338.7
5,185.1	5,564.3	2.0	8,796.7	3,460.0
3,871.2	4,078.2	4.0	6,265.7	2,664.0
3,487.7	3,654.5	5.0	5,553.9	2,425.4
2,415.9	2,489.8	10.0	3,643.6	1,738.0
1,519.5	1,544.6	20.0	2,157.9	1,131.3
589.7	589.7	50.0	777.5	448.7
211.2	207.0	80.0	283.1	149.3
119.5	114.8	90.0	167.2	78.4
73.4	68.8	95.0	107.6	44.7
28.2	24.3	99.0	46.1	14.6

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 6-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
09 Dec 1924	702.5	1	1951	2,445.7	1.92
28 Apr 1926	979.7	2	1956	1,991.7	3.85
13 Mar 1927	554.8	3	1964	1,849.2	5.77
06 Apr 1928	930.8	4	1965	1,787.0	7.69
07 Apr 1929	1,378.0	5	1937	1,632.8	9.62
10 Apr 1930	370.5	6	1971	1,412.3	11.54
23 Mar 1931	411.0	7	1928	1,378.0	13.46
14 Feb 1932	941.7	8	1968	1,314.3	15.38
06 May 1933	285.7	9	1966	1,049.5	17.31
25 Sep 1933	34.8	10	1925	979.7	19.23
31 May 1935	---	11	1967	949.7	21.15
16 Apr 1936	778.5	12	1953	947.2	23.08
16 Apr 1937	840.5	13	1931	941.7	25.00
06 Mar 1938	1,632.8	14	1959	934.0	26.92
27 Mar 1939	655.7	15	1927	930.8	28.85
04 Mar 1940	302.0	16	1961	921.0	30.77
19 Mar 1941	737.2	17	1944	917.5	32.69
07 Apr 1942	603.0	18	1970	869.8	34.62
12 Mar 1943	649.3	19	1936	840.5	36.54
09 Apr 1944	764.5	20	1935	778.5	38.46
24 Apr 1945	917.5	21	1943	764.5	40.38
25 Mar 1946	130.5	22	1940	737.2	42.31
30 Nov 1946	355.7	23	1948	726.8	44.23
08 Apr 1948	525.7	24	1924	702.5	46.15
21 Mar 1949	726.8	25	1957	667.5	48.08
05 Mar 1950	325.5	26	1938	655.7	50.00
10 May 1951	143.2	27	1942	649.3	51.92
23 Jan 1952	2,445.7	28	1963	612.0	53.85
16 Mar 1953	352.3	29	1941	603.0	55.77
28 Mar 1954	947.2	30	1926	554.8	57.69
20 Mar 1955	104.8	31	1947	525.7	59.62
27 Aug 1955	441.2	32	1958	467.5	61.54
14 Jan 1957	1,991.7	33	1955	441.2	63.46
28 Mar 1958	667.5	34	1930	411.0	65.38
01 Oct 1958	467.5	35	1929	370.5	67.31
15 Mar 1960	934.0	36	1946	355.7	69.23
07 Apr 1961	263.7	37	1952	352.3	71.15
11 Apr 1962	921.0	38	1949	325.5	73.08
30 Mar 1963	127.8	39	1939	302.0	75.00
16 Apr 1964	612.0	40	1932	285.7	76.92
12 Jan 1965	1,849.2	41	1960	263.7	78.85
04 Jan 1966	1,787.0	42	1950	143.2	80.77
12 Dec 1966	1,049.5	43	1945	130.5	82.69
03 Apr 1968	949.7	44	1969	128.3	84.62
30 Jan 1969	1,314.3	45	1962	127.8	86.54
23 Mar 1970	128.3	46	1954	104.8	88.46
11 Sep 1970	869.8	47	1974	79.6	90.38
31 Dec 1971	1,412.3	48	1933	34.8	92.31
20 Jul 1972	11.9	49	1972	11.9*	94.23
05 Aug 1973	9.4	50	1973	9.4*	96.15
12 Aug 1974	79.6	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>

Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,056.0	2,070.0	0.2	3,120.2	1,472.4
2,018.1	2,034.4	0.5	3,054.7	1,447.6
1,971.0	1,990.2	1.0	2,973.4	1,416.6
1,898.3	1,918.6	2.0	2,848.7	1,368.6
1,786.7	1,807.5	4.0	2,659.1	1,294.5
1,739.4	1,760.9	5.0	2,579.3	1,262.9
1,544.2	1,559.7	10.0	2,254.3	1,131.2
1,249.9	1,259.4	20.0	1,778.1	928.3
639.8	639.8	50.0	857.4	485.6
212.6	206.8	80.0	283.7	152.2
98.1	92.1	90.0	138.3	63.6
46.4	41.6	95.0	70.6	26.7
8.6	6.4	99.0	16.1	3.7

<< Conditional Statistics >>

Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.676	Historic Events	0
Standard Dev	0.515	High Outliers	0
Station Skew	-1.591	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.591	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>

Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,055.2	---	0.2	---	---
2,016.8	---	0.5	---	---
1,968.9	---	1.0	---	---
1,895.6	---	2.0	---	---
1,782.6	---	4.0	---	---
1,734.0	---	5.0	---	---
1,535.9	---	10.0	---	---
1,238.3	---	20.0	---	---
622.6	---	50.0	---	---
191.8	---	80.0	---	---
78.2	---	90.0	---	---
27.8	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 17.83

2 low outlier(s) identified below test value of 17.83

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.758	Historic Events	1
Standard Dev	0.400	High Outliers	0
Station Skew	-0.917	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.591	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 7,242.43

0 high outlier(s) identified above input threshold of 2,445.7

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.751	Historic Events	1
Standard Dev	0.395	High Outliers	0
Station Skew	-0.927	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.591	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
09 Dec 1924	702.5	1	1951	2,445.7	0.95
28 Apr 1926	979.7	2	1951	2,445.7	2.39
13 Mar 1927	554.8	3	1956	1,991.7	4.31
06 Apr 1928	930.8	4	1964	1,849.2	6.24
07 Apr 1929	1,378.0	5	1965	1,787.0	8.16
10 Apr 1930	370.5	6	1937	1,632.8	10.08
23 Mar 1931	411.0	7	1971	1,412.3	12.01

14 Feb 1932	941.7	8	1928	1,378.0	13.93
06 May 1933	285.7	9	1968	1,314.3	15.85
25 Sep 1933	34.8	10	1966	1,049.5	17.78
31 May 1935	---	11	1925	979.7	19.70
16 Apr 1936	778.5	12	1967	949.7	21.62
16 Apr 1937	840.5	13	1953	947.2	23.55
06 Mar 1938	1,632.8	14	1931	941.7	25.47
27 Mar 1939	655.7	15	1959	934.0	27.39
04 Mar 1940	302.0	16	1927	930.8	29.32
19 Mar 1941	737.2	17	1961	921.0	31.24
07 Apr 1942	603.0	18	1944	917.5	33.17
12 Mar 1943	649.3	19	1970	869.8	35.09
09 Apr 1944	764.5	20	1936	840.5	37.01
24 Apr 1945	917.5	21	1935	778.5	38.94
25 Mar 1946	130.5	22	1943	764.5	40.86
30 Nov 1946	355.7	23	1940	737.2	42.78
08 Apr 1948	525.7	24	1948	726.8	44.71
21 Mar 1949	726.8	25	1924	702.5	46.63
05 Mar 1950	325.5	26	1957	667.5	48.55
01 Jan 1951	2,445.7	27	1938	655.7	50.48
10 May 1951	143.2	28	1942	649.3	52.40
23 Jan 1952	2,445.7	29	1963	612.0	54.32
16 Mar 1953	352.3	30	1941	603.0	56.25
28 Mar 1954	947.2	31	1926	554.8	58.17
20 Mar 1955	104.8	32	1947	525.7	60.09
27 Aug 1955	441.2	33	1958	467.5	62.02
14 Jan 1957	1,991.7	34	1955	441.2	63.94
28 Mar 1958	667.5	35	1930	411.0	65.86
01 Oct 1958	467.5	36	1929	370.5	67.79
15 Mar 1960	934.0	37	1946	355.7	69.71
07 Apr 1961	263.7	38	1952	352.3	71.63
11 Apr 1962	921.0	39	1949	325.5	73.56
30 Mar 1963	127.8	40	1939	302.0	75.48
16 Apr 1964	612.0	41	1932	285.7	77.40
12 Jan 1965	1,849.2	42	1960	263.7	79.33
04 Jan 1966	1,787.0	43	1950	143.2	81.25
12 Dec 1966	1,049.5	44	1945	130.5	83.17
03 Apr 1968	949.7	45	1969	128.3	85.10
30 Jan 1969	1,314.3	46	1962	127.8	87.02
23 Mar 1970	128.3	47	1954	104.8	88.94
11 Sep 1970	869.8	48	1974	79.6	90.87
31 Dec 1971	1,412.3	49	1933	34.8	92.79
20 Jul 1972	11.9	50	1972	11.9*	94.72
05 Aug 1973	9.4	51	1973	9.4*	96.64
12 Aug 1974	79.6	52	1934	---	98.56

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 2.0196

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.117
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,740.2	3,979.9	0.2	5,920.6	2,637.5
3,307.1	3,484.1	0.5	5,129.0	2,364.0
2,954.5	3,091.6	1.0	4,498.7	2,137.7
2,580.5	2,679.1	2.0	3,845.2	1,893.6
2,185.4	2,251.8	4.0	3,174.0	1,630.2

2,053.9	2,111.8	5.0	2,955.4	1,541.1
1,632.5	1,663.6	10.0	2,272.9	1,249.9
1,192.7	1,206.0	20.0	1,595.2	934.1
581.8	581.8	50.0	733.4	464.6
240.5	236.0	80.0	305.8	181.2
141.3	135.8	90.0	186.9	99.3
87.7	82.1	95.0	121.6	57.3
32.6	27.8	99.0	50.7	17.9

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.714	Historic Events	1
Standard Dev	0.423	High Outliers	0
Station Skew	-0.967	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.724	Missing Events	1
Adopted Skew	-0.724	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,168.2	11,746.1	0.2	19,600.1	6,225.1
7,794.0	8,723.4	0.5	14,342.1	4,924.9
6,215.0	6,807.6	1.0	11,001.9	4,031.2
4,817.6	5,169.9	2.0	8,173.3	3,214.7
3,596.9	3,789.2	4.0	5,821.6	2,475.2
3,240.5	3,395.5	5.0	5,160.3	2,253.5
2,244.7	2,313.4	10.0	3,385.3	1,614.9
1,411.8	1,435.1	20.0	2,005.0	1,051.2
547.9	547.9	50.0	722.4	416.9
196.3	192.3	80.0	263.1	138.7
111.1	106.7	90.0	155.3	72.9
68.2	63.9	95.0	100.0	41.5
26.2	22.6	99.0	42.8	13.6

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 7-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
10	Dec	1924	617.9	1	1951	2,128.1*	1.92
28	Apr	1926	944.4	2	1956	1,753.3	3.85
13	Mar	1927	493.9	3	1964	1,608.1	5.77
07	Apr	1928	896.4	4	1965	1,562.9	7.69
07	Apr	1929	1,272.7	5	1937	1,446.4	9.62
11	Apr	1930	356.4	6	1928	1,272.7	11.54
24	Mar	1931	408.0	7	1971	1,228.6	13.46
15	Feb	1932	850.3	8	1968	1,161.7	15.38
04	Apr	1933	264.7	9	1925	944.4	17.31
26	Sep	1933	30.4	10	1966	913.9	19.23
31	May	1935	---	11	1967	913.3	21.15
16	Apr	1936	744.1	12	1959	902.0	23.08
16	Apr	1937	831.6	13	1961	898.0	25.00
07	Mar	1938	1,446.4	14	1927	896.4	26.92
27	Mar	1939	629.6	15	1944	868.7	28.85
05	Mar	1940	281.4	16	1931	850.3	30.77
20	Mar	1941	709.0	17	1953	839.3	32.69
07	Apr	1942	578.7	18	1936	831.6	34.62
12	Mar	1943	662.3	19	1970	749.9	36.54
10	Apr	1944	734.6	20	1935	744.1	38.46
24	Apr	1945	868.7	21	1943	734.6	40.38
25	Mar	1946	122.1	22	1948	715.4	42.31
01	Dec	1946	317.1	23	1940	709.0	44.23
11	Apr	1948	525.9	24	1942	662.3	46.15
15	Apr	1949	715.4	25	1938	629.6	48.08
06	Mar	1950	307.4	26	1957	627.9	50.00
11	May	1951	126.7	27	1924	617.9	51.92
24	Jan	1952	2,128.1	28	1963	591.3	53.85
17	Mar	1953	334.6	29	1941	578.7	55.77
29	Mar	1954	839.3	30	1947	525.9	57.69
21	Mar	1955	97.1	31	1926	493.9	59.62
27	Aug	1955	410.0	32	1958	425.1	61.54
15	Jan	1957	1,753.3	33	1955	410.0	63.46
29	Mar	1958	627.9	34	1930	408.0	65.38
02	Oct	1958	425.1	35	1929	356.4	67.31
15	Mar	1960	902.0	36	1952	334.6	69.23
08	Apr	1961	246.4	37	1946	317.1	71.15
11	Apr	1962	898.0	38	1949	307.4	73.08
31	Mar	1963	120.0	39	1939	281.4	75.00
17	Apr	1964	591.3	40	1932	264.7	76.92
13	Jan	1965	1,608.1	41	1960	246.4	78.85
05	Jan	1966	1,562.9	42	1950	126.7	80.77
13	Dec	1966	913.9	43	1945	122.1	82.69
03	Apr	1968	913.3	44	1962	120.0	84.62
30	Jan	1969	1,161.7	45	1969	119.1	86.54
24	Mar	1970	119.1	46	1954	97.1	88.46
12	Sep	1970	749.9	47	1974	73.2	90.38
01	Jan	1972	1,228.6	48	1933	30.4	92.31
20	Jul	1972	10.8	49	1972	10.8*	94.23
06	Aug	1973	8.9	50	1973	8.9*	96.15
07	Aug	1974	73.2	51	1934	---	98.08

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
1,826.7	1,836.8	0.2	2,753.7	1,313.7
1,798.3	1,810.5	0.5	2,705.0	1,295.0
1,762.0	1,776.8	1.0	2,642.8	1,271.0
1,704.4	1,720.5	2.0	2,544.8	1,232.8
1,613.5	1,630.5	4.0	2,391.0	1,172.1
1,574.2	1,592.1	5.0	2,325.2	1,145.8
1,408.8	1,422.0	10.0	2,050.9	1,033.9
1,151.7	1,160.1	20.0	1,636.1	856.3
598.6	598.6	50.0	802.1	454.7
199.6	194.1	80.0	266.1	143.2
91.7	86.1	90.0	129.1	59.6
43.0	38.6	95.0	65.5	24.8
7.8	5.8	99.0	14.6	3.3

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.644	Historic Events	0
Standard Dev	0.513	High Outliers	0
Station Skew	-1.642	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.642	Systematic Events	51

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
1,826.1	---	0.2	---	---
1,797.3	---	0.5	---	---
1,760.4	---	1.0	---	---
1,702.2	---	2.0	---	---
1,610.0	---	4.0	---	---
1,569.6	---	5.0	---	---
1,401.6	---	10.0	---	---
1,141.4	---	20.0	---	---
582.7	---	50.0	---	---
180.0	---	80.0	---	---
72.9	---	90.0	---	---
25.7	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 50 events, 10 percent outlier test deviate K(N) = 2.768
Computed low outlier test value = 16.68

2 low outlier(s) identified below test value of 16.68

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 2 low outlier(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.725	Historic Events	1
Standard Dev	0.398	High Outliers	0
Station Skew	-1.027	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.642	Systematic Events	51
		Historic Period	104

<< High Outlier Test >>

Based on 48 events, 10 percent outlier test deviate K(N) = 2.753
Computed high outlier test value = 6,613.81

1 high outlier(s) identified above input threshold of 2,128.1

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and         *
*        comparison with similar data should be explored, *
*        if not incorporated in this analysis.            *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.712	Historic Events	1
Standard Dev	0.390	High Outliers	1
Station Skew	-1.060	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.642	Systematic Events	51
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
10 Dec 1924	617.9	1	1951	2,128.1*	0.95
28 Apr 1926	944.4	2	1951	2,128.1	1.90
13 Mar 1927	493.9	3	1956	1,753.3	3.35

07 Apr 1928	896.4	4	1964	1,608.1	5.30
07 Apr 1929	1,272.7	5	1965	1,562.9	7.24
11 Apr 1930	356.4	6	1937	1,446.4	9.18
24 Mar 1931	408.0	7	1928	1,272.7	11.12
15 Feb 1932	850.3	8	1971	1,228.6	13.07
04 Apr 1933	264.7	9	1968	1,161.7	15.01
26 Sep 1933	30.4	10	1925	944.4	16.95
31 May 1935	---	11	1966	913.9	18.90
16 Apr 1936	744.1	12	1967	913.3	20.84
16 Apr 1937	831.6	13	1959	902.0	22.78
07 Mar 1938	1,446.4	14	1961	898.0	24.72
27 Mar 1939	629.6	15	1927	896.4	26.67
05 Mar 1940	281.4	16	1944	868.7	28.61
20 Mar 1941	709.0	17	1931	850.3	30.55
07 Apr 1942	578.7	18	1953	839.3	32.50
12 Mar 1943	662.3	19	1936	831.6	34.44
10 Apr 1944	734.6	20	1970	749.9	36.38
24 Apr 1945	868.7	21	1935	744.1	38.32
25 Mar 1946	122.1	22	1943	734.6	40.27
01 Dec 1946	317.1	23	1948	715.4	42.21
11 Apr 1948	525.9	24	1940	709.0	44.15
15 Apr 1949	715.4	25	1942	662.3	46.10
06 Mar 1950	307.4	26	1938	629.6	48.04
01 Jan 1951	2,128.1	27	1957	627.9	49.98
11 May 1951	126.7	28	1924	617.9	51.92
24 Jan 1952	2,128.1	29	1963	591.3	53.87
17 Mar 1953	334.6	30	1941	578.7	55.81
29 Mar 1954	839.3	31	1947	525.9	57.75
21 Mar 1955	97.1	32	1926	493.9	59.70
27 Aug 1955	410.0	33	1958	425.1	61.64
15 Jan 1957	1,753.3	34	1955	410.0	63.58
29 Mar 1958	627.9	35	1930	408.0	65.52
02 Oct 1958	425.1	36	1929	356.4	67.47
15 Mar 1960	902.0	37	1952	334.6	69.41
08 Apr 1961	246.4	38	1946	317.1	71.35
11 Apr 1962	898.0	39	1949	307.4	73.30
31 Mar 1963	120.0	40	1939	281.4	75.24
17 Apr 1964	591.3	41	1932	264.7	77.18
13 Jan 1965	1,608.1	42	1960	246.4	79.12
05 Jan 1966	1,562.9	43	1950	126.7	81.07
13 Dec 1966	913.9	44	1945	122.1	83.01
03 Apr 1968	913.3	45	1962	120.0	84.95
30 Jan 1969	1,161.7	46	1969	119.1	86.90
24 Mar 1970	119.1	47	1954	97.1	88.84
12 Sep 1970	749.9	48	1974	73.2	90.78
01 Jan 1972	1,228.6	49	1933	30.4	92.72
20 Jul 1972	10.8	50	1972	10.8*	94.67
06 Aug 1973	8.9	51	1973	8.9*	96.61
07 Aug 1974	73.2	52	1934	---	98.55

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 2.04

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew =	0.141
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,180.0	3,360.1	0.2	4,976.3	2,259.7

2,846.4	2,983.2	0.5	4,373.8	2,047.3
2,567.9	2,676.5	1.0	3,880.7	1,867.3
2,265.7	2,345.7	2.0	3,356.8	1,668.8
1,939.1	1,994.4	4.0	2,805.1	1,450.2
1,828.7	1,877.3	5.0	2,622.4	1,375.1
1,469.2	1,495.8	10.0	2,042.1	1,126.0
1,084.7	1,096.4	20.0	1,450.5	849.7
535.0	535.0	50.0	674.6	427.3
220.4	216.2	80.0	280.2	166.2
128.4	123.4	90.0	169.9	90.3
78.9	73.8	95.0	109.5	51.4
28.5	24.2	99.0	44.6	15.6

<< Synthetic Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.673	Historic Events	1
Standard Dev	0.423	High Outliers	1
Station Skew	-1.110	Low Outliers	2
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.788	Missing Events	1
Adopted Skew	-0.788	Systematic Events	51
		Historic Period	104

<< User Frequency Curve >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,257.4	10,694.1	0.2	17,844.5	5,667.5
7,095.9	7,942.1	0.5	13,057.5	4,483.8
5,658.3	6,197.9	1.0	10,016.5	3,670.1
4,386.1	4,706.9	2.0	7,441.2	2,926.8
3,274.7	3,449.8	4.0	5,300.2	2,253.5
2,950.3	3,091.4	5.0	4,698.1	2,051.6
2,043.6	2,106.2	10.0	3,082.1	1,470.2
1,285.4	1,306.6	20.0	1,825.4	957.0
498.8	498.8	50.0	657.7	379.5
178.7	175.1	80.0	239.5	126.3
101.1	97.1	90.0	141.4	66.3
62.1	58.2	95.0	91.1	37.8
23.8	20.6	99.0	39.0	12.4

<< User Statistics >>
Chevelon near Winslow 09398000-Chevelon near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.511		
User Skew	-0.289		

Note: No ordinates specified for graphical frequency curve

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Volume-Duration Analysis
  16 Sep 2011   05:14 PM
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--- Input Data ---

Analysis Name: Clear Creek near Winslow 09398500
Description:

Data Set Name: Clear Creek near Winslow 09398500-Clear Creek near Winslow-
FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR
Winslow\Analysis\Volume_Frequency_Analysi/Clear Creek at
Winslow/FLOW//1DAY/09398500/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Clear_Creek_near_Winslow_09398500\
Clear_Creek_near_Winslow_09398500.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Clear_Creek_near_Winslow_09398500\
Clear_Creek_near_Winslow_09398500.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 31 May 1947
Record End Date:   12 Oct 1992


User-Specified Durations
   Duration:   1 day
   Duration:   2 days
   Duration:   3 days
   Duration:   4 days
   Duration:   5 days
   Duration:   6 days
   Duration:   7 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
   Frequency: 0.2
   Frequency: 0.5
   Frequency: 1.0
   Frequency: 2.0
   Frequency: 4.0
   Frequency: 5.0
   Frequency: 10.0
   Frequency: 20.0
   Frequency: 50.0
   Frequency: 80.0
   Frequency: 90.0
   Frequency: 95.0
   Frequency: 99.0
```

```
Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1946
Historic Period End Year: 2008

  1-day Historic Events
  Year: 1978   Value: 9,300

  2-day Historic Events
  Year: 1978   Value: 8,400

  3-day Historic Events
  Year: 1978   Value: 6,180

  4-day Historic Events
  Year: 1978   Value: 4,844

  5-day Historic Events
  Year: 1978   Value: 3,980

  6-day Historic Events
  Year: 1978   Value: 3,375

  7-day Historic Events
  Year: 1978   Value: 2,926

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---



====================================================================
Statistical Analysis of 1-day Maximum values
====================================================================

Note: Data is missing for all or part of 6 years in analysis period.


Warning: 1 events occur in first 6 days of analysis year for 1-day
duration.

Suggest reviewing data and changing the year/season specification on the
General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)
--------------------------------------------------------------------
|     Events Analyzed        |            Ordered Events              |
|                    FLOW    |       Analysis        FLOW   Weibull   |
| Day Mon Year        cfs    |  Rank     Year         cfs   Plot Pos  |
|----------------------------|----------------------------------------|
|  12 Apr 1948     1,460.0   |    1       1978     9,300.0*   2.13    |
|  14 Apr 1949     1,580.0   |    2       1965     7,150.0    4.26    |
```

28 Feb 1950	942.0	3	1977	6,100.0	6.38
05 May 1951	574.0	4	1966	6,020.0	8.51
18 Jan 1952	5,600.0	5	1951	5,600.0	10.64
11 Mar 1953	442.0	6	1970	5,000.0	12.77
23 Mar 1954	3,620.0	7	1956	4,710.0	14.89
16 Mar 1955	156.0	8	1979	4,620.0	17.02
24 Aug 1955	831.0	9	1968	3,740.0	19.15
09 Jan 1957	4,710.0	10	1964	3,640.0	21.28
23 Mar 1958	1,710.0	11	1953	3,620.0	23.40
13 Sep 1958	910.0	12	1984	3,540.0	25.53
25 Dec 1959	1,410.0	13	1972	3,350.0	27.66
05 Apr 1961	886.0	14	1981	3,220.0	29.79
13 Feb 1962	1,900.0	15	1971	2,850.0	31.91
11 Feb 1963	326.0	16	1990	2,240.0	34.04
16 Apr 1964	1,020.0	17	1985	1,960.0	36.17
07 Jan 1965	3,640.0	18	1961	1,900.0	38.30
30 Dec 1965	7,150.0	19	1975	1,860.0	40.43
07 Dec 1966	6,020.0	20	1982	1,750.0	42.55
02 Apr 1968	1,570.0	21	1957	1,710.0	44.68
26 Jan 1969	3,740.0	22	1948	1,580.0	46.81
02 Mar 1970	433.0	23	1967	1,570.0	48.94
06 Sep 1970	5,000.0	24	1983	1,490.0	51.06
26 Dec 1971	2,850.0	25	1947	1,460.0	53.19
20 Oct 1972	3,350.0	26	1959	1,410.0	55.32
21 Mar 1974	515.0	27	1963	1,020.0	57.45
23 Apr 1975	769.0	28	1987	968.0	59.57
10 Feb 1976	1,860.0	29	1949	942.0	61.70
10 Apr 1977	295.0	30	1986	931.0	63.83
01 Mar 1978	6,100.0	31	1958	910.0	65.96
18 Dec 1978	9,300.0	32	1960	886.0	68.09
20 Feb 1980	4,620.0	33	1955	831.0	70.21
08 Apr 1981	218.0	34	1974	769.0	72.34
12 Mar 1982	3,220.0	35	1950	574.0	74.47
25 Apr 1983	1,750.0	36	1973	515.0	76.60
27 Dec 1983	1,490.0	37	1988	488.0	78.72
12 Mar 1985	3,540.0	38	1952	442.0	80.85
26 Nov 1985	1,960.0	39	1969	433.0	82.98
12 Apr 1987	931.0	40	1962	326.0	85.11
27 Apr 1988	968.0	41	1976	295.0	87.23
11 Mar 1989	488.0	42	1980	218.0	89.36
06 Apr 1990	156.0	43	1989	156.0	91.49
08 Apr 1991	2,240.0	44	1954	156.0	93.62
05 Jun 1991	1.0	45	1992	65.0	95.74
06 Oct 1992	65.0	46	1991	1.0*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew = 0.61
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
23,725.2	26,078.9	0.2	50,420.7	13,456.5
19,991.6	21,676.0	0.5	41,229.5	11,561.1
17,038.8	18,304.4	1.0	34,185.2	10,028.8
14,018.8	14,888.8	2.0	27,215.5	8,424.9
10,988.9	11,540.0	4.0	20,500.4	6,769.4
10,023.6	10,493.5	5.0	18,428.0	6,230.1
7,104.8	7,331.5	10.0	12,394.7	4,555.4
4,400.7	4,484.1	20.0	7,191.6	2,924.0
1,432.8	1,432.8	50.0	2,117.1	982.2
347.8	336.2	80.0	519.7	215.9

```
|       146.4       136.3 |     90.0     |       233.9        80.6 |
|        67.0        59.5 |     95.0     |       116.0        32.4 |
|        13.0         9.7 |     99.0     |        27.6         4.7 |
|-------------------------|--------------|-------------------------|


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                 3.067  |  Historic Events           0  |
|  Standard Dev         0.674  |  High Outliers          0     |
|  Station Skew        -2.234  |  Low Outliers           0     |
|  Regional Skew       -0.100  |  Zero Events            0     |
|  Weighted Skew       -0.806  |  Missing Events         0     |
|  Adopted Skew        -0.806  |  Systematic Events        46  |
|------------------------------|-------------------------------|

--- End of Preliminary Results ---




----------------------
<< Low Outlier Test >>
----------------------
 Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
                         Computed low outlier test value = 16.68

            1 low outlier(s) identified below test value of 16.68


     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                 3.153  |  Historic Events           1  |
|  Standard Dev         0.506  |  High Outliers          0     |
|  Station Skew        -0.518  |  Low Outliers           1     |
|  Regional Skew       -0.100  |  Zero Events            0     |
|  Weighted Skew       -0.806  |  Missing Events         0     |
|  Adopted Skew        -0.806  |  Systematic Events        46  |
|                              |  Historic Period          63  |
|------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
                    Computed high outlier test value = 34,058.04

      1 high outlier(s) identified above input threshold of 9,300

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and         *
   *        comparison with similar data should be explored, *
   *        if not incorporated in this analysis.            *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                          and 1 historic event(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)
```

Log Transform: FLOW, cfs		Number of Events	
Mean	3.143	Historic Events	1
Standard Dev	0.499	High Outliers	1
Station Skew	-0.530	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.806	Missing Events	0
Adopted Skew	-0.806	Systematic Events	46
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12	Apr	1948	1,460.0	1	1978	9,300.0*	1.56
14	Apr	1949	1,580.0	2	1978	9,300.0	3.12
28	Feb	1950	942.0	3	1965	7,150.0	4.97
05	May	1951	574.0	4	1977	6,100.0	7.08
18	Jan	1952	5,600.0	5	1966	6,020.0	9.20
11	Mar	1953	442.0	6	1951	5,600.0	11.32
23	Mar	1954	3,620.0	7	1970	5,000.0	13.44
16	Mar	1955	156.0	8	1956	4,710.0	15.56
24	Aug	1955	831.0	9	1979	4,620.0	17.67
09	Jan	1957	4,710.0	10	1968	3,740.0	19.79
23	Mar	1958	1,710.0	11	1964	3,640.0	21.91
13	Sep	1958	910.0	12	1953	3,620.0	24.03
25	Dec	1959	1,410.0	13	1984	3,540.0	26.15
05	Apr	1961	886.0	14	1972	3,350.0	28.26
13	Feb	1962	1,900.0	15	1981	3,220.0	30.38
11	Feb	1963	326.0	16	1971	2,850.0	32.50
16	Apr	1964	1,020.0	17	1990	2,240.0	34.62
07	Jan	1965	3,640.0	18	1985	1,960.0	36.74
30	Dec	1965	7,150.0	19	1961	1,900.0	38.85
07	Dec	1966	6,020.0	20	1975	1,860.0	40.97
02	Apr	1968	1,570.0	21	1982	1,750.0	43.09
26	Jan	1969	3,740.0	22	1957	1,710.0	45.21
02	Mar	1970	433.0	23	1948	1,580.0	47.33
06	Sep	1970	5,000.0	24	1967	1,570.0	49.44
26	Dec	1971	2,850.0	25	1983	1,490.0	51.56
20	Oct	1972	3,350.0	26	1947	1,460.0	53.68
21	Mar	1974	515.0	27	1959	1,410.0	55.80
23	Apr	1975	769.0	28	1963	1,020.0	57.92
10	Feb	1976	1,860.0	29	1987	968.0	60.03
10	Apr	1977	295.0	30	1949	942.0	62.15
01	Jan	1978	9,300.0	31	1986	931.0	64.27
01	Mar	1978	6,100.0	32	1958	910.0	66.39
18	Dec	1978	9,300.0	33	1960	886.0	68.51
20	Feb	1980	4,620.0	34	1955	831.0	70.62
08	Apr	1981	218.0	35	1974	769.0	72.74
12	Mar	1982	3,220.0	36	1950	574.0	74.86
25	Apr	1983	1,750.0	37	1973	515.0	76.98
27	Dec	1983	1,490.0	38	1988	488.0	79.10
12	Mar	1985	3,540.0	39	1952	442.0	81.22
26	Nov	1985	1,960.0	40	1969	433.0	83.33
12	Apr	1987	931.0	41	1962	326.0	85.45
27	Apr	1988	968.0	42	1976	295.0	87.57
11	Mar	1989	488.0	43	1980	218.0	89.69

06 Apr 1990	156.0	44	1989	156.0	91.81
08 Apr 1991	2,240.0	45	1954	156.0	93.92
05 Jun 1991	1.0	46	1992	65.0	96.04
06 Oct 1992	65.0	47	1991	1.0*	98.16

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3556

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew =	0.117
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,642.9	24,821.1	0.2	41,778.4	13,315.5
17,203.0	19,174.0	0.5	31,831.7	10,885.4
14,106.5	15,419.0	1.0	25,182.2	9,138.9
11,249.2	12,063.0	2.0	19,295.2	7,479.2
8,643.5	9,108.4	4.0	14,174.6	5,913.3
7,860.2	8,241.1	5.0	12,689.3	5,430.4
5,605.3	5,780.9	10.0	8,580.6	3,999.3
3,629.0	3,691.4	20.0	5,230.8	2,676.8
1,458.6	1,458.6	50.0	1,944.1	1,099.6
525.8	514.0	80.0	710.9	366.8
294.9	281.8	90.0	417.1	189.8
178.7	165.8	95.0	265.9	105.9
65.8	55.3	99.0	110.3	32.5

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.131	Historic Events	1
Standard Dev	0.502	High Outliers	1
Station Skew	-0.515	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.399	Missing Events	0
Adopted Skew	-0.399	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,662.8	24,846.1	0.2	41,824.7	13,325.9
17,216.4	19,190.1	0.5	31,861.7	10,892.6
14,115.9	15,430.1	1.0	25,202.8	9,144.1
11,255.5	12,070.2	2.0	19,308.4	7,482.7
8,647.3	9,112.6	4.0	14,182.3	5,915.5
7,863.3	8,244.6	5.0	12,695.6	5,432.2
5,606.8	5,782.6	10.0	8,583.6	4,000.1

3,629.5	3,692.0	20.0	5,231.8	2,677.1
1,458.5	1,458.5	50.0	1,944.1	1,099.5
525.7	513.9	80.0	710.8	366.7
294.9	281.7	90.0	417.0	189.7
178.6	165.8	95.0	265.8	105.9
65.8	55.3	99.0	110.3	32.5

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 2-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 7 days of analysis year for 2-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,435.0	1	1978	8,400.0*	2.13
15 Apr 1949	1,580.0	2	1966	5,265.0	4.26
01 Mar 1950	792.5	3	1965	5,060.0	6.38
06 May 1951	481.0	4	1951	4,700.0	8.51
19 Jan 1952	4,700.0	5	1956	4,295.0	10.64
12 Mar 1953	412.0	6	1977	4,250.0	12.77
24 Mar 1954	2,620.0	7	1979	3,760.0	14.89
16 Mar 1955	152.5	8	1968	3,240.0	17.02
25 Aug 1955	769.5	9	1972	3,050.0	19.15
10 Jan 1957	4,295.0	10	1970	2,900.0	21.28
23 Mar 1958	1,670.0	11	1964	2,750.0	23.40
29 Sep 1958	757.0	12	1984	2,645.0	25.53
26 Dec 1959	1,325.0	13	1953	2,620.0	27.66
05 Apr 1961	838.0	14	1981	2,585.0	29.79
14 Feb 1962	1,610.0	15	1971	2,340.0	31.91
12 Feb 1963	255.5	16	1990	2,120.0	34.04
17 Apr 1964	1,010.0	17	1982	1,715.0	36.17
08 Jan 1965	2,750.0	18	1957	1,670.0	38.30
31 Dec 1965	5,060.0	19	1975	1,625.0	40.43
07 Dec 1966	5,265.0	20	1961	1,610.0	42.55
02 Apr 1968	1,395.0	21	1948	1,580.0	44.68
27 Jan 1969	3,240.0	22	1947	1,435.0	46.81
03 Mar 1970	340.0	23	1967	1,395.0	48.94
07 Sep 1970	2,900.0	24	1985	1,394.0	51.06
27 Dec 1971	2,340.0	25	1959	1,325.0	53.19
27 Apr 1973	3,050.0	26	1983	1,280.0	55.32

22 Mar 1974	466.0	27	1963	1,010.0	57.45
23 Apr 1975	735.5	28	1987	940.5	59.57
23 Apr 1976	1,625.0	29	1986	921.5	61.70
10 Apr 1977	294.5	30	1960	838.0	63.83
02 Mar 1978	4,250.0	31	1949	792.5	65.96
19 Dec 1978	8,400.0	32	1955	769.5	68.09
20 Feb 1980	3,760.0	33	1958	757.0	70.21
09 Apr 1981	206.5	34	1974	735.5	72.34
13 Mar 1982	2,585.0	35	1950	481.0	74.47
26 Apr 1983	1,715.0	36	1988	468.0	76.60
28 Dec 1983	1,280.0	37	1973	466.0	78.72
13 Mar 1985	2,645.0	38	1952	412.0	80.85
27 Nov 1985	1,394.0	39	1969	340.0	82.98
12 Apr 1987	921.5	40	1976	294.5	85.11
27 Apr 1988	940.5	41	1962	255.5	87.23
11 Mar 1989	468.0	42	1980	206.5	89.36
07 Apr 1990	153.5	43	1989	153.5	91.49
08 Apr 1991	2,120.0	44	1954	152.5	93.62
05 Jun 1991	0.9	45	1992	59.0	95.74
07 Oct 1992	59.0	46	1991	0.9*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew = 0.678
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
19,106.8	20,955.2	0.2	39,803.9	11,001.4
16,166.7	17,494.6	0.5	32,706.2	9,486.6
13,833.0	14,834.4	1.0	27,243.0	8,258.1
11,436.6	12,128.1	2.0	21,812.0	6,967.6
9,020.1	9,460.7	4.0	16,548.0	5,629.5
8,247.1	8,623.6	5.0	14,915.6	5,192.0
5,897.6	6,080.9	10.0	10,135.2	3,827.1
3,699.0	3,767.3	20.0	5,964.9	2,485.2
1,241.0	1,241.0	50.0	1,814.3	859.5
313.1	302.9	80.0	462.8	196.9
135.0	125.9	90.0	212.9	75.5
63.1	56.2	95.0	107.7	31.1
12.9	9.7	99.0	26.7	4.7

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.007	Historic Events	0
Standard Dev	0.656	High Outliers	0
Station Skew	-2.386	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.804	Missing Events	0
Adopted Skew	-0.804	Systematic Events	46

--- End of Preliminary Results ---

```
----------------------
<< Low Outlier Test >>
----------------------
 Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
                         Computed low outlier test value = 16.32

           1 low outlier(s) identified below test value of 16.32


     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:         |                               |
|          FLOW, cfs            |       Number of Events        |
|-------------------------------|-------------------------------|
|  Mean                 3.093   |  Historic Events          1   |
|  Standard Dev         0.485   |  High Outliers         0      |
|  Station Skew        -0.566   |  Low Outliers          1      |
|  Regional Skew       -0.100   |  Zero Events           0      |
|  Weighted Skew       -0.804   |  Missing Events        0      |
|  Adopted Skew        -0.804   |  Systematic Events       46   |
|                               |  Historic Period         63   |
|-------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
                    Computed high outlier test value = 26,055.45

      1 high outlier(s) identified above input threshold of 8,400

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 
   * Note - Collection of historical information and          *
   *        comparison with similar data should be explored,  *
   *        if not incorporated in this analysis.             *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                          and 1 historic event(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)
----------------------------------------------------------------
|        Log Transform:         |                               |
|          FLOW, cfs            |       Number of Events        |
|-------------------------------|-------------------------------|
|  Mean                 3.083   |  Historic Events          1   |
|  Standard Dev         0.478   |  High Outliers         1      |
|  Station Skew        -0.590   |  Low Outliers          1      |
|  Regional Skew       -0.100   |  Zero Events           0      |
|  Weighted Skew       -0.804   |  Missing Events        0      |
|  Adopted Skew        -0.804   |  Systematic Events       46   |
|                               |  Historic Period         63   |
|-------------------------------|-------------------------------|


Note: Statistics and frequency curve were modified
using conditional probablity adjustment.




--- Final Results ---

<< Plotting Positions >>
```

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,435.0	1	1978	8,400.0*	1.56
15 Apr 1949	1,580.0	2	1978	8,400.0	3.12
01 Mar 1950	792.5	3	1966	5,265.0	4.97
06 May 1951	481.0	4	1965	5,060.0	7.08
19 Jan 1952	4,700.0	5	1951	4,700.0	9.20
12 Mar 1953	412.0	6	1956	4,295.0	11.32
24 Mar 1954	2,620.0	7	1977	4,250.0	13.44
16 Mar 1955	152.5	8	1979	3,760.0	15.56
25 Aug 1955	769.5	9	1968	3,240.0	17.67
10 Jan 1957	4,295.0	10	1972	3,050.0	19.79
23 Mar 1958	1,670.0	11	1970	2,900.0	21.91
29 Sep 1958	757.0	12	1964	2,750.0	24.03
26 Dec 1959	1,325.0	13	1984	2,645.0	26.15
05 Apr 1961	838.0	14	1953	2,620.0	28.26
14 Feb 1962	1,610.0	15	1981	2,585.0	30.38
12 Feb 1963	255.5	16	1971	2,340.0	32.50
17 Apr 1964	1,010.0	17	1990	2,120.0	34.62
08 Jan 1965	2,750.0	18	1982	1,715.0	36.74
31 Dec 1965	5,060.0	19	1957	1,670.0	38.85
07 Dec 1966	5,265.0	20	1975	1,625.0	40.97
02 Apr 1968	1,395.0	21	1961	1,610.0	43.09
27 Jan 1969	3,240.0	22	1948	1,580.0	45.21
03 Mar 1970	340.0	23	1947	1,435.0	47.33
07 Sep 1970	2,900.0	24	1967	1,395.0	49.44
27 Dec 1971	2,340.0	25	1985	1,394.0	51.56
27 Apr 1973	3,050.0	26	1959	1,325.0	53.68
22 Mar 1974	466.0	27	1983	1,280.0	55.80
23 Apr 1975	735.5	28	1963	1,010.0	57.92
23 Apr 1976	1,625.0	29	1987	940.5	60.03
10 Apr 1977	294.5	30	1986	921.5	62.15
01 Jan 1978	8,400.0	31	1960	838.0	64.27
02 Mar 1978	4,250.0	32	1949	792.5	66.39
19 Dec 1978	8,400.0	33	1955	769.5	68.51
20 Feb 1980	3,760.0	34	1958	757.0	70.62
09 Apr 1981	206.5	35	1974	735.5	72.74
13 Mar 1982	2,585.0	36	1950	481.0	74.86
26 Apr 1983	1,715.0	37	1988	468.0	76.98
28 Dec 1983	1,280.0	38	1973	466.0	79.10
13 Mar 1985	2,645.0	39	1952	412.0	81.22
27 Nov 1985	1,394.0	40	1969	340.0	83.33
12 Apr 1987	921.5	41	1976	294.5	85.45
27 Apr 1988	940.5	42	1962	255.5	87.57
11 Mar 1989	468.0	43	1980	206.5	89.69
07 Apr 1990	153.5	44	1989	153.5	91.81
08 Apr 1991	2,120.0	45	1954	152.5	93.92
05 Jun 1991	0.9	46	1992	59.0	96.04
07 Oct 1992	59.0	47	1991	0.9*	98.16

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3556

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.122
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Computed	Expected	Percent	Confidence Limits

Curve FLOW, cfs	Probability FLOW, cfs	Chance Exceedance	0.05 FLOW, cfs	0.95 FLOW, cfs
15,947.9	18,055.6	0.2	29,671.0	10,075.2
12,937.2	14,281.3	0.5	23,162.7	8,383.6
10,785.0	11,701.6	1.0	18,687.2	7,140.7
8,754.0	9,336.2	2.0	14,621.8	5,935.2
6,856.4	7,198.0	4.0	10,986.9	4,772.8
6,276.1	6,558.8	5.0	9,911.6	4,408.6
4,575.1	4,709.0	10.0	6,875.9	3,311.5
3,038.1	3,087.3	20.0	4,314.7	2,268.8
1,276.2	1,276.2	50.0	1,681.7	973.4
477.7	467.3	80.0	637.8	338.4
272.5	260.6	90.0	380.1	178.5
167.1	155.4	95.0	245.0	101.0
62.7	52.9	99.0	103.4	31.7

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.071	Historic Events	1
Standard Dev	0.481	High Outliers	1
Station Skew	-0.579	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.441	Missing Events	0
Adopted Skew	-0.441	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
18,868.0	21,640.7	0.2	36,428.8	11,606.7
14,995.3	16,714.4	0.5	27,751.2	9,487.3
12,294.8	13,439.5	1.0	21,951.3	7,964.4
9,803.4	10,513.0	2.0	16,817.4	6,517.4
7,531.7	7,937.0	4.0	12,352.6	5,152.3
6,848.9	7,181.0	5.0	11,057.8	4,731.4
4,883.5	5,036.6	10.0	7,476.3	3,484.1
3,161.3	3,215.6	20.0	4,556.8	2,331.7
1,270.4	1,270.4	50.0	1,693.3	957.6
457.9	447.6	80.0	619.1	319.4
256.8	245.4	90.0	363.2	165.3
155.6	144.4	95.0	231.6	92.2
57.3	48.2	99.0	96.1	28.3

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

===
Statistical Analysis of 3-day Maximum values
===

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 8 days of analysis year for 3-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,336.7	1	1978	6,180.0*	2.13
16 Apr 1949	1,523.3	2	1977	3,986.7	4.26
02 Mar 1950	705.7	3	1966	3,933.3	6.38
06 May 1951	446.0	4	1965	3,810.0	8.51
20 Jan 1952	3,466.7	5	1956	3,670.0	10.64
29 Mar 1953	401.3	6	1951	3,466.7	12.77
25 Mar 1954	1,965.3	7	1979	3,000.0	14.89
17 Mar 1955	145.7	8	1972	2,966.7	17.02
25 Aug 1955	635.0	9	1968	2,540.0	19.15
11 Jan 1957	3,670.0	10	1981	2,243.3	21.28
24 Mar 1958	1,446.7	11	1984	2,213.3	23.40
30 Sep 1958	626.3	12	1964	2,115.7	25.53
27 Mar 1960	1,213.3	13	1970	2,033.3	27.66
06 Apr 1961	794.0	14	1953	1,965.3	29.79
14 Feb 1962	1,423.3	15	1990	1,953.3	31.91
31 Mar 1963	232.0	16	1971	1,810.7	34.04
17 Apr 1964	977.3	17	1982	1,583.3	36.17
08 Jan 1965	2,115.7	18	1975	1,536.7	38.30
01 Jan 1966	3,810.0	19	1948	1,523.3	40.43
08 Dec 1966	3,933.3	20	1957	1,446.7	42.55
02 Apr 1968	1,356.7	21	1961	1,423.3	44.68
28 Jan 1969	2,540.0	22	1967	1,356.7	46.81
04 Mar 1970	281.0	23	1947	1,336.7	48.94
08 Sep 1970	2,033.3	24	1959	1,213.3	51.06
28 Dec 1971	1,810.7	25	1983	1,053.3	53.19
28 Apr 1973	2,966.7	26	1985	1,048.7	55.32
22 Mar 1974	433.7	27	1963	977.3	57.45
24 Apr 1975	722.0	28	1986	876.0	59.57
24 Apr 1976	1,536.7	29	1987	855.7	61.70
10 Apr 1977	284.7	30	1960	794.0	63.83
03 Mar 1978	3,986.7	31	1974	722.0	65.96
20 Dec 1978	6,180.0	32	1949	705.7	68.09
21 Feb 1980	3,000.0	33	1955	635.0	70.21
09 Apr 1981	201.0	34	1958	626.3	72.34
14 Mar 1982	2,243.3	35	1950	446.0	74.47
26 Apr 1983	1,583.3	36	1988	435.7	76.60
28 Dec 1983	1,053.3	37	1973	433.7	78.72
13 Mar 1985	2,213.3	38	1952	401.3	80.85
28 Nov 1985	1,048.7	39	1976	284.7	82.98
12 Apr 1987	876.0	40	1969	281.0	85.11
28 Apr 1988	855.7	41	1962	232.0	87.23
12 Mar 1989	435.7	42	1980	201.0	89.36
08 Apr 1990	145.0	43	1954	145.7	91.49
09 Apr 1991	1,953.3	44	1989	145.0	93.62
06 Jun 1991	0.9	45	1992	51.0	95.74
08 Oct 1992	51.0	46	1991	0.9*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew = 0.753
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
15,485.1	16,956.8	0.2	31,634.3	9,049.9
13,142.6	14,201.5	0.5	26,086.7	7,825.3
11,280.3	12,080.1	1.0	21,807.8	6,830.9
9,363.8	9,917.6	2.0	17,542.2	5,784.3
7,424.8	7,779.1	4.0	13,391.1	4,696.1
6,802.7	7,105.8	5.0	12,099.3	4,339.4
4,904.4	5,053.1	10.0	8,298.7	3,222.5
3,113.2	3,169.1	20.0	4,950.9	2,116.0
1,076.4	1,076.4	50.0	1,556.2	753.5
282.8	273.9	80.0	413.3	180.3
125.1	117.0	90.0	194.7	71.2
59.9	53.5	95.0	100.6	30.2
12.8	9.7	99.0	26.0	4.9

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.948	Historic Events	0
Standard Dev	0.637	High Outliers	0
Station Skew	-2.537	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.798	Missing Events	0
Adopted Skew	-0.798	Systematic Events	46

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
Computed low outlier test value = 16.08

1 low outlier(s) identified below test value of 16.08

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.032	Historic Events	1
Standard Dev	0.462	High Outliers	0
Station Skew	-0.688	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.798	Missing Events	0

Adopted Skew	-0.798	Systematic Events	46
		Historic Period	63

<< High Outlier Test >>

Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
Computed high outlier test value = 19,579.49

1 high outlier(s) identified above input threshold of 6,180

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis.

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Systematic Statistics >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.023	Historic Events	1
Standard Dev	0.456	High Outliers	1
Station Skew	-0.708	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.798	Missing Events	0
Adopted Skew	-0.798	Systematic Events	46
		Historic Period	63

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,336.7	1	1978	6,180.0*	1.56
16 Apr 1949	1,523.3	2	1978	6,180.0	3.12
02 Mar 1950	705.7	3	1977	3,986.7	4.97
06 May 1951	446.0	4	1966	3,933.3	7.08
20 Jan 1952	3,466.7	5	1965	3,810.0	9.20
29 Mar 1953	401.3	6	1956	3,670.0	11.32
25 Mar 1954	1,965.3	7	1951	3,466.7	13.44
17 Mar 1955	145.7	8	1979	3,000.0	15.56
25 Aug 1955	635.0	9	1972	2,966.7	17.67
11 Jan 1957	3,670.0	10	1968	2,540.0	19.79
24 Mar 1958	1,446.7	11	1981	2,243.3	21.91
30 Sep 1958	626.3	12	1984	2,213.3	24.03
27 Mar 1960	1,213.3	13	1964	2,115.7	26.15
06 Apr 1961	794.0	14	1970	2,033.3	28.26
14 Feb 1962	1,423.3	15	1953	1,965.3	30.38
31 Mar 1963	232.0	16	1990	1,953.3	32.50
17 Apr 1964	977.3	17	1971	1,810.7	34.62
08 Jan 1965	2,115.7	18	1982	1,583.3	36.74

01 Jan 1966	3,810.0	19	1975	1,536.7	38.85
08 Dec 1966	3,933.3	20	1948	1,523.3	40.97
02 Apr 1968	1,356.7	21	1957	1,446.7	43.09
28 Jan 1969	2,540.0	22	1961	1,423.3	45.21
04 Mar 1970	281.0	23	1967	1,356.7	47.33
08 Sep 1970	2,033.3	24	1947	1,336.7	49.44
28 Dec 1971	1,810.7	25	1959	1,213.3	51.56
28 Apr 1973	2,966.7	26	1983	1,053.3	53.68
22 Mar 1974	433.7	27	1985	1,048.7	55.80
24 Apr 1975	722.0	28	1963	977.3	57.92
24 Apr 1976	1,536.7	29	1986	876.0	60.03
10 Apr 1977	284.7	30	1987	855.7	62.15
01 Jan 1978	6,180.0	31	1960	794.0	64.27
03 Mar 1978	3,986.7	32	1974	722.0	66.39
20 Dec 1978	6,180.0	33	1949	705.7	68.51
21 Feb 1980	3,000.0	34	1955	635.0	70.62
09 Apr 1981	201.0	35	1958	626.3	72.74
14 Mar 1982	2,243.3	36	1950	446.0	74.86
26 Apr 1983	1,583.3	37	1988	435.7	76.98
28 Dec 1983	1,053.3	38	1973	433.7	79.10
13 Mar 1985	2,213.3	39	1952	401.3	81.22
28 Nov 1985	1,048.7	40	1976	284.7	83.33
12 Apr 1987	876.0	41	1969	281.0	85.45
28 Apr 1988	855.7	42	1962	232.0	87.57
12 Mar 1989	435.7	43	1980	201.0	89.69
08 Apr 1990	145.0	44	1954	145.7	91.81
09 Apr 1991	1,953.3	45	1989	145.0	93.92
06 Jun 1991	0.9	46	1992	51.0	96.04
08 Oct 1992	51.0	47	1991	0.9*	98.16

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3556

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.132
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,293.6	12,555.9	0.2	20,112.5	7,359.3
9,425.0	10,265.7	0.5	16,241.3	6,276.4
8,036.9	8,631.9	1.0	13,461.0	5,452.3
6,680.8	7,072.8	2.0	10,834.7	4,627.4
5,366.8	5,606.3	4.0	8,388.3	3,805.1
4,954.6	5,155.9	5.0	7,643.5	3,541.5
3,714.0	3,813.0	10.0	5,477.9	2,727.5
2,543.6	2,581.6	20.0	3,560.6	1,922.5
1,121.9	1,121.9	50.0	1,462.4	865.6
434.4	425.1	80.0	572.8	312.3
250.6	239.7	90.0	344.8	166.8
154.5	143.7	95.0	223.5	95.0
58.1	48.9	99.0	94.5	29.9

<< Synthetic Statistics >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	3.010	Historic Events	1
Standard Dev	0.462	High Outliers	1
Station Skew	-0.705	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.521	Missing Events	0
Adopted Skew	-0.521	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
16,412.2	18,824.0	0.2	31,687.4	10,096.0
13,043.6	14,538.9	0.5	24,139.2	8,252.5
10,694.6	11,690.2	1.0	19,094.2	6,927.8
8,527.4	9,144.7	2.0	14,628.5	5,669.1
6,551.4	6,903.9	4.0	10,744.9	4,481.7
5,957.4	6,246.3	5.0	9,618.5	4,115.6
4,247.9	4,381.0	10.0	6,503.2	3,030.6
2,749.8	2,797.1	20.0	3,963.7	2,028.2
1,105.0	1,105.0	50.0	1,472.9	833.0
398.3	389.4	80.0	538.5	277.8
223.4	213.4	90.0	316.0	143.8
135.3	125.6	95.0	201.4	80.2
49.8	41.9	99.0	83.6	24.6

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 4-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 9 days of analysis year for 4-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,238.2	1	1978	4,844.0*	2.13

16 Apr 1949	1,482.5	2	1977	3,447.5	4.26
02 Mar 1950	647.8	3	1966	3,079.0	6.38
07 May 1951	391.0	4	1965	3,027.5	8.51
21 Jan 1952	2,764.2	5	1956	2,980.0	10.64
29 Mar 1953	399.5	6	1972	2,900.0	12.77
26 Mar 1954	1,561.5	7	1951	2,764.2	14.89
17 Mar 1955	140.5	8	1979	2,467.5	17.02
26 Aug 1955	560.2	9	1968	2,036.5	19.15
12 Jan 1957	2,980.0	10	1981	1,972.5	21.28
25 Mar 1958	1,236.8	11	1964	1,932.5	23.40
01 Oct 1958	519.8	12	1984	1,925.0	25.53
26 Mar 1960	1,176.0	13	1990	1,805.0	27.66
07 Apr 1961	728.2	14	1970	1,562.5	29.79
11 Apr 1962	1,375.0	15	1953	1,561.5	31.91
31 Mar 1963	222.2	16	1982	1,492.5	34.04
18 Apr 1964	950.5	17	1948	1,482.5	36.17
22 Apr 1965	1,932.5	18	1971	1,463.8	38.30
02 Jan 1966	3,027.5	19	1975	1,442.5	40.43
09 Dec 1966	3,079.0	20	1961	1,375.0	42.55
02 Apr 1968	1,347.5	21	1967	1,347.5	44.68
29 Jan 1969	2,036.5	22	1947	1,238.2	46.81
05 Mar 1970	245.8	23	1957	1,236.8	48.94
09 Sep 1970	1,562.5	24	1959	1,176.0	51.06
29 Dec 1971	1,463.8	25	1963	950.5	53.19
28 Apr 1973	2,900.0	26	1983	908.0	55.32
22 Mar 1974	427.0	27	1985	871.5	57.45
26 Apr 1975	724.5	28	1986	853.2	59.57
25 Apr 1976	1,442.5	29	1987	778.5	61.70
11 Apr 1977	271.2	30	1960	728.2	63.83
04 Mar 1978	3,447.5	31	1974	724.5	65.96
21 Dec 1978	4,844.0	32	1949	647.8	68.09
22 Feb 1980	2,467.5	33	1955	560.2	70.21
10 Apr 1981	197.8	34	1958	519.8	72.34
15 Mar 1982	1,972.5	35	1973	427.0	74.47
27 Apr 1983	1,492.5	36	1988	419.2	76.60
29 Dec 1983	908.0	37	1952	399.5	78.72
14 Mar 1985	1,925.0	38	1950	391.0	80.85
29 Mar 1986	871.5	39	1976	271.2	82.98
13 Apr 1987	853.2	40	1969	245.8	85.11
28 Apr 1988	778.5	41	1962	222.2	87.23
13 Mar 1989	419.2	42	1980	197.8	89.36
09 Apr 1990	136.0	43	1954	140.5	91.49
10 Apr 1991	1,805.0	44	1989	136.0	93.62
01 Jun 1991	1.0	45	1992	45.5	95.74
09 Oct 1992	45.5	46	1991	1.0*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew =	0.787
Mean-square error of regional skew =	0.302

<< Frequency Curve >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,755.9	13,936.4	0.2	25,477.3	7,583.3
10,872.8	11,725.1	0.5	21,115.4	6,582.3
9,371.1	10,016.8	1.0	17,737.8	5,767.2
7,819.7	8,268.9	2.0	14,355.6	4,906.6
6,242.3	6,531.2	4.0	11,044.5	4,007.7
5,734.0	5,981.8	5.0	10,008.9	3,711.9
4,174.9	4,297.6	10.0	6,943.2	2,781.4
2,687.7	2,734.5	20.0	4,209.1	1,850.3
961.6	961.6	50.0	1,373.3	681.2

```
|       264.2       256.2 |     80.0     |        381.3       170.9 |
|       120.2       112.6 |     90.0     |        184.3        69.7 |
|        59.0        53.0 |     95.0     |         97.4        30.4 |
|        13.3        10.2 |     99.0     |         26.4         5.2 |
|-------------------------|--------------|-------------------------|


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                  2.902 |  Historic Events            0 |
|  Standard Dev          0.616 |  High Outliers          0     |
|  Station Skew         -2.602 |  Low Outliers           0     |
|  Regional Skew        -0.100 |  Zero Events            0     |
|  Weighted Skew        -0.794 |  Missing Events         0     |
|  Adopted Skew         -0.794 |  Systematic Events        46  |
|------------------------------|-------------------------------|

--- End of Preliminary Results ---



----------------------
<< Low Outlier Test >>
----------------------
 Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
                          Computed low outlier test value = 16.53

            1 low outlier(s) identified below test value of 16.53


     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)
----------------------------------------------------------------
|        Log Transform:        |                               |
|          FLOW, cfs           |       Number of Events        |
|------------------------------|-------------------------------|
|  Mean                  2.983 |  Historic Events            1 |
|  Standard Dev          0.444 |  High Outliers          0     |
|  Station Skew         -0.801 |  Low Outliers           1     |
|  Regional Skew        -0.100 |  Zero Events            0     |
|  Weighted Skew        -0.794 |  Missing Events         0     |
|  Adopted Skew         -0.794 |  Systematic Events        46  |
|                              |  Historic Period          63  |
|------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
                     Computed high outlier test value = 15,602.62

      1 high outlier(s) identified above input threshold of 4,844

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and          *
   *        comparison with similar data should be explored,  *
   *        if not incorporated in this analysis.             *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                           and 1 historic event(s)


<< Systematic Statistics >>
```

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.975	Historic Events	1
Standard Dev	0.439	High Outliers	1
Station Skew	-0.818	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.794	Missing Events	0
Adopted Skew	-0.794	Systematic Events	46
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
12 Apr 1948	1,238.2	1	1978	4,844.0*	1.56
16 Apr 1949	1,482.5	2	1978	4,844.0	3.12
02 Mar 1950	647.8	3	1977	3,447.5	4.97
07 May 1951	391.0	4	1966	3,079.0	7.08
21 Jan 1952	2,764.2	5	1965	3,027.5	9.20
29 Mar 1953	399.5	6	1956	2,980.0	11.32
26 Mar 1954	1,561.5	7	1972	2,900.0	13.44
17 Mar 1955	140.5	8	1951	2,764.2	15.56
26 Aug 1955	560.2	9	1979	2,467.5	17.67
12 Jan 1957	2,980.0	10	1968	2,036.5	19.79
25 Mar 1958	1,236.8	11	1981	1,972.5	21.91
01 Oct 1958	519.8	12	1964	1,932.5	24.03
26 Mar 1960	1,176.0	13	1984	1,925.0	26.15
07 Apr 1961	728.2	14	1990	1,805.0	28.26
11 Apr 1962	1,375.0	15	1970	1,562.5	30.38
31 Mar 1963	222.2	16	1953	1,561.5	32.50
18 Apr 1964	950.5	17	1982	1,492.5	34.62
22 Apr 1965	1,932.5	18	1948	1,482.5	36.74
02 Jan 1966	3,027.5	19	1971	1,463.8	38.85
09 Dec 1966	3,079.0	20	1975	1,442.5	40.97
02 Apr 1968	1,347.5	21	1961	1,375.0	43.09
29 Jan 1969	2,036.5	22	1967	1,347.5	45.21
05 Mar 1970	245.8	23	1947	1,238.2	47.33
09 Sep 1970	1,562.5	24	1957	1,236.8	49.44
29 Dec 1971	1,463.8	25	1959	1,176.0	51.56
28 Apr 1973	2,900.0	26	1963	950.5	53.68
22 Mar 1974	427.0	27	1983	908.0	55.80
26 Apr 1975	724.5	28	1985	871.5	57.92
25 Apr 1976	1,442.5	29	1986	853.2	60.03
11 Apr 1977	271.2	30	1987	778.5	62.15
01 Jan 1978	4,844.0	31	1960	728.2	64.27
04 Mar 1978	3,447.5	32	1974	724.5	66.39
21 Dec 1978	4,844.0	33	1949	647.8	68.51
22 Feb 1980	2,467.5	34	1955	560.2	70.62
10 Apr 1981	197.8	35	1958	519.8	72.74
15 Mar 1982	1,972.5	36	1973	427.0	74.86
27 Apr 1983	1,492.5	37	1988	419.2	76.98
29 Dec 1983	908.0	38	1952	399.5	79.10
14 Mar 1985	1,925.0	39	1950	391.0	81.22
29 Mar 1986	871.5	40	1976	271.2	83.33
13 Apr 1987	853.2	41	1969	245.8	85.45
28 Apr 1988	778.5	42	1962	222.2	87.57

13 Mar 1989	419.2	43	1980	197.8	89.69
09 Apr 1990	136.0	44	1954	140.5	91.81
10 Apr 1991	1,805.0	45	1989	136.0	93.92
01 Jun 1991	1.0	46	1992	45.5	96.04
09 Oct 1992	45.5	47	1991	1.0*	98.16

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3556

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.143
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,590.4	9,416.5	0.2	14,787.2	5,733.7
7,329.7	7,900.4	0.5	12,260.8	4,985.2
6,362.3	6,779.1	1.0	10,379.1	4,398.3
5,389.0	5,672.3	2.0	8,542.2	3,794.8
4,416.5	4,595.5	4.0	6,771.2	3,175.9
4,104.8	4,257.3	5.0	6,219.1	2,973.6
3,145.7	3,223.1	10.0	4,573.3	2,335.9
2,207.5	2,238.3	20.0	3,056.5	1,683.7
1,011.6	1,011.6	50.0	1,307.9	787.3
401.8	393.3	80.0	524.9	292.3
233.6	223.5	90.0	318.2	157.5
144.5	134.4	95.0	206.8	90.1
54.2	45.6	99.0	87.4	28.2

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.961	Historic Events	1
Standard Dev	0.446	High Outliers	1
Station Skew	-0.824	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.591	Missing Events	0
Adopted Skew	-0.591	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
14,667.3	16,822.6	0.2	28,318.3	9,022.6
11,656.7	12,993.1	0.5	21,572.7	7,375.1
9,557.5	10,447.3	1.0	17,064.1	6,191.2
7,620.8	8,172.4	2.0	13,073.1	5,066.3
5,854.8	6,169.9	4.0	9,602.5	4,005.2
5,324.0	5,582.2	5.0	8,595.9	3,678.0

3,796.2	3,915.2	10.0	5,811.7	2,708.4
2,457.5	2,499.7	20.0	3,542.3	1,812.6
987.5	987.5	50.0	1,316.3	744.4
355.9	348.0	80.0	481.3	248.3
199.7	190.7	90.0	282.4	128.5
121.0	112.2	95.0	180.0	71.7
44.5	37.5	99.0	74.7	22.0

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 10 days of analysis year for 5-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
13 Apr 1948	1,179.2	1	1978	3,980.0*	2.13
16 Apr 1949	1,448.0	2	1977	3,044.0	4.26
03 Mar 1950	613.0	3	1972	2,820.0	6.38
08 May 1951	339.8	4	1965	2,522.0	8.51
22 Jan 1952	2,292.8	5	1966	2,515.8	10.64
30 Mar 1953	391.6	6	1956	2,513.2	12.77
27 Mar 1954	1,305.0	7	1951	2,292.8	14.89
17 Mar 1955	135.0	8	1979	2,122.8	17.02
26 Aug 1955	507.6	9	1964	1,894.0	19.15
12 Jan 1957	2,513.2	10	1981	1,746.8	21.28
20 Apr 1958	1,160.0	11	1984	1,730.4	23.40
02 Oct 1958	440.6	12	1990	1,708.0	25.53
26 Mar 1960	1,170.8	13	1968	1,695.2	27.66
07 Apr 1961	672.8	14	1948	1,448.0	29.79
11 Apr 1962	1,344.0	15	1982	1,412.0	31.91
31 Mar 1963	217.8	16	1961	1,344.0	34.04
16 Apr 1964	954.8	17	1975	1,343.8	36.17
22 Apr 1965	1,894.0	18	1967	1,322.0	38.30
03 Jan 1966	2,522.0	19	1953	1,305.0	40.43
10 Dec 1966	2,515.8	20	1970	1,270.0	42.55
02 Apr 1968	1,322.0	21	1971	1,252.2	44.68
30 Jan 1969	1,695.2	22	1947	1,179.2	46.81
06 Mar 1970	217.8	23	1959	1,170.8	48.94
09 Sep 1970	1,270.0	24	1957	1,160.0	51.06
29 Dec 1971	1,252.2	25	1963	954.8	53.19

29 Apr 1973	2,820.0	26	1985	842.2	55.32
22 Mar 1974	415.4	27	1986	793.0	57.45
26 Apr 1975	720.0	28	1983	791.6	59.57
26 Apr 1976	1,343.8	29	1974	720.0	61.70
12 Apr 1977	252.8	30	1987	712.2	63.83
05 Mar 1978	3,044.0	31	1960	672.8	65.96
22 Dec 1978	3,980.0	32	1949	613.0	68.09
23 Feb 1980	2,122.8	33	1955	507.6	70.21
11 Apr 1981	195.2	34	1958	440.6	72.34
16 Mar 1982	1,746.8	35	1973	415.4	74.47
28 Apr 1983	1,412.0	36	1988	402.0	76.60
30 Dec 1983	791.6	37	1952	391.6	78.72
15 Mar 1985	1,730.4	38	1950	339.8	80.85
29 Mar 1986	842.2	39	1976	252.8	82.98
13 Apr 1987	793.0	40	1969	217.8	85.11
29 Apr 1988	712.2	41	1962	217.8	87.23
14 Mar 1989	402.0	42	1980	195.2	89.36
10 Apr 1990	126.0	43	1954	135.0	91.49
11 Apr 1991	1,708.0	44	1989	126.0	93.62
01 Jun 1991	1.1	45	1992	42.0	95.74
10 Oct 1992	42.0	46	1991	1.1*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew = 0.785
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,842.6	11,815.5	0.2	21,231.5	6,542.4
9,284.8	9,990.7	0.5	17,692.6	5,702.1
8,036.9	8,574.2	1.0	14,937.7	5,015.2
6,741.5	7,117.3	2.0	12,163.4	4,286.7
5,416.6	5,660.0	4.0	9,428.9	3,521.8
4,987.7	5,197.0	5.0	8,569.0	3,269.1
3,664.8	3,769.3	10.0	6,007.1	2,469.9
2,389.3	2,429.7	20.0	3,694.2	1,662.4
880.3	880.3	50.0	1,244.5	629.7
250.9	243.5	80.0	358.4	164.4
116.7	109.6	90.0	176.8	68.8
58.5	52.6	95.0	95.2	30.7
13.8	10.6	99.0	26.8	5.6

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.866	Historic Events	0
Standard Dev	0.598	High Outliers	0
Station Skew	-2.597	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.794	Missing Events	0
Adopted Skew	-0.794	Systematic Events	46

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
Computed low outlier test value = 16.99

1 low outlier(s) identified below test value of 16.99

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.944	Historic Events	1
Standard Dev	0.432	High Outliers	0
Station Skew	-0.888	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.794	Missing Events	0
Adopted Skew	-0.794	Systematic Events	46
		Historic Period	63

<< High Outlier Test >>

Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
Computed high outlier test value = 13,261.41

1 high outlier(s) identified above input threshold of 3,980

* Note - Collection of historical information and comparison with similar data should be explored, if not incorporated in this analysis.

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.936	Historic Events	1
Standard Dev	0.428	High Outliers	1
Station Skew	-0.901	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.794	Missing Events	0
Adopted Skew	-0.794	Systematic Events	46
		Historic Period	63

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
13	Apr	1948	1,179.2	1	1978	3,980.0*	1.56
16	Apr	1949	1,448.0	2	1978	3,980.0	3.12
03	Mar	1950	613.0	3	1977	3,044.0	4.97
08	May	1951	339.8	4	1972	2,820.0	7.08
22	Jan	1952	2,292.8	5	1965	2,522.0	9.20
30	Mar	1953	391.6	6	1966	2,515.8	11.32
27	Mar	1954	1,305.0	7	1956	2,513.2	13.44
17	Mar	1955	135.0	8	1951	2,292.8	15.56
26	Aug	1955	507.6	9	1979	2,122.8	17.67
12	Jan	1957	2,513.2	10	1964	1,894.0	19.79
20	Apr	1958	1,160.0	11	1981	1,746.8	21.91
02	Oct	1958	440.6	12	1984	1,730.4	24.03
26	Mar	1960	1,170.8	13	1990	1,708.0	26.15
07	Apr	1961	672.8	14	1968	1,695.2	28.26
11	Apr	1962	1,344.0	15	1948	1,448.0	30.38
31	Mar	1963	217.8	16	1982	1,412.0	32.50
16	Apr	1964	954.8	17	1961	1,344.0	34.62
22	Apr	1965	1,894.0	18	1975	1,343.8	36.74
03	Jan	1966	2,522.0	19	1967	1,322.0	38.85
10	Dec	1966	2,515.8	20	1953	1,305.0	40.97
02	Apr	1968	1,322.0	21	1970	1,270.0	43.09
30	Jan	1969	1,695.2	22	1971	1,252.2	45.21
06	Mar	1970	217.8	23	1947	1,179.2	47.33
09	Sep	1970	1,270.0	24	1959	1,170.8	49.44
29	Dec	1971	1,252.2	25	1957	1,160.0	51.56
29	Apr	1973	2,820.0	26	1963	954.8	53.68
22	Mar	1974	415.4	27	1985	842.2	55.80
26	Apr	1975	720.0	28	1986	793.0	57.92
26	Apr	1976	1,343.8	29	1983	791.6	60.03
12	Apr	1977	252.8	30	1974	720.0	62.15
01	Jan	1978	3,980.0	31	1987	712.2	64.27
05	Mar	1978	3,044.0	32	1960	672.8	66.39
22	Dec	1978	3,980.0	33	1949	613.0	68.51
23	Feb	1980	2,122.8	34	1955	507.6	70.62
11	Apr	1981	195.2	35	1958	440.6	72.74
16	Mar	1982	1,746.8	36	1973	415.4	74.86
28	Apr	1983	1,412.0	37	1988	402.0	76.98
30	Dec	1983	791.6	38	1952	391.6	79.10
15	Mar	1985	1,730.4	39	1950	339.8	81.22
29	Mar	1986	842.2	40	1976	252.8	83.33
13	Apr	1987	793.0	41	1969	217.8	85.45
29	Apr	1988	712.2	42	1962	217.8	87.57
14	Mar	1989	402.0	43	1980	195.2	89.69
10	Apr	1990	126.0	44	1954	135.0	91.81
11	Apr	1991	1,708.0	45	1989	126.0	93.92
01	Jun	1991	1.1	46	1992	42.0	96.04
10	Oct	1992	42.0	47	1991	1.1*	98.16

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.3556

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.156
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
7,131.4	7,753.1	0.2	12,032.7	4,827.4
6,164.5	6,603.8	0.5	10,132.9	4,244.9
5,407.4	5,734.6	1.0	8,685.5	3,779.7
4,631.5	4,858.3	2.0	7,243.5	3,293.1
3,841.2	3,987.7	4.0	5,823.1	2,785.2
3,584.6	3,710.3	5.0	5,373.6	2,617.1
2,783.6	2,848.6	10.0	4,013.0	2,080.4
1,982.1	2,008.6	20.0	2,727.1	1,519.8
929.2	929.2	50.0	1,195.7	726.8
374.5	366.7	80.0	486.6	274.3
218.6	209.2	90.0	296.1	148.5
135.4	126.0	95.0	192.7	85.0
50.7	42.6	99.0	81.2	26.6

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.922	Historic Events	1
Standard Dev	0.438	High Outliers	1
Station Skew	-0.914	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.637	Missing Events	0
Adopted Skew	-0.637	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
13,396.9	15,365.6	0.2	25,865.7	8,241.1
10,647.1	11,867.8	0.5	19,704.2	6,736.3
8,729.7	9,542.4	1.0	15,586.1	5,655.0
6,960.7	7,464.6	2.0	11,940.9	4,627.5
5,347.8	5,635.5	4.0	8,770.8	3,658.3
4,862.9	5,098.7	5.0	7,851.4	3,359.4
3,467.4	3,576.1	10.0	5,308.4	2,473.8
2,244.6	2,283.2	20.0	3,235.5	1,655.6
902.0	902.0	50.0	1,202.3	680.0
325.1	317.8	80.0	439.6	226.8
182.4	174.2	90.0	257.9	117.3
110.5	102.5	95.0	164.4	65.5
40.7	34.2	99.0	68.2	20.1

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

==
Statistical Analysis of 6-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 11 days of analysis year for 6-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
13 Apr 1948	1,123.0	1	1978	3,374.7	2.13
17 Apr 1949	1,413.3	2	1977	2,810.0	4.26
04 Mar 1950	576.5	3	1972	2,716.7	6.38
08 May 1951	299.0	4	1956	2,189.3	8.51
23 Jan 1952	1,962.7	5	1965	2,160.0	10.64
30 Mar 1953	375.8	6	1979	2,129.3	12.77
28 Mar 1954	1,136.5	7	1966	2,124.5	14.89
17 Mar 1955	133.0	8	1951	1,962.7	17.02
25 Aug 1955	493.5	9	1964	1,856.7	19.15
13 Jan 1957	2,189.3	10	1990	1,626.7	21.28
21 Apr 1958	1,113.7	11	1984	1,566.5	23.40
30 Sep 1958	396.5	12	1981	1,555.5	25.53
27 Mar 1960	1,164.0	13	1968	1,487.8	27.66
08 Apr 1961	631.2	14	1948	1,413.3	29.79
11 Apr 1962	1,330.0	15	1982	1,395.0	31.91
31 Mar 1963	215.0	16	1961	1,330.0	34.04
17 Apr 1964	962.3	17	1967	1,275.0	36.17
23 Apr 1965	1,856.7	18	1975	1,260.2	38.30
04 Jan 1966	2,160.0	19	1959	1,164.0	40.43
11 Dec 1966	2,124.5	20	1953	1,136.5	42.55
02 Apr 1968	1,275.0	21	1947	1,123.0	44.68
27 Jan 1969	1,487.8	22	1957	1,113.7	46.81
07 Mar 1970	195.7	23	1971	1,084.3	48.94
10 Sep 1970	1,070.0	24	1970	1,070.0	51.06
30 Dec 1971	1,084.3	25	1963	962.3	53.19
29 Apr 1973	2,716.7	26	1985	812.2	55.32
23 Mar 1974	403.3	27	1986	749.7	57.45
26 Apr 1975	676.7	28	1983	690.7	59.57
26 Apr 1976	1,260.2	29	1974	676.7	61.70
12 Apr 1977	238.3	30	1987	639.3	63.83
06 Mar 1978	2,810.0	31	1960	631.2	65.96
23 Dec 1978	3,374.7	32	1949	576.5	68.09
20 Feb 1980	2,129.3	33	1955	493.5	70.21
12 Apr 1981	189.2	34	1973	403.3	72.34
17 Mar 1982	1,555.5	35	1958	396.5	74.47
30 Apr 1983	1,395.0	36	1988	388.8	76.60
31 Dec 1983	690.7	37	1952	375.8	78.72
16 Mar 1985	1,566.5	38	1950	299.0	80.85
29 Mar 1986	812.2	39	1976	238.3	82.98
14 Apr 1987	749.7	40	1962	215.0	85.11
30 Apr 1988	639.3	41	1969	195.7	87.23
14 Mar 1989	388.8	42	1980	189.2	89.36
10 Apr 1990	116.7	43	1954	133.0	91.49
11 Apr 1991	1,626.7	44	1989	116.7	93.62
01 Jun 1991	1.3	45	1992	39.5	95.74
11 Oct 1992	39.5	46	1991	1.3*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew =	0.751
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,412.2	10,227.5	0.2	18,098.2	5,757.0
8,100.5	8,695.7	0.5	15,170.8	5,039.8
7,043.4	7,499.1	1.0	12,876.8	4,450.4
5,939.9	6,260.6	2.0	10,551.3	3,822.2
4,803.6	5,012.9	4.0	8,241.2	3,158.4
4,433.9	4,614.4	5.0	7,510.5	2,938.2
3,286.6	3,377.6	10.0	5,318.7	2,237.7
2,168.2	2,203.8	20.0	3,315.2	1,522.7
820.3	820.3	50.0	1,149.4	591.8
241.4	234.4	80.0	341.6	159.8
114.4	107.6	90.0	171.5	68.3
58.3	52.6	95.0	93.7	31.1
14.2	11.0	99.0	27.2	5.9

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.837	Historic Events	0
Standard Dev	0.583	High Outliers	0
Station Skew	-2.535	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.798	Missing Events	0
Adopted Skew	-0.798	Systematic Events	46

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
Computed low outlier test value = 17.49

1 low outlier(s) identified below test value of 17.49

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.911	Historic Events	1
Standard Dev	0.425	High Outliers	0
Station Skew	-0.938	Low Outliers	1
Regional Skew	-0.100	Zero Events	0

Weighted Skew -0.798	Missing Events 0
Adopted Skew -0.798	Systematic Events 46
	Historic Period 63

```
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<< High Outlier Test >>
-----------------------
 Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
                    Computed high outlier test value = 11,785.19

    0 high outlier(s) identified above input threshold of 3,374.7

    Statistics and frequency curve adjusted for 0 high outlier(s)
                                             and 1 historic event(s)
```

<< Systematic Statistics >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.908	Historic Events	1
Standard Dev	0.423	High Outliers	0
Station Skew	-0.937	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.798	Missing Events	0
Adopted Skew	-0.798	Systematic Events	46
		Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
13 Apr 1948	1,123.0	1	1978	3,374.7	1.56
17 Apr 1949	1,413.3	2	1978	3,374.7	3.40
04 Mar 1950	576.5	3	1977	2,810.0	5.50
08 May 1951	299.0	4	1972	2,716.7	7.61
23 Jan 1952	1,962.7	5	1956	2,189.3	9.71
30 Mar 1953	375.8	6	1965	2,160.0	11.82
28 Mar 1954	1,136.5	7	1979	2,129.3	13.93
17 Mar 1955	133.0	8	1966	2,124.5	16.03
25 Aug 1955	493.5	9	1951	1,962.7	18.14
13 Jan 1957	2,189.3	10	1964	1,856.7	20.24
21 Apr 1958	1,113.7	11	1990	1,626.7	22.35
30 Sep 1958	396.5	12	1984	1,566.5	24.46
27 Mar 1960	1,164.0	13	1981	1,555.5	26.56
08 Apr 1961	631.2	14	1968	1,487.8	28.67
11 Apr 1962	1,330.0	15	1948	1,413.3	30.77
31 Mar 1963	215.0	16	1982	1,395.0	32.88
17 Apr 1964	962.3	17	1961	1,330.0	34.99
23 Apr 1965	1,856.7	18	1967	1,275.0	37.09
04 Jan 1966	2,160.0	19	1975	1,260.2	39.20
11 Dec 1966	2,124.5	20	1959	1,164.0	41.30
02 Apr 1968	1,275.0	21	1953	1,136.5	43.41
27 Jan 1969	1,487.8	22	1947	1,123.0	45.52
07 Mar 1970	195.7	23	1957	1,113.7	47.62

10 Sep 1970	1,070.0	24	1971	1,084.3	49.73
30 Dec 1971	1,084.3	25	1970	1,070.0	51.83
29 Apr 1973	2,716.7	26	1963	962.3	53.94
23 Mar 1974	403.3	27	1985	812.2	56.05
26 Apr 1975	676.7	28	1986	749.7	58.15
26 Apr 1976	1,260.2	29	1983	690.7	60.26
12 Apr 1977	238.3	30	1974	676.7	62.36
01 Jan 1978	3,374.7	31	1987	639.3	64.47
06 Mar 1978	2,810.0	32	1960	631.2	66.58
23 Dec 1978	3,374.7	33	1949	576.5	68.68
20 Feb 1980	2,129.3	34	1955	493.5	70.79
12 Apr 1981	189.2	35	1973	403.3	72.89
17 Mar 1982	1,555.5	36	1958	396.5	75.00
30 Apr 1983	1,395.0	37	1988	388.8	77.11
31 Dec 1983	690.7	38	1952	375.8	79.21
16 Mar 1985	1,566.5	39	1950	299.0	81.32
29 Mar 1986	812.2	40	1976	238.3	83.42
14 Apr 1987	749.7	41	1962	215.0	85.53
30 Apr 1988	639.3	42	1969	195.7	87.64
14 Mar 1989	388.8	43	1980	189.2	89.74
10 Apr 1990	116.7	44	1954	133.0	91.85
11 Apr 1991	1,626.7	45	1989	116.7	93.95
01 Jun 1991	1.3	46	1992	39.5	96.06
11 Oct 1992	39.5	47	1991	1.3*	98.17

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 1.3478

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.163
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,426.6	6,965.4	0.2	10,753.2	4,376.2
5,582.4	5,966.5	0.5	9,108.2	3,864.6
4,916.3	5,204.5	1.0	7,844.1	3,453.0
4,229.0	4,430.1	2.0	6,575.0	3,019.8
3,523.7	3,654.7	4.0	5,314.7	2,564.6
3,293.5	3,406.2	5.0	4,913.6	2,413.2
2,571.1	2,629.9	10.0	3,692.0	1,927.4
1,841.8	1,866.0	20.0	2,526.3	1,415.8
872.1	872.1	50.0	1,119.7	683.8
354.2	346.8	80.0	459.0	260.2
207.3	198.5	90.0	280.0	141.4
128.7	119.7	95.0	182.6	81.1
48.2	40.5	99.0	77.1	25.4

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.894	Historic Events	1
Standard Dev	0.434	High Outliers	0
Station Skew	-0.952	Low Outliers	1
Regional Skew	-0.100	Zero Events	0

Weighted Skew	-0.654	Missing Events	0
Adopted Skew	-0.654	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
12,553.0	14,397.6	0.2	24,236.2	7,722.0
9,976.4	11,120.2	0.5	18,463.0	6,312.0
8,179.8	8,941.3	1.0	14,604.3	5,298.8
6,522.3	6,994.3	2.0	11,188.7	4,336.0
5,010.9	5,280.5	4.0	8,218.3	3,427.9
4,556.6	4,777.5	5.0	7,356.8	3,147.8
3,249.0	3,350.9	10.0	4,974.0	2,318.0
2,103.2	2,139.4	20.0	3,031.7	1,551.3
845.2	845.2	50.0	1,126.5	637.1
304.6	297.8	80.0	411.9	212.5
170.9	163.2	90.0	241.7	110.0
103.5	96.1	95.0	154.1	61.4
38.1	32.1	99.0	63.9	18.8

<< User Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 7-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

Warning: 1 events occur in first 12 days of analysis year for 7-day duration.

Suggest reviewing data and changing the year/season specification on the General tab to capture independent max/min volumes.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
16 Apr 1948	1,091.6	1	1978	2,925.9	2.13
17 Apr 1949	1,377.1	2	1972	2,614.3	4.26
05 Mar 1950	543.3	3	1977	2,557.1	6.38
09 May 1951	269.4	4	1979	2,036.6	8.51
24 Jan 1952	1,717.4	5	1956	1,959.3	10.64
31 Mar 1953	356.1	6	1965	1,894.3	12.77

29 Mar 1954	1,018.1	7	1966	1,838.9	14.89
17 Mar 1955	130.3	8	1964	1,815.7	17.02
26 Aug 1955	471.0	9	1951	1,717.4	19.15
14 Jan 1957	1,959.3	10	1990	1,527.9	21.28
22 Apr 1958	1,069.9	11	1968	1,438.1	23.40
01 Oct 1958	368.4	12	1982	1,428.6	25.53
27 Mar 1960	1,139.7	13	1984	1,426.7	27.66
09 Apr 1961	589.1	14	1981	1,406.4	29.79
12 Apr 1962	1,300.0	15	1948	1,377.1	31.91
31 Mar 1963	214.4	16	1961	1,300.0	34.04
18 Apr 1964	949.1	17	1967	1,221.4	36.17
24 Apr 1965	1,815.7	18	1975	1,181.0	38.30
05 Jan 1966	1,894.3	19	1959	1,139.7	40.43
12 Dec 1966	1,838.9	20	1947	1,091.6	42.55
03 Apr 1968	1,221.4	21	1957	1,069.9	44.68
28 Jan 1969	1,438.1	22	1953	1,018.1	46.81
08 Mar 1970	182.0	23	1971	957.0	48.94
11 Sep 1970	922.9	24	1963	949.1	51.06
30 Dec 1971	957.0	25	1970	922.9	53.19
30 Apr 1973	2,614.3	26	1985	788.9	55.32
24 Mar 1974	388.0	27	1986	710.0	57.45
27 Apr 1975	640.0	28	1974	640.0	59.57
27 Apr 1976	1,181.0	29	1983	611.9	61.70
13 Apr 1977	225.4	30	1960	589.1	63.83
07 Mar 1978	2,557.1	31	1987	584.3	65.96
24 Dec 1978	2,925.9	32	1949	543.3	68.09
21 Feb 1980	2,036.6	33	1955	471.0	70.21
13 Apr 1981	183.4	34	1973	388.0	72.34
18 Mar 1982	1,406.4	35	1958	368.4	74.47
01 May 1983	1,428.6	36	1988	368.0	76.60
01 Jan 1984	611.9	37	1952	356.1	78.72
17 Mar 1985	1,426.7	38	1950	269.4	80.85
30 Mar 1986	788.9	39	1976	225.4	82.98
15 Apr 1987	710.0	40	1962	214.4	85.11
30 Apr 1988	584.3	41	1980	183.4	87.23
15 Mar 1989	368.0	42	1969	182.0	89.36
11 Apr 1990	109.7	43	1954	130.3	91.49
11 Apr 1991	1,527.9	44	1989	109.7	93.62
01 Jun 1991	1.6	45	1992	37.4	95.74
12 Oct 1992	37.4	46	1991	1.6*	97.87

* Outlier

<< Skew Weighting >>

Based on 46 events, mean-square error of station skew = 0.711
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,271.3	8,963.9	0.2	15,636.2	5,123.8
7,151.9	7,660.5	0.5	13,179.4	4,504.0
6,244.9	6,636.3	1.0	11,242.1	3,992.2
5,292.9	5,570.1	2.0	9,266.0	3,443.9
4,306.4	4,488.6	4.0	7,288.7	2,861.4
3,983.9	4,141.4	5.0	6,659.8	2,667.2
2,977.4	3,057.6	10.0	4,761.3	2,046.5
1,986.1	2,017.8	20.0	3,005.3	1,406.9
770.2	770.2	50.0	1,070.4	560.1
233.4	226.9	80.0	327.6	156.2
112.6	106.1	90.0	167.2	68.1
58.3	52.7	95.0	92.6	31.6
14.7	11.5	99.0	27.7	6.2

```
<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)
-----------------------------------------------------------------
|        Log Transform:          |                               |
|          FLOW, cfs             |       Number of Events        |
|--------------------------------|-------------------------------|
|  Mean                  2.811   |  Historic Events           0  |
|  Standard Dev          0.568   |  High Outliers          0     |
|  Station Skew         -2.455   |  Low Outliers           0     |
|  Regional Skew        -0.100   |  Zero Events            0     |
|  Weighted Skew        -0.802   |  Missing Events         0     |
|  Adopted Skew         -0.802   |  Systematic Events        46  |
|--------------------------------|-------------------------------|

--- End of Preliminary Results ---



----------------------
<< Low Outlier Test >>
----------------------
 Based on 46 events, 10 percent outlier test deviate K(N) = 2.736
                         Computed low outlier test value = 18.03

           1 low outlier(s) identified below test value of 18.03


     Statistics and frequency curve adjusted for 1 low outlier(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)
-----------------------------------------------------------------
|        Log Transform:          |                               |
|          FLOW, cfs             |       Number of Events        |
|--------------------------------|-------------------------------|
|  Mean                  2.882   |  Historic Events           1  |
|  Standard Dev          0.420   |  High Outliers          0     |
|  Station Skew         -0.970   |  Low Outliers           1     |
|  Regional Skew        -0.100   |  Zero Events            0     |
|  Weighted Skew        -0.802   |  Missing Events         0     |
|  Adopted Skew         -0.802   |  Systematic Events        46  |
|                                |  Historic Period          63  |
|--------------------------------|-------------------------------|


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 45 events, 10 percent outlier test deviate K(N) = 2.727
                    Computed high outlier test value = 10,655.09

    0 high outlier(s) identified above input threshold of 2,925.9

    Statistics and frequency curve adjusted for 0 high outlier(s)
                                          and 1 historic event(s)


<< Systematic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)
-----------------------------------------------------------------
|        Log Transform:          |                               |
|          FLOW, cfs             |       Number of Events        |
|--------------------------------|-------------------------------|
|  Mean                  2.879   |  Historic Events           1  |
|  Standard Dev          0.418   |  High Outliers          0     |
|  Station Skew         -0.967   |  Low Outliers           1     |
|  Regional Skew        -0.100   |  Zero Events            0     |
|  Weighted Skew        -0.802   |  Missing Events         0     |
|  Adopted Skew         -0.802   |  Systematic Events        46  |
```

	Historic Period	63

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
16 Apr 1948	1,091.6	1	1978	2,925.9	1.56
17 Apr 1949	1,377.1	2	1978	2,925.9	3.40
05 Mar 1950	543.3	3	1972	2,614.3	5.50
09 May 1951	269.4	4	1977	2,557.1	7.61
24 Jan 1952	1,717.4	5	1979	2,036.6	9.71
31 Mar 1953	356.1	6	1956	1,959.3	11.82
29 Mar 1954	1,018.1	7	1965	1,894.3	13.93
17 Mar 1955	130.3	8	1966	1,838.9	16.03
26 Aug 1955	471.0	9	1964	1,815.7	18.14
14 Jan 1957	1,959.3	10	1951	1,717.4	20.24
22 Apr 1958	1,069.9	11	1990	1,527.9	22.35
01 Oct 1958	368.4	12	1968	1,438.1	24.46
27 Mar 1960	1,139.7	13	1982	1,428.6	26.56
09 Apr 1961	589.1	14	1984	1,426.7	28.67
12 Apr 1962	1,300.0	15	1981	1,406.4	30.77
31 Mar 1963	214.4	16	1948	1,377.1	32.88
18 Apr 1964	949.1	17	1961	1,300.0	34.99
24 Apr 1965	1,815.7	18	1967	1,221.4	37.09
05 Jan 1966	1,894.3	19	1975	1,181.0	39.20
12 Dec 1966	1,838.9	20	1959	1,139.7	41.30
03 Apr 1968	1,221.4	21	1947	1,091.6	43.41
28 Jan 1969	1,438.1	22	1957	1,069.9	45.52
08 Mar 1970	182.0	23	1953	1,018.1	47.62
11 Sep 1970	922.9	24	1971	957.0	49.73
30 Dec 1971	957.0	25	1963	949.1	51.83
30 Apr 1973	2,614.3	26	1970	922.9	53.94
24 Mar 1974	388.0	27	1985	788.9	56.05
27 Apr 1975	640.0	28	1986	710.0	58.15
27 Apr 1976	1,181.0	29	1974	640.0	60.26
13 Apr 1977	225.4	30	1983	611.9	62.36
01 Jan 1978	2,925.9	31	1960	589.1	64.47
07 Mar 1978	2,557.1	32	1987	584.3	66.58
24 Dec 1978	2,925.9	33	1949	543.3	68.68
21 Feb 1980	2,036.6	34	1955	471.0	70.79
13 Apr 1981	183.4	35	1973	388.0	72.89
18 Mar 1982	1,406.4	36	1958	368.4	75.00
01 May 1983	1,428.6	37	1988	368.0	77.11
01 Jan 1984	611.9	38	1952	356.1	79.21
17 Mar 1985	1,426.7	39	1950	269.4	81.32
30 Mar 1986	788.9	40	1976	225.4	83.42
15 Apr 1987	710.0	41	1962	214.4	85.53
30 Apr 1988	584.3	42	1980	183.4	87.64
15 Mar 1989	368.0	43	1969	182.0	89.74
11 Apr 1990	109.7	44	1954	130.3	91.85
11 Apr 1991	1,527.9	45	1989	109.7	93.95
01 Jun 1991	1.6	46	1992	37.4	96.06
12 Oct 1992	37.4	47	1991	1.6*	98.17

Note: Plotting positions based on historic period (H) = 63
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 1.3478

* Outlier

<< Skew Weighting >>

Based on 63 events, mean-square error of station skew = 0.169
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
5,797.8	6,267.3	0.2	9,624.4	3,970.5
5,057.8	5,394.8	0.5	8,193.5	3,519.4
4,469.9	4,724.5	1.0	7,085.8	3,154.3
3,859.6	4,038.5	2.0	5,966.1	2,767.8
3,229.3	3,346.6	4.0	4,846.2	2,359.2
3,022.7	3,124.0	5.0	4,488.0	2,222.8
2,371.2	2,424.3	10.0	3,391.3	1,783.1
1,708.1	1,730.2	20.0	2,335.5	1,316.6
816.8	816.8	50.0	1,046.1	642.0
334.5	327.6	80.0	432.3	246.5
196.5	188.2	90.0	264.6	134.5
122.3	113.8	95.0	172.9	77.4
46.0	38.7	99.0	73.3	24.3

<< Synthetic Statistics >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.865	Historic Events	1
Standard Dev	0.429	High Outliers	0
Station Skew	-0.985	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.667	Missing Events	0
Adopted Skew	-0.667	Systematic Events	46
		Historic Period	63

<< User Frequency Curve >>
Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
11,744.3	13,470.1	0.2	22,674.9	7,224.5
9,333.7	10,403.8	0.5	17,273.6	5,905.3
7,652.8	8,365.3	1.0	13,663.5	4,957.4
6,102.1	6,543.7	2.0	10,467.9	4,056.7
4,688.1	4,940.3	4.0	7,688.8	3,207.0
4,263.0	4,469.7	5.0	6,882.8	2,945.0
3,039.7	3,135.0	10.0	4,653.6	2,168.6
1,967.7	2,001.6	20.0	2,836.4	1,451.4
790.7	790.7	50.0	1,054.0	596.1
285.0	278.6	80.0	385.4	198.8
159.9	152.7	90.0	226.1	102.9
96.9	89.9	95.0	144.1	57.4
35.7	30.0	99.0	59.8	17.6

<< User Statistics >>

Clear Creek near Winslow 09398500-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.502		
User Skew	-0.399		

Note: No ordinates specified for graphical frequency curve

```
--------------------------
Volume-Duration Analysis
  16 Sep 2011   05:20 PM
--------------------------


--- Input Data ---

Analysis Name: Clear Creek near Winslow 09399000
Description:

Data Set Name: Clear Creek near Winslow 09399000-Clear Creek near Winslow-
FLOW
DSS File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\Flow_Volume_Duration_Frequency_Analysis.dss
DSS Pathname: /C:\PROJECTS\T24449 LCR
Winslow\Analysis\Volume_Frequency_Analysi/Clear Creek at
Winslow/FLOW//1DAY/09399000/

Project Path:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis
Report File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Clear_Creek_near_Winslow_09399000\
Clear_Creek_near_Winslow_09399000.rpt
Result File Name:
C:\Users\Home\Desktop\Attachments_2011_09_14\Flow_Volume_Duration_Frequency
_Analysis\VolumeFrequencyAnalysisResults\Clear_Creek_near_Winslow_09399000\
Clear_Creek_near_Winslow_09399000.xml

Analyze Maximums

Analysis Year: Other Year
Analysis Year Start Day: 01 Jun

Record Start Date: 31 May 1928
Record End Date:   14 Apr 1985


User-Specified Durations
   Duration:   1 day
   Duration:   2 days
   Duration:   3 days
   Duration:   4 days
   Duration:   5 days
   Duration:   6 days
   Duration:   7 days

Plotting Position Type: Weibull

Probability Distribution Type: Pearson Type III
Use Log Transform
Compute Expected Probability Curve

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

User-Specified Frequencies
   Frequency: 0.2
   Frequency: 0.5
   Frequency: 1.0
   Frequency: 2.0
   Frequency: 4.0
   Frequency: 5.0
   Frequency: 10.0
   Frequency: 20.0
   Frequency: 50.0
   Frequency: 80.0
   Frequency: 90.0
   Frequency: 95.0
   Frequency: 99.0
```

```
Skew Option: Use Weighted Skew
  1-day Regional Skew: -0.1
  1-day Regional Skew MSE: -0.1
  2-day Regional Skew: -0.1
  2-day Regional Skew MSE: -0.1
  3-day Regional Skew: -0.1
  3-day Regional Skew MSE: -0.1
  4-day Regional Skew: -0.1
  4-day Regional Skew MSE: -0.1
  5-day Regional Skew: -0.1
  5-day Regional Skew MSE: -0.1
  6-day Regional Skew: -0.1
  6-day Regional Skew MSE: -0.1
  7-day Regional Skew: -0.1
  7-day Regional Skew MSE: -0.1

Use Historic Data
Historic Period Start Year: 1884
Historic Period End Year: 1987

  1-day Historic Events
  Year: 1978   Value: 21,500

  2-day Historic Events
  Year: 1978   Value: 12,725

  3-day Historic Events
  Year: 1978   Value: 9,707

  4-day Historic Events
  Year: 1978   Value: 7,650

  5-day Historic Events
  Year: 1978   Value: 6,282

  6-day Historic Events
  Year: 1978   Value: 5,338

  7-day Historic Events
  Year: 1978   Value: 4,647

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---



====================================================================
Statistical Analysis of 1-day Maximum values
====================================================================

Note: Data is missing for all or part of 6 years in analysis period.


--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)
--------------------------------------------------------------------
|     Events Analyzed        |            Ordered Events            |
|                   FLOW     |       Analysis        FLOW  Weibull  |
| Day Mon Year       cfs     |  Rank     Year         cfs  Plot Pos |
|----------------------------|--------------------------------------|
|  05 Apr 1929    15,600.0   |    1       1978    21,500.0*   1.72   |
|  10 Apr 1930       861.0   |    2       1928    15,600.0    3.45   |
|  24 Mar 1931       726.0   |    3       1937    12,900.0    5.17   |
|  10 Feb 1932     4,690.0   |    4       1951     9,370.0    6.90   |
|  05 Apr 1933       675.0   |    5       1966     8,630.0    8.62   |
|  31 Jul 1933       139.0   |    6       1965     8,620.0   10.34   |
|  31 May 1935         ---   |    7       1977     6,150.0   12.07   |
|  14 Apr 1936     1,360.0   |    8       1979     5,800.0   13.79   |
```

18 Mar 1937	2,120.0	9	1956	4,740.0	15.52
04 Mar 1938	12,900.0	10	1931	4,690.0	17.24
05 Apr 1939	1,200.0	11	1972	4,430.0	18.97
29 Feb 1940	440.0	12	1964	3,760.0	20.69
15 Mar 1941	2,920.0	13	1981	3,650.0	22.41
06 Apr 1942	1,770.0	14	1968	3,500.0	24.14
12 Mar 1943	1,170.0	15	1971	3,410.0	25.86
07 Apr 1944	1,260.0	16	1953	3,110.0	27.59
23 Apr 1945	1,810.0	17	1970	2,960.0	29.31
09 Apr 1946	596.0	18	1940	2,920.0	31.03
26 Nov 1946	906.0	19	1936	2,120.0	32.76
12 Apr 1948	1,460.0	20	1957	1,870.0	34.48
15 Apr 1949	1,630.0	21	1944	1,810.0	36.21
01 Mar 1950	871.0	22	1961	1,790.0	37.93
06 May 1951	541.0	23	1941	1,770.0	39.66
19 Jan 1952	9,370.0	24	1948	1,630.0	41.38
28 Mar 1953	470.0	25	1975	1,490.0	43.10
24 Mar 1954	3,110.0	26	1967	1,460.0	44.83
23 Jul 1954	121.0	27	1947	1,460.0	46.55
26 Aug 1955	790.0	28	1959	1,360.0	48.28
11 Jan 1957	4,740.0	29	1935	1,360.0	50.00
23 Mar 1958	1,870.0	30	1943	1,260.0	51.72
29 Sep 1958	720.0	31	1938	1,200.0	53.45
26 Dec 1959	1,360.0	32	1942	1,170.0	55.17
06 Apr 1961	799.0	33	1963	912.0	56.90
14 Feb 1962	1,790.0	34	1946	906.0	58.62
31 Mar 1963	173.0	35	1949	871.0	60.34
17 Apr 1964	912.0	36	1929	861.0	62.07
08 Jan 1965	3,760.0	37	1960	799.0	63.79
31 Dec 1965	8,620.0	38	1974	791.0	65.52
07 Dec 1966	8,630.0	39	1955	790.0	67.24
14 Apr 1968	1,460.0	40	1982	729.0	68.97
27 Jan 1969	3,500.0	41	1930	726.0	70.69
19 Mar 1970	198.0	42	1958	720.0	72.41
06 Sep 1970	2,960.0	43	1932	675.0	74.14
27 Dec 1971	3,410.0	44	1945	596.0	75.86
20 Oct 1972	4,430.0	45	1984	545.0	77.59
22 Mar 1974	486.0	46	1950	541.0	79.31
24 Apr 1975	791.0	47	1973	486.0	81.03
23 Apr 1976	1,490.0	48	1952	470.0	82.76
11 Apr 1977	316.0	49	1939	440.0	84.48
02 Mar 1978	6,150.0	50	1976	316.0	86.21
19 Dec 1978	21,500.0	51	1980	200.0	87.93
20 Feb 1980	5,800.0	52	1969	198.0	89.66
09 Apr 1981	200.0	53	1962	173.0	91.38
13 Mar 1982	3,650.0	54	1933	139.0	93.10
25 Dec 1982	729.0	55	1954	121.0	94.83
11 Aug 1983	8.3	56	1983	8.3*	96.55
24 Mar 1985	545.0	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,581.3	23,354.9	0.2	39,852.9	13,451.7
18,154.4	19,400.9	0.5	32,629.0	11,525.4
15,493.5	16,415.9	1.0	27,176.1	9,998.5
12,807.0	13,435.2	2.0	21,829.8	8,423.6
10,135.4	10,530.9	4.0	16,697.9	6,816.3
9,287.0	9,623.2	5.0	15,112.3	6,295.6
6,719.4	6,883.6	10.0	10,466.6	4,681.4

4,315.5	4,377.3	20.0	6,373.8	3,100.9
1,566.2	1,566.2	50.0	2,138.9	1,156.4
449.1	438.4	80.0	621.7	307.2
211.6	201.2	90.0	309.2	132.0
107.7	99.1	95.0	167.9	60.9
26.5	21.6	99.0	48.4	11.9

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.123	Historic Events	0
Standard Dev	0.598	High Outliers	0
Station Skew	-0.728	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.728	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
21,512.4	---	0.2	---	---
18,083.9	---	0.5	---	---
15,421.7	---	1.0	---	---
12,737.3	---	2.0	---	---
10,066.8	---	4.0	---	---
9,216.2	---	5.0	---	---
6,651.3	---	10.0	---	---
4,254.5	---	20.0	---	---
1,518.9	---	50.0	---	---
410.8	---	80.0	---	---
176.5	---	90.0	---	---
73.6	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 27.71

1 low outlier(s) identified below test value of 27.71

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.184	Historic Events	1

Standard Dev	0.540	High Outliers	0
Station Skew	0.153	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.728	Systematic Events	57
		Historic Period	104

```
-----------------------
<< High Outlier Test >>
-----------------------
 Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
                     Computed high outlier test value = 49,954.78

     1 high outlier(s) identified above input threshold of 21,500

   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
   * Note - Collection of historical information and             *
   *        comparison with similar data should be explored,     *
   *        if not incorporated in this analysis.                *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

    Statistics and frequency curve adjusted for 1 high outlier(s)
                                          and 1 historic event(s)
```

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.165	Historic Events	1
Standard Dev	0.522	High Outliers	1
Station Skew	0.098	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-0.728	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
05 Apr 1929	15,600.0	1	1978	21,500.0*	0.95
10 Apr 1930	861.0	2	1978	21,500.0	1.90
24 Mar 1931	726.0	3	1928	15,600.0	3.25
10 Feb 1932	4,690.0	4	1937	12,900.0	4.98
05 Apr 1933	675.0	5	1951	9,370.0	6.72
31 Jul 1933	139.0	6	1966	8,630.0	8.45
31 May 1935	---	7	1965	8,620.0	10.19
14 Apr 1936	1,360.0	8	1977	6,150.0	11.92
18 Mar 1937	2,120.0	9	1979	5,800.0	13.66
04 Mar 1938	12,900.0	10	1956	4,740.0	15.39
05 Apr 1939	1,200.0	11	1931	4,690.0	17.13
29 Feb 1940	440.0	12	1972	4,430.0	18.86
15 Mar 1941	2,920.0	13	1964	3,760.0	20.60
06 Apr 1942	1,770.0	14	1981	3,650.0	22.33

12 Mar 1943	1,170.0	15	1968	3,500.0	24.06
07 Apr 1944	1,260.0	16	1971	3,410.0	25.80
23 Apr 1945	1,810.0	17	1953	3,110.0	27.53
09 Apr 1946	596.0	18	1970	2,960.0	29.27
26 Nov 1946	906.0	19	1940	2,920.0	31.00
12 Apr 1948	1,460.0	20	1936	2,120.0	32.74
15 Apr 1949	1,630.0	21	1957	1,870.0	34.47
01 Mar 1950	871.0	22	1944	1,810.0	36.21
06 May 1951	541.0	23	1961	1,790.0	37.94
19 Jan 1952	9,370.0	24	1941	1,770.0	39.68
28 Mar 1953	470.0	25	1948	1,630.0	41.41
24 Mar 1954	3,110.0	26	1975	1,490.0	43.15
23 Jul 1954	121.0	27	1967	1,460.0	44.88
26 Aug 1955	790.0	28	1947	1,460.0	46.62
11 Jan 1957	4,740.0	29	1959	1,360.0	48.35
23 Mar 1958	1,870.0	30	1935	1,360.0	50.09
29 Sep 1958	720.0	31	1943	1,260.0	51.82
26 Dec 1959	1,360.0	32	1938	1,200.0	53.55
06 Apr 1961	799.0	33	1942	1,170.0	55.29
14 Feb 1962	1,790.0	34	1963	912.0	57.02
31 Mar 1963	173.0	35	1946	906.0	58.76
17 Apr 1964	912.0	36	1949	871.0	60.49
08 Jan 1965	3,760.0	37	1929	861.0	62.23
31 Dec 1965	8,620.0	38	1960	799.0	63.96
07 Dec 1966	8,630.0	39	1974	791.0	65.70
14 Apr 1968	1,460.0	40	1955	790.0	67.43
27 Jan 1969	3,500.0	41	1982	729.0	69.17
19 Mar 1970	198.0	42	1930	726.0	70.90
06 Sep 1970	2,960.0	43	1958	720.0	72.64
27 Dec 1971	3,410.0	44	1932	675.0	74.37
20 Oct 1972	4,430.0	45	1945	596.0	76.11
22 Mar 1974	486.0	46	1984	545.0	77.84
24 Apr 1975	791.0	47	1950	541.0	79.57
23 Apr 1976	1,490.0	48	1973	486.0	81.31
11 Apr 1977	316.0	49	1952	470.0	83.04
01 Jan 1978	21,500.0	50	1939	440.0	84.78
02 Mar 1978	6,150.0	51	1976	316.0	86.51
19 Dec 1978	21,500.0	52	1980	200.0	88.25
20 Feb 1980	5,800.0	53	1969	198.0	89.98
09 Apr 1981	200.0	54	1962	173.0	91.72
13 Mar 1982	3,650.0	55	1933	139.0	93.45
25 Dec 1982	729.0	56	1954	121.0	95.19
11 Aug 1983	8.3	57	1983	8.3*	96.92
24 Mar 1985	545.0	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8214

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.056
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
50,774.5	61,762.4	0.2	104,491.4	29,485.7
34,314.2	39,776.3	0.5	66,129.2	20,870.3
24,888.1	27,922.7	1.0	45,499.3	15,705.4
17,560.9	19,140.0	2.0	30,360.5	11,517.5
11,949.8	12,699.0	4.0	19,469.1	8,159.6
10,453.8	11,027.5	5.0	16,696.1	7,233.6

6,622.2	6,847.6	10.0	9,918.4	4,777.2
3,830.8	3,897.5	20.0	5,369.0	2,874.1
1,366.8	1,366.8	50.0	1,785.1	1,045.8
498.3	490.2	80.0	664.5	355.2
296.5	287.5	90.0	410.4	198.5
194.0	184.7	95.0	279.0	122.4
88.5	79.9	99.0	138.1	49.5

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.142	Historic Events	1
Standard Dev	0.526	High Outliers	1
Station Skew	0.108	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	0.075	Missing Events	1
Adopted Skew	0.075	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
50,604.9	61,543.2	0.2	104,073.7	29,401.7
34,213.6	39,653.5	0.5	65,896.5	20,818.4
24,823.3	27,846.7	1.0	45,356.7	15,670.9
17,521.3	19,095.3	2.0	30,277.6	11,495.7
11,927.4	12,674.4	4.0	19,424.5	8,147.0
10,435.6	11,007.7	5.0	16,660.3	7,223.2
6,613.5	6,838.3	10.0	9,902.0	4,772.2
3,827.6	3,894.2	20.0	5,363.2	2,872.5
1,366.9	1,366.9	50.0	1,784.8	1,046.1
498.7	490.6	80.0	664.9	355.6
296.9	287.8	90.0	410.8	198.8
194.3	185.0	95.0	279.3	122.6
88.7	80.1	99.0	138.4	49.6

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (1-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

==
Statistical Analysis of 2-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06	Apr	1929	9,645.0	1	1978	12,725.0*	1.72
11	Apr	1930	808.5	2	1928	9,645.0	3.45
24	Mar	1931	675.5	3	1937	7,770.0	5.17
11	Feb	1932	3,540.0	4	1966	6,095.0	6.90
05	Apr	1933	650.0	5	1951	5,870.0	8.62
31	Jul	1933	84.5	6	1965	5,510.0	10.34
31	May	1935	---	7	1977	4,530.0	12.07
15	Apr	1936	1,345.0	8	1979	4,465.0	13.79
19	Mar	1937	1,775.0	9	1956	3,980.0	15.52
05	Mar	1938	7,770.0	10	1931	3,540.0	17.24
05	Apr	1939	1,160.0	11	1972	3,185.0	18.97
01	Mar	1940	419.0	12	1968	3,185.0	20.69
16	Mar	1941	2,280.0	13	1981	2,775.0	22.41
07	Apr	1942	1,515.0	14	1964	2,555.0	24.14
12	Mar	1943	1,034.0	15	1971	2,335.0	25.86
08	Apr	1944	1,255.0	16	1940	2,280.0	27.59
23	Apr	1945	1,755.0	17	1970	2,265.0	29.31
10	Apr	1946	471.5	18	1953	2,170.0	31.03
26	Nov	1946	794.5	19	1936	1,775.0	32.76
13	Apr	1948	1,435.0	20	1944	1,755.0	34.48
16	Apr	1949	1,610.0	21	1948	1,610.0	36.21
02	Mar	1950	744.5	22	1957	1,605.0	37.93
07	May	1951	482.0	23	1961	1,600.0	39.66
20	Jan	1952	5,870.0	24	1941	1,515.0	41.38
28	Mar	1953	457.0	25	1975	1,490.0	43.10
25	Mar	1954	2,170.0	26	1967	1,435.0	44.83
24	Jul	1954	81.5	27	1947	1,435.0	46.55
26	Aug	1955	789.0	28	1935	1,345.0	48.28
11	Jan	1957	3,980.0	29	1943	1,255.0	50.00
24	Mar	1958	1,605.0	30	1959	1,165.0	51.72
30	Sep	1958	646.5	31	1938	1,160.0	53.45
27	Mar	1960	1,165.0	32	1942	1,034.0	55.17
06	Apr	1961	741.0	33	1963	902.5	56.90
14	Feb	1962	1,600.0	34	1929	808.5	58.62
01	Apr	1963	170.5	35	1946	794.5	60.34
18	Apr	1964	902.5	36	1955	789.0	62.07
09	Jan	1965	2,555.0	37	1974	762.5	63.79
01	Jan	1966	5,510.0	38	1949	744.5	65.52
08	Dec	1966	6,095.0	39	1960	741.0	67.24
03	Apr	1968	1,435.0	40	1930	675.5	68.97
28	Jan	1969	3,185.0	41	1982	652.5	70.69
20	Mar	1970	198.0	42	1932	650.0	72.41
07	Sep	1970	2,265.0	43	1958	646.5	74.14
28	Dec	1971	2,335.0	44	1950	482.0	75.86
21	Oct	1972	3,185.0	45	1945	471.5	77.59
23	Mar	1974	459.0	46	1973	459.0	79.31
24	Apr	1975	762.5	47	1952	457.0	81.03
24	Apr	1976	1,490.0	48	1984	436.5	82.76
11	Apr	1977	287.5	49	1939	419.0	84.48
03	Mar	1978	4,530.0	50	1976	287.5	86.21
20	Dec	1978	12,725.0	51	1969	198.0	87.93
21	Feb	1980	4,465.0	52	1980	190.0	89.66
09	Apr	1981	190.0	53	1962	170.5	91.38
14	Mar	1982	2,775.0	54	1933	84.5	93.10
25	Dec	1982	652.5	55	1954	81.5	94.83
11	Aug	1983	7.9	56	1983	7.9*	96.55
25	Mar	1985	436.5	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary
frequency statistics are for the conditional frequency curve
because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,005.4	10,387.4	0.2	16,684.6	6,702.1
9,146.8	9,467.5	0.5	15,051.0	6,181.2
8,362.3	8,640.5	1.0	13,580.6	5,699.9
7,445.7	7,666.3	2.0	11,892.0	5,130.3
6,385.1	6,549.5	4.0	9,981.6	4,460.3
6,011.9	6,161.0	5.0	9,321.4	4,221.3
4,754.1	4,838.1	10.0	7,148.2	3,401.7
3,360.0	3,397.7	20.0	4,849.2	2,461.4
1,393.9	1,393.9	50.0	1,875.6	1,047.7
420.4	410.2	80.0	569.8	295.3
195.6	185.5	90.0	279.9	125.2
96.4	88.2	95.0	147.7	55.6
21.1	16.8	99.0	38.5	9.5

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.047	Historic Events	0
Standard Dev	0.564	High Outliers	0
Station Skew	-1.052	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.052	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
9,988.8	---	0.2	---	---
9,126.7	---	0.5	---	---
8,338.7	---	1.0	---	---
7,419.8	---	2.0	---	---
6,355.3	---	4.0	---	---
5,978.6	---	5.0	---	---
4,716.3	---	10.0	---	---
3,320.4	---	20.0	---	---
1,354.9	---	50.0	---	---
383.9	---	80.0	---	---
161.7	---	90.0	---	---
64.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811

Computed low outlier test value = 29

1 low outlier(s) identified below test value of 29

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.105	Historic Events	1
Standard Dev	0.501	High Outliers	0
Station Skew	-0.184	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.052	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 32,234.48

1 high outlier(s) identified above input threshold of 12,725

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and           *
*        comparison with similar data should be explored,   *
*        if not incorporated in this analysis.              *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.088	Historic Events	1
Standard Dev	0.486	High Outliers	1
Station Skew	-0.244	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.052	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Events Analyzed	FLOW	Ordered Events Analysis	FLOW	Weibull

Day Mon Year	cfs	Rank	Year	cfs	Plot Pos
06 Apr 1929	9,645.0	1	1978	12,725.0*	0.95
11 Apr 1930	808.5	2	1978	12,725.0	1.90
24 Mar 1931	675.5	3	1928	9,645.0	3.25
11 Feb 1932	3,540.0	4	1937	7,770.0	4.98
05 Apr 1933	650.0	5	1966	6,095.0	6.72
31 Jul 1933	84.5	6	1951	5,870.0	8.45
31 May 1935	---	7	1965	5,510.0	10.19
15 Apr 1936	1,345.0	8	1977	4,530.0	11.92
19 Mar 1937	1,775.0	9	1979	4,465.0	13.66
05 Mar 1938	7,770.0	10	1956	3,980.0	15.39
05 Apr 1939	1,160.0	11	1931	3,540.0	17.13
01 Mar 1940	419.0	12	1972	3,185.0	18.86
16 Mar 1941	2,280.0	13	1968	3,185.0	20.60
07 Apr 1942	1,515.0	14	1981	2,775.0	22.33
12 Mar 1943	1,034.0	15	1964	2,555.0	24.06
08 Apr 1944	1,255.0	16	1971	2,335.0	25.80
23 Apr 1945	1,755.0	17	1940	2,280.0	27.53
10 Apr 1946	471.5	18	1970	2,265.0	29.27
26 Nov 1946	794.5	19	1953	2,170.0	31.00
13 Apr 1948	1,435.0	20	1936	1,775.0	32.74
16 Apr 1949	1,610.0	21	1944	1,755.0	34.47
02 Mar 1950	744.5	22	1948	1,610.0	36.21
07 May 1951	482.0	23	1957	1,605.0	37.94
20 Jan 1952	5,870.0	24	1961	1,600.0	39.68
28 Mar 1953	457.0	25	1941	1,515.0	41.41
25 Mar 1954	2,170.0	26	1975	1,490.0	43.15
24 Jul 1954	81.5	27	1967	1,435.0	44.88
26 Aug 1955	789.0	28	1947	1,435.0	46.62
11 Jan 1957	3,980.0	29	1935	1,345.0	48.35
24 Mar 1958	1,605.0	30	1943	1,255.0	50.09
30 Sep 1958	646.5	31	1959	1,165.0	51.82
27 Mar 1960	1,165.0	32	1938	1,160.0	53.55
06 Apr 1961	741.0	33	1942	1,034.0	55.29
14 Feb 1962	1,600.0	34	1963	902.5	57.02
01 Apr 1963	170.5	35	1929	808.5	58.76
18 Apr 1964	902.5	36	1946	794.5	60.49
09 Jan 1965	2,555.0	37	1955	789.0	62.23
01 Jan 1966	5,510.0	38	1974	762.5	63.96
08 Dec 1966	6,095.0	39	1949	744.5	65.70
03 Apr 1968	1,435.0	40	1960	741.0	67.43
28 Jan 1969	3,185.0	41	1930	675.5	69.17
20 Mar 1970	198.0	42	1982	652.5	70.90
07 Sep 1970	2,265.0	43	1932	650.0	72.64
28 Dec 1971	2,335.0	44	1958	646.5	74.37
21 Oct 1972	3,185.0	45	1950	482.0	76.11
23 Mar 1974	459.0	46	1945	471.5	77.84
24 Apr 1975	762.5	47	1973	459.0	79.57
24 Apr 1976	1,490.0	48	1952	457.0	81.31
11 Apr 1977	287.5	49	1984	436.5	83.04
01 Jan 1978	12,725.0	50	1939	419.0	84.78
03 Mar 1978	4,530.0	51	1976	287.5	86.51
20 Dec 1978	12,725.0	52	1969	198.0	88.25
21 Feb 1980	4,465.0	53	1980	190.0	89.98
09 Apr 1981	190.0	54	1962	170.5	91.72
14 Mar 1982	2,775.0	55	1933	84.5	93.45
25 Dec 1982	652.5	56	1954	81.5	95.19
11 Aug 1983	7.9	57	1983	7.9*	96.92
25 Mar 1985	436.5	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8214

* Outlier

<< Skew Weighting >>

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--------------------------------------------------------------
Based on 104 events, mean-square error of station skew =    0.062
Mean-square error of regional skew =                        0.302
```

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
22,714.7	26,015.3	0.2	41,727.9	14,323.0
17,190.1	19,094.3	0.5	30,167.4	11,191.1
13,590.3	14,783.7	1.0	22,965.7	9,081.9
10,458.1	11,157.0	2.0	16,961.4	7,188.0
7,765.1	8,140.8	4.0	12,039.6	5,501.0
6,987.0	7,288.0	5.0	10,667.3	5,000.5
4,831.5	4,963.9	10.0	7,008.8	3,573.4
3,049.6	3,094.2	20.0	4,184.8	2,330.7
1,212.9	1,212.9	50.0	1,558.1	946.0
456.3	448.7	80.0	596.2	333.3
267.6	258.8	90.0	363.3	183.2
170.2	161.3	95.0	240.9	109.3
70.7	62.8	99.0	110.0	39.6

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.067	Historic Events	1
Standard Dev	0.491	High Outliers	1
Station Skew	-0.232	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.209	Missing Events	1
Adopted Skew	-0.209	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
42,525.3	51,717.2	0.2	87,457.3	24,707.4
28,751.0	33,322.5	0.5	55,375.5	17,494.5
20,860.0	23,400.7	1.0	38,115.0	13,168.8
14,723.9	16,046.5	2.0	25,443.5	9,660.3
10,023.1	10,650.8	4.0	16,323.2	6,846.2
8,769.4	9,250.2	5.0	14,000.3	6,069.9
5,557.6	5,746.5	10.0	8,321.0	4,010.2
3,216.5	3,272.5	20.0	4,506.9	2,413.8
1,148.7	1,148.7	50.0	1,499.9	879.1
419.1	412.3	80.0	558.7	298.8
249.5	241.9	90.0	345.2	167.1
163.3	155.5	95.0	234.7	103.1
74.5	67.3	99.0	116.3	41.7

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (2-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		

User Skew	0.075	

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 3-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Events Analyzed		Ordered Events			
	FLOW		Analysis	FLOW	Weibull
Day Mon Year	cfs	Rank	Year	cfs	Plot Pos
06 Apr 1929	7,480.0	1	1978	9,706.7	1.72
10 Apr 1930	791.0	2	1928	7,480.0	3.45
25 Mar 1931	658.7	3	1937	5,650.0	5.17
12 Feb 1932	2,790.0	4	1966	4,410.0	6.90
06 Apr 1933	638.3	5	1951	4,313.3	8.62
01 Aug 1933	63.0	6	1965	4,206.7	10.34
31 May 1935	---	7	1977	4,100.0	12.07
15 Apr 1936	1,326.7	8	1979	3,606.7	13.79
19 Mar 1937	1,643.3	9	1956	3,206.7	15.52
05 Mar 1938	5,650.0	10	1972	2,993.3	17.24
06 Apr 1939	1,083.7	11	1931	2,790.0	18.97
02 Mar 1940	403.3	12	1968	2,626.7	20.69
16 Mar 1941	1,893.3	13	1981	2,326.7	22.41
07 Apr 1942	1,323.3	14	1964	2,010.0	24.14
13 Mar 1943	934.7	15	1940	1,893.3	25.86
08 Apr 1944	1,200.0	16	1971	1,763.7	27.59
23 Apr 1945	1,683.3	17	1970	1,692.7	29.31
11 Apr 1946	391.7	18	1944	1,683.3	31.03
27 Nov 1946	682.0	19	1953	1,652.0	32.76
13 Apr 1948	1,350.0	20	1936	1,643.3	34.48
16 Apr 1949	1,553.3	21	1948	1,553.3	36.21
03 Mar 1950	664.3	22	1961	1,460.0	37.93
08 May 1951	414.7	23	1967	1,403.3	39.66
21 Jan 1952	4,313.3	24	1975	1,386.7	41.38
29 Mar 1953	452.7	25	1957	1,363.3	43.10
26 Mar 1954	1,652.0	26	1947	1,350.0	44.83
21 Mar 1955	74.7	27	1935	1,326.7	46.55
27 Aug 1955	683.7	28	1941	1,323.3	48.28
12 Jan 1957	3,206.7	29	1943	1,200.0	50.00
25 Mar 1958	1,363.3	30	1959	1,123.3	51.72
30 Sep 1958	584.3	31	1938	1,083.7	53.45
28 Mar 1960	1,123.3	32	1942	934.7	55.17
07 Apr 1961	721.7	33	1963	874.0	56.90
12 Apr 1962	1,460.0	34	1929	791.0	58.62
02 Apr 1963	164.0	35	1974	743.7	60.34
18 Apr 1964	874.0	36	1960	721.7	62.07
09 Jan 1965	2,010.0	37	1955	683.7	63.79
01 Jan 1966	4,206.7	38	1946	682.0	65.52
09 Dec 1966	4,410.0	39	1949	664.3	67.24
03 Apr 1968	1,403.3	40	1930	658.7	68.97
28 Jan 1969	2,626.7	41	1932	638.3	70.69
20 Mar 1970	184.3	42	1958	584.3	72.41
08 Sep 1970	1,692.7	43	1982	571.7	74.14
29 Dec 1971	1,763.7	44	1952	452.7	75.86
30 Apr 1973	2,993.3	45	1973	433.0	77.59
23 Mar 1974	433.0	46	1950	414.7	79.31
25 Apr 1975	743.7	47	1939	403.3	81.03
25 Apr 1976	1,386.7	48	1945	391.7	82.76
12 Apr 1977	278.0	49	1984	352.7	84.48

04 Mar 1978	4,100.0	50	1976	278.0	86.21
20 Dec 1978	9,706.7	51	1980	186.7	87.93
21 Feb 1980	3,606.7	52	1969	184.3	89.66
10 Apr 1981	186.7	53	1962	164.0	91.38
15 Mar 1982	2,326.7	54	1954	74.7	93.10
26 Dec 1982	571.7	55	1933	63.0	94.83
12 Aug 1983	6.1	56	1983	6.1*	96.55
25 Mar 1985	352.7	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,162.3	6,272.0	0.2	9,716.6	4,288.7
5,880.0	5,986.9	0.5	9,210.4	4,109.6
5,583.3	5,689.8	1.0	8,682.8	3,920.3
5,190.9	5,286.9	2.0	7,992.1	3,667.9
4,675.0	4,757.6	4.0	7,097.3	3,332.5
4,477.5	4,556.8	5.0	6,759.0	3,202.9
3,748.9	3,798.9	10.0	5,533.0	2,718.4
2,822.3	2,848.2	20.0	4,030.5	2,085.0
1,277.1	1,277.1	50.0	1,710.2	966.7
393.4	383.5	80.0	528.1	279.8
179.1	169.4	90.0	254.0	115.9
85.1	77.4	95.0	129.8	49.4
16.6	12.9	99.0	30.5	7.3

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.990	Historic Events	0
Standard Dev	0.550	High Outliers	0
Station Skew	-1.310	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.310	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,157.0	---	0.2	---	---
5,872.5	---	0.5	---	---
5,573.4	---	1.0	---	---
5,178.9	---	2.0	---	---
4,659.3	---	4.0	---	---
4,458.7	---	5.0	---	---
3,724.5	---	10.0	---	---
2,793.4	---	20.0	---	---

1,243.1	---	50.0	---	---
358.3	---	80.0	---	---
146.7	---	90.0	---	---
55.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 27.74

1 low outlier(s) identified below test value of 27.74

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.047	Historic Events	1
Standard Dev	0.479	High Outliers	0
Station Skew	-0.350	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.310	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 24,487.88

0 high outlier(s) identified above input threshold of 9,706.7

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.039	Historic Events	1
Standard Dev	0.471	High Outliers	0
Station Skew	-0.378	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.310	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
06	Apr	1929	7,480.0	1	1978	9,706.7	0.95
10	Apr	1930	791.0	2	1978	9,706.7	2.29
25	Mar	1931	658.7	3	1928	7,480.0	4.01
12	Feb	1932	2,790.0	4	1937	5,650.0	5.73
06	Apr	1933	638.3	5	1966	4,410.0	7.45
01	Aug	1933	63.0	6	1951	4,313.3	9.17
31	May	1935	---	7	1965	4,206.7	10.89
15	Apr	1936	1,326.7	8	1977	4,100.0	12.61
19	Mar	1937	1,643.3	9	1979	3,606.7	14.34
05	Mar	1938	5,650.0	10	1956	3,206.7	16.06
06	Apr	1939	1,083.7	11	1972	2,993.3	17.78
02	Mar	1940	403.3	12	1931	2,790.0	19.50
16	Mar	1941	1,893.3	13	1968	2,626.7	21.22
07	Apr	1942	1,323.3	14	1981	2,326.7	22.94
13	Mar	1943	934.7	15	1964	2,010.0	24.66
08	Apr	1944	1,200.0	16	1940	1,893.3	26.38
23	Apr	1945	1,683.3	17	1971	1,763.7	28.10
11	Apr	1946	391.7	18	1970	1,692.7	29.82
27	Nov	1946	682.0	19	1944	1,683.3	31.55
13	Apr	1948	1,350.0	20	1953	1,652.0	33.27
16	Apr	1949	1,553.3	21	1936	1,643.3	34.99
03	Mar	1950	664.3	22	1948	1,553.3	36.71
08	May	1951	414.7	23	1961	1,460.0	38.43
21	Jan	1952	4,313.3	24	1967	1,403.3	40.15
29	Mar	1953	452.7	25	1975	1,386.7	41.87
26	Mar	1954	1,652.0	26	1957	1,363.3	43.59
21	Mar	1955	74.7	27	1947	1,350.0	45.31
27	Aug	1955	683.7	28	1935	1,326.7	47.03
12	Jan	1957	3,206.7	29	1941	1,323.3	48.76
25	Mar	1958	1,363.3	30	1943	1,200.0	50.48
30	Sep	1958	584.3	31	1959	1,123.3	52.20
28	Mar	1960	1,123.3	32	1938	1,083.7	53.92
07	Apr	1961	721.7	33	1942	934.7	55.64
12	Apr	1962	1,460.0	34	1963	874.0	57.36
02	Apr	1963	164.0	35	1929	791.0	59.08
18	Apr	1964	874.0	36	1974	743.7	60.80
09	Jan	1965	2,010.0	37	1960	721.7	62.52
01	Jan	1966	4,206.7	38	1955	683.7	64.24
09	Dec	1966	4,410.0	39	1946	682.0	65.96
03	Apr	1968	1,403.3	40	1949	664.3	67.69
28	Jan	1969	2,626.7	41	1930	658.7	69.41
20	Mar	1970	184.3	42	1932	638.3	71.13
08	Sep	1970	1,692.7	43	1958	584.3	72.85
29	Dec	1971	1,763.7	44	1982	571.7	74.57
30	Apr	1973	2,993.3	45	1952	452.7	76.29
23	Mar	1974	433.0	46	1973	433.0	78.01
25	Apr	1975	743.7	47	1950	414.7	79.73
25	Apr	1976	1,386.7	48	1939	403.3	81.45
12	Apr	1977	278.0	49	1945	391.7	83.17
01	Jan	1978	9,706.7	50	1984	352.7	84.90
04	Mar	1978	4,100.0	51	1976	278.0	86.62
20	Dec	1978	9,706.7	52	1980	186.7	88.34
21	Feb	1980	3,606.7	53	1969	184.3	90.06
10	Apr	1981	186.7	54	1962	164.0	91.78
15	Mar	1982	2,326.7	55	1954	74.7	93.50
26	Dec	1982	571.7	56	1933	63.0	95.22
12	Aug	1983	6.1	57	1983	6.1*	96.94
25	Mar	1985	352.7	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 1

| Weighting factor for systematic events (W) = 1.807 |

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew =	0.069
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
16,203.5	18,186.6	0.2	28,582.3	10,522.0
12,742.5	13,950.6	0.5	21,616.7	8,502.3
10,377.1	11,169.2	1.0	17,037.6	7,081.8
8,230.0	8,714.9	2.0	13,034.6	5,756.0
6,301.7	6,575.0	4.0	9,589.2	4,526.9
5,727.4	5,950.2	5.0	8,595.5	4,152.1
4,087.7	4,190.0	10.0	5,856.4	3,052.8
2,664.6	2,700.8	20.0	3,625.7	2,051.4
1,105.6	1,105.6	50.0	1,411.2	868.7
422.4	415.3	80.0	547.5	311.5
246.9	238.7	90.0	332.7	170.6
155.7	147.4	95.0	218.9	100.8
62.7	55.4	99.0	97.3	35.2

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	3.018	Historic Events	1
Standard Dev	0.477	High Outliers	0
Station Skew	-0.369	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.319	Missing Events	1
Adopted Skew	-0.319	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
38,034.7	46,256.0	0.2	78,222.0	22,098.4
25,715.0	29,803.7	0.5	49,527.9	15,647.1
18,657.3	20,929.6	1.0	34,090.2	11,778.2
13,169.1	14,352.0	2.0	22,756.7	8,640.2
8,964.7	9,526.1	4.0	14,599.5	6,123.3
7,843.4	8,273.4	5.0	12,521.9	5,429.0
4,970.7	5,139.7	10.0	7,442.3	3,586.8
2,876.9	2,926.9	20.0	4,031.0	2,158.9
1,027.4	1,027.4	50.0	1,341.5	786.2
374.8	368.7	80.0	499.7	267.3
223.2	216.3	90.0	308.8	149.4
146.0	139.1	95.0	209.9	92.2
66.6	60.2	99.0	104.0	37.3

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (3-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 4-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07	Apr	1929	6,055.0	1	1978	7,650.0*	1.72
11	Apr	1930	782.2	2	1928	6,055.0	3.45
24	Mar	1931	650.0	3	1937	4,590.0	5.17
13	Feb	1932	2,293.5	4	1977	3,560.0	6.90
06	Apr	1933	618.2	5	1965	3,450.0	8.62
02	Aug	1933	49.0	6	1966	3,442.0	10.34
31	May	1935	---	7	1951	3,400.0	12.07
16	Apr	1936	1,300.0	8	1979	3,050.0	13.79
18	Mar	1937	1,525.0	9	1972	2,935.0	15.52
05	Mar	1938	4,590.0	10	1956	2,652.0	17.24
07	Apr	1939	995.0	11	1931	2,293.5	18.97
03	Mar	1940	383.2	12	1968	2,232.5	20.69
17	Mar	1941	1,668.8	13	1981	2,012.5	22.41
07	Apr	1942	1,213.8	14	1964	1,787.5	24.14
13	Mar	1943	859.8	15	1940	1,668.8	25.86
09	Apr	1944	1,167.5	16	1944	1,647.5	27.59
23	Apr	1945	1,647.5	17	1936	1,525.0	29.31
12	Apr	1946	333.2	18	1948	1,512.5	31.03
28	Nov	1946	582.5	19	1961	1,437.5	32.76
13	Apr	1948	1,247.5	20	1971	1,432.5	34.48
17	Apr	1949	1,512.5	21	1967	1,372.5	36.21
04	Mar	1950	613.0	22	1970	1,345.5	37.93
09	May	1951	356.2	23	1953	1,324.5	39.66
22	Jan	1952	3,400.0	24	1935	1,300.0	41.38
30	Mar	1953	450.5	25	1975	1,290.0	43.10
27	Mar	1954	1,324.5	26	1947	1,247.5	44.83
22	Mar	1955	69.2	27	1941	1,213.8	46.55
27	Aug	1955	613.0	28	1943	1,167.5	48.28
12	Jan	1957	2,652.0	29	1957	1,165.5	50.00
26	Mar	1958	1,165.5	30	1959	1,093.2	51.72
01	Oct	1958	540.5	31	1938	995.0	53.45
27	Mar	1960	1,093.2	32	1942	859.8	55.17
08	Apr	1961	679.0	33	1963	845.5	56.90
12	Apr	1962	1,437.5	34	1929	782.2	58.62
02	Apr	1963	155.5	35	1974	714.5	60.34
18	Apr	1964	845.5	36	1960	679.0	62.07
23	Apr	1965	1,787.5	37	1930	650.0	63.79
02	Jan	1966	3,450.0	38	1932	618.2	65.52
10	Dec	1966	3,442.0	39	1955	613.0	67.24

03 Apr 1968	1,372.5	40	1949	613.0	68.97
29 Jan 1969	2,232.5	41	1946	582.5	70.69
21 Mar 1970	170.0	42	1958	540.5	72.41
09 Sep 1970	1,345.5	43	1982	506.5	74.14
30 Dec 1971	1,432.5	44	1952	450.5	75.86
30 Apr 1973	2,935.0	45	1973	426.2	77.59
23 Mar 1974	426.2	46	1939	383.2	79.31
26 Apr 1975	714.5	47	1950	356.2	81.03
26 Apr 1976	1,290.0	48	1945	333.2	82.76
13 Apr 1977	259.2	49	1984	310.0	84.48
04 Mar 1978	3,560.0	50	1976	259.2	86.21
21 Dec 1978	7,650.0	51	1980	182.5	87.93
22 Feb 1980	3,050.0	52	1969	170.0	89.66
11 Apr 1981	182.5	53	1962	155.5	91.38
16 Mar 1982	2,012.5	54	1954	69.2	93.10
27 Dec 1982	506.5	55	1933	49.0	94.83
13 Aug 1983	4.9	56	1983	4.9*	96.55
26 Mar 1985	310.0	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
4,418.6	4,456.7	0.2	6,738.4	3,143.8
4,307.9	4,350.1	0.5	6,547.1	3,071.6
4,176.8	4,224.1	1.0	6,321.7	2,985.7
3,983.6	4,031.3	2.0	5,991.8	2,858.7
3,700.4	3,746.9	4.0	5,513.0	2,671.0
3,584.0	3,630.9	5.0	5,317.9	2,593.3
3,120.0	3,152.5	10.0	4,550.8	2,280.6
2,457.5	2,476.4	20.0	3,488.1	1,823.8
1,185.9	1,185.9	50.0	1,585.6	900.6
370.1	360.6	80.0	494.3	265.3
165.2	155.9	90.0	233.2	107.6
76.0	68.8	95.0	115.8	44.2
13.4	10.3	99.0	25.0	5.8

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.943	Historic Events	0
Standard Dev	0.544	High Outliers	0
Station Skew	-1.514	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.514	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve	Expected Probability	Percent Chance	Confidence Limits 0.05	Confidence Limits 0.95

FLOW, cfs		Exceedance	FLOW, cfs	
4,416.5	---	0.2	---	---
4,304.6	---	0.5	---	---
4,171.9	---	1.0	---	---
3,977.3	---	2.0	---	---
3,691.2	---	4.0	---	---
3,572.3	---	5.0	---	---
3,103.0	---	10.0	---	---
2,435.1	---	20.0	---	---
1,155.4	---	50.0	---	---
336.3	---	80.0	---	---
134.1	---	90.0	---	---
48.1	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 25.96

1 low outlier(s) identified below test value of 25.96

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.999	Historic Events	1
Standard Dev	0.465	High Outliers	0
Station Skew	-0.510	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.514	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 20,116.26

1 high outlier(s) identified above input threshold of 7,650

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* Note - Collection of historical information and          *
*        comparison with similar data should be explored,  *
*        if not incorporated in this analysis.             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform:	

FLOW, cfs		Number of Events	
Mean	2.985	Historic Events	1
Standard Dev	0.453	High Outliers	1
Station Skew	-0.576	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.514	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07 Apr 1929	6,055.0	1	1978	7,650.0*	0.95
11 Apr 1930	782.2	2	1978	7,650.0	1.90
24 Mar 1931	650.0	3	1928	6,055.0	3.25
13 Feb 1932	2,293.5	4	1937	4,590.0	4.98
06 Apr 1933	618.2	5	1977	3,560.0	6.72
02 Aug 1933	49.0	6	1965	3,450.0	8.45
31 May 1935	---	7	1966	3,442.0	10.19
16 Apr 1936	1,300.0	8	1951	3,400.0	11.92
18 Mar 1937	1,525.0	9	1979	3,050.0	13.66
05 Mar 1938	4,590.0	10	1972	2,935.0	15.39
07 Apr 1939	995.0	11	1956	2,652.0	17.13
03 Mar 1940	383.2	12	1931	2,293.5	18.86
17 Mar 1941	1,668.8	13	1968	2,232.5	20.60
07 Apr 1942	1,213.8	14	1981	2,012.5	22.33
13 Mar 1943	859.8	15	1964	1,787.5	24.06
09 Apr 1944	1,167.5	16	1940	1,668.8	25.80
23 Apr 1945	1,647.5	17	1944	1,647.5	27.53
12 Apr 1946	333.2	18	1936	1,525.0	29.27
28 Nov 1946	582.5	19	1948	1,512.5	31.00
13 Apr 1948	1,247.5	20	1961	1,437.5	32.74
17 Apr 1949	1,512.5	21	1971	1,432.5	34.47
04 Mar 1950	613.0	22	1967	1,372.5	36.21
09 May 1951	356.2	23	1970	1,345.5	37.94
22 Jan 1952	3,400.0	24	1953	1,324.5	39.68
30 Mar 1953	450.5	25	1935	1,300.0	41.41
27 Mar 1954	1,324.5	26	1975	1,290.0	43.15
22 Mar 1955	69.2	27	1947	1,247.5	44.88
27 Aug 1955	613.0	28	1941	1,213.8	46.62
12 Jan 1957	2,652.0	29	1943	1,167.5	48.35
26 Mar 1958	1,165.5	30	1957	1,165.5	50.09
01 Oct 1958	540.5	31	1959	1,093.2	51.82
27 Mar 1960	1,093.2	32	1938	995.0	53.55
08 Apr 1961	679.0	33	1942	859.8	55.29
12 Apr 1962	1,437.5	34	1963	845.5	57.02
02 Apr 1963	155.5	35	1929	782.2	58.76
18 Apr 1964	845.5	36	1974	714.5	60.49
23 Apr 1965	1,787.5	37	1960	679.0	62.23
02 Jan 1966	3,450.0	38	1930	650.0	63.96
10 Dec 1966	3,442.0	39	1932	618.2	65.70
03 Apr 1968	1,372.5	40	1955	613.0	67.43
29 Jan 1969	2,232.5	41	1949	613.0	69.17
21 Mar 1970	170.0	42	1946	582.5	70.90
09 Sep 1970	1,345.5	43	1958	540.5	72.64
30 Dec 1971	1,432.5	44	1982	506.5	74.37
30 Apr 1973	2,935.0	45	1952	450.5	76.11

23 Mar 1974	426.2	46	1973	426.2	77.84
26 Apr 1975	714.5	47	1939	383.2	79.57
26 Apr 1976	1,290.0	48	1950	356.2	81.31
13 Apr 1977	259.2	49	1945	333.2	83.04
01 Jan 1978	7,650.0	50	1984	310.0	84.78
04 Mar 1978	3,560.0	51	1976	259.2	86.51
21 Dec 1978	7,650.0	52	1980	182.5	88.25
22 Feb 1980	3,050.0	53	1969	170.0	89.98
11 Apr 1981	182.5	54	1962	155.5	91.72
16 Mar 1982	2,012.5	55	1954	69.2	93.45
27 Dec 1982	506.5	56	1933	49.0	95.19
13 Aug 1983	4.9	57	1983	4.9*	96.92
26 Mar 1985	310.0	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8214

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.082
Mean-square error of regional skew = 0.302

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
10,766.7	11,786.5	0.2	18,066.6	7,247.5
8,881.6	9,550.0	0.5	14,451.6	6,107.0
7,506.1	7,972.5	1.0	11,895.6	5,255.2
6,183.4	6,486.6	2.0	9,513.0	4,416.9
4,922.4	5,104.9	4.0	7,322.0	3,595.8
4,531.1	4,683.5	5.0	6,660.5	3,335.7
3,366.3	3,440.4	10.0	4,752.0	2,542.9
2,285.9	2,314.0	20.0	3,080.6	1,774.5
999.9	999.9	50.0	1,267.4	792.2
388.4	381.8	80.0	498.9	289.7
225.5	217.8	90.0	301.2	157.5
140.2	132.4	95.0	195.8	91.5
53.9	47.2	99.0	83.6	30.2

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.964	Historic Events	1
Standard Dev	0.462	High Outliers	1
Station Skew	-0.575	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.474	Missing Events	1
Adopted Skew	-0.474	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Computed Curve	Expected Probability	Percent Chance	Confidence Limits 0.05	Confidence Limits 0.95

FLOW, cfs		Exceedance	FLOW, cfs	
33,533.4	40,781.6	0.2	68,964.5	19,483.0
22,671.6	26,276.4	0.5	43,666.4	13,795.3
16,449.2	18,452.6	1.0	30,055.6	10,384.3
11,610.5	12,653.5	2.0	20,063.5	7,617.6
7,903.7	8,398.7	4.0	12,871.7	5,398.6
6,915.1	7,294.3	5.0	11,039.9	4,786.5
4,382.4	4,531.4	10.0	6,561.6	3,162.3
2,536.4	2,580.5	20.0	3,553.9	1,903.4
905.8	905.8	50.0	1,182.7	693.2
330.5	325.1	80.0	440.6	235.6
196.7	190.7	90.0	272.2	131.7
128.8	122.6	95.0	185.1	81.3
58.8	53.1	99.0	91.7	32.9

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (4-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 5-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07	Apr	1929	5,032.4	1	1978	6,282.2*	1.72
11	Apr	1930	757.0	2	1928	5,032.4	3.45
24	Mar	1931	653.6	3	1937	3,906.0	5.17
14	Feb	1932	1,958.6	4	1977	3,154.0	6.90
06	Apr	1933	582.4	5	1965	2,890.0	8.62
03	Aug	1933	39.4	6	1972	2,840.0	10.34
31	May	1935	---	7	1966	2,824.2	12.07
16	Apr	1936	1,266.0	8	1951	2,813.6	13.79
19	Mar	1937	1,506.0	9	1979	2,612.2	15.52
06	Mar	1938	3,906.0	10	1956	2,285.6	17.24
07	Apr	1939	909.6	11	1931	1,958.6	18.97
04	Mar	1940	361.8	12	1968	1,886.0	20.69
18	Mar	1941	1,480.0	13	1981	1,770.0	22.41
08	Apr	1942	1,128.6	14	1964	1,736.0	24.14
12	Mar	1943	823.2	15	1944	1,626.0	25.86
10	Apr	1944	1,130.4	16	1936	1,506.0	27.59
24	Apr	1945	1,626.0	17	1940	1,480.0	29.31
13	Apr	1946	288.0	18	1948	1,472.0	31.03
29	Nov	1946	504.0	19	1961	1,398.0	32.76
14	Apr	1948	1,181.6	20	1967	1,344.0	34.48
17	Apr	1949	1,472.0	21	1935	1,266.0	36.21
05	Mar	1950	568.2	22	1971	1,206.8	37.93
09	May	1951	314.4	23	1975	1,198.2	39.66

23 Jan 1952	2,813.6	24	1947	1,181.6	41.38
31 Mar 1953	445.8	25	1943	1,130.4	43.10
28 Mar 1954	1,118.0	26	1941	1,128.6	44.83
23 Mar 1955	63.4	27	1953	1,118.0	46.55
27 Aug 1955	545.8	28	1970	1,105.4	48.28
13 Jan 1957	2,285.6	29	1959	1,090.6	50.00
21 Apr 1958	1,052.8	30	1957	1,052.8	51.72
02 Oct 1958	482.2	31	1938	909.6	53.45
27 Mar 1960	1,090.6	32	1963	849.0	55.17
09 Apr 1961	635.2	33	1942	823.2	56.90
12 Apr 1962	1,398.0	34	1929	757.0	58.62
02 Apr 1963	152.6	35	1974	702.2	60.34
18 Apr 1964	849.0	36	1930	653.6	62.07
23 Apr 1965	1,736.0	37	1960	635.2	63.79
03 Jan 1966	2,890.0	38	1932	582.4	65.52
11 Dec 1966	2,824.2	39	1949	568.2	67.24
03 Apr 1968	1,344.0	40	1955	545.8	68.97
30 Jan 1969	1,886.0	41	1946	504.0	70.69
22 Mar 1970	155.0	42	1958	482.2	72.41
10 Sep 1970	1,105.4	43	1952	445.8	74.14
31 Dec 1971	1,206.8	44	1982	445.2	75.86
30 Apr 1973	2,840.0	45	1973	416.6	77.59
24 Mar 1974	416.6	46	1939	361.8	79.31
27 Apr 1975	702.2	47	1950	314.4	81.03
27 Apr 1976	1,198.2	48	1945	288.0	82.76
14 Apr 1977	238.0	49	1984	277.0	84.48
05 Mar 1978	3,154.0	50	1976	238.0	86.21
22 Dec 1978	6,282.2	51	1980	178.0	87.93
23 Feb 1980	2,612.2	52	1969	155.0	89.66
12 Apr 1981	178.0	53	1962	152.6	91.38
17 Mar 1982	1,770.0	54	1954	63.4	93.10
28 Dec 1982	445.2	55	1933	39.4	94.83
14 Aug 1983	4.1	56	1983	4.1*	96.55
27 Mar 1985	277.0	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,494.4	3,510.4	0.2	5,226.3	2,517.2
3,443.0	3,462.6	0.5	5,139.4	2,483.0
3,375.7	3,400.1	1.0	5,026.3	2,438.3
3,267.5	3,294.4	2.0	4,845.0	2,366.1
3,093.9	3,123.0	4.0	4,556.2	2,249.6
3,018.4	3,048.9	5.0	4,431.4	2,198.7
2,697.2	2,719.9	10.0	3,906.4	1,980.3
2,193.1	2,207.7	20.0	3,103.3	1,630.9
1,108.8	1,108.8	50.0	1,483.1	842.9
348.5	339.4	80.0	464.3	250.8
152.8	143.9	90.0	215.2	99.8
68.4	61.7	95.0	104.2	39.7
11.1	8.4	99.0	20.9	4.7

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	2.902	Historic Events	0
Standard Dev	0.542	High Outliers	0
Station Skew	-1.671	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.671	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,493.5	---	0.2	---	---
3,441.3	---	0.5	---	---
3,373.1	---	1.0	---	---
3,263.8	---	2.0	---	---
3,088.0	---	4.0	---	---
3,010.4	---	5.0	---	---
2,684.4	---	10.0	---	---
2,174.9	---	20.0	---	---
1,081.1	---	50.0	---	---
316.0	---	80.0	---	---
123.2	---	90.0	---	---
42.4	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 23.96

1 low outlier(s) identified below test value of 23.96

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.959	Historic Events	1
Standard Dev	0.457	High Outliers	0
Station Skew	-0.654	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.671	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 17,433.55

1 high outlier(s) identified above input threshold of 6,282.2

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s) and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.945	Historic Events	1
Standard Dev	0.446	High Outliers	1
Station Skew	-0.716	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.671	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
07 Apr 1929	5,032.4	1	1978	6,282.2*	0.95
11 Apr 1930	757.0	2	1978	6,282.2	1.90
24 Mar 1931	653.6	3	1928	5,032.4	3.25
14 Feb 1932	1,958.6	4	1937	3,906.0	4.98
06 Apr 1933	582.4	5	1977	3,154.0	6.72
03 Aug 1933	39.4	6	1965	2,890.0	8.45
31 May 1935	---	7	1972	2,840.0	10.19
16 Apr 1936	1,266.0	8	1966	2,824.2	11.92
19 Mar 1937	1,506.0	9	1951	2,813.6	13.66
06 Mar 1938	3,906.0	10	1979	2,612.2	15.39
07 Apr 1939	909.6	11	1956	2,285.6	17.13
04 Mar 1940	361.8	12	1931	1,958.6	18.86
18 Mar 1941	1,480.0	13	1968	1,886.0	20.60
08 Apr 1942	1,128.6	14	1981	1,770.0	22.33
12 Mar 1943	823.2	15	1964	1,736.0	24.06
10 Apr 1944	1,130.4	16	1944	1,626.0	25.80
24 Apr 1945	1,626.0	17	1936	1,506.0	27.53
13 Apr 1946	288.0	18	1940	1,480.0	29.27
29 Nov 1946	504.0	19	1948	1,472.0	31.00
14 Apr 1948	1,181.6	20	1961	1,398.0	32.74
17 Apr 1949	1,472.0	21	1967	1,344.0	34.47
05 Mar 1950	568.2	22	1935	1,266.0	36.21
09 May 1951	314.4	23	1971	1,206.8	37.94
23 Jan 1952	2,813.6	24	1975	1,198.2	39.68
31 Mar 1953	445.8	25	1947	1,181.6	41.41
28 Mar 1954	1,118.0	26	1943	1,130.4	43.15
23 Mar 1955	63.4	27	1941	1,128.6	44.88
27 Aug 1955	545.8	28	1953	1,118.0	46.62
13 Jan 1957	2,285.6	29	1970	1,105.4	48.35

21 Apr 1958	1,052.8	30	1959	1,090.6	50.09
02 Oct 1958	482.2	31	1957	1,052.8	51.82
27 Mar 1960	1,090.6	32	1938	909.6	53.55
09 Apr 1961	635.2	33	1963	849.0	55.29
12 Apr 1962	1,398.0	34	1942	823.2	57.02
02 Apr 1963	152.6	35	1929	757.0	58.76
18 Apr 1964	849.0	36	1974	702.2	60.49
23 Apr 1965	1,736.0	37	1930	653.6	62.23
03 Jan 1966	2,890.0	38	1960	635.2	63.96
11 Dec 1966	2,824.2	39	1932	582.4	65.70
03 Apr 1968	1,344.0	40	1949	568.2	67.43
30 Jan 1969	1,886.0	41	1955	545.8	69.17
22 Mar 1970	155.0	42	1946	504.0	70.90
10 Sep 1970	1,105.4	43	1958	482.2	72.64
31 Dec 1971	1,206.8	44	1952	445.8	74.37
30 Apr 1973	2,840.0	45	1982	445.2	76.11
24 Mar 1974	416.6	46	1973	416.6	77.84
27 Apr 1975	702.2	47	1939	361.8	79.57
27 Apr 1976	1,198.2	48	1950	314.4	81.31
14 Apr 1977	238.0	49	1945	288.0	83.04
01 Jan 1978	6,282.2	50	1984	277.0	84.78
05 Mar 1978	3,154.0	51	1976	238.0	86.51
22 Dec 1978	6,282.2	52	1980	178.0	88.25
23 Feb 1980	2,612.2	53	1969	155.0	89.98
12 Apr 1981	178.0	54	1962	152.6	91.72
17 Mar 1982	1,770.0	55	1954	63.4	93.45
28 Dec 1982	445.2	56	1933	39.4	95.19
14 Aug 1983	4.1	57	1983	4.1*	96.92
27 Mar 1985	277.0	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8214

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.092
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
8,477.0	9,152.3	0.2	13,884.1	5,804.2
7,180.7	7,644.3	0.5	11,456.8	5,006.0
6,195.1	6,531.6	1.0	9,660.6	4,386.6
5,211.8	5,439.1	2.0	7,917.5	3,755.9
4,238.5	4,381.1	4.0	6,247.2	3,116.2
3,928.8	4,049.7	5.0	5,728.7	2,908.7
2,982.4	3,043.3	10.0	4,189.8	2,260.8
2,068.5	2,092.5	20.0	2,781.5	1,608.7
926.3	926.3	50.0	1,172.7	735.3
359.2	353.0	80.0	460.4	268.8
206.2	198.9	90.0	275.0	144.3
126.2	119.0	95.0	176.3	82.3
46.4	40.3	99.0	72.4	25.8

<< Synthetic Statistics >>

Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	2.923	Historic Events	1
Standard Dev	0.458	High Outliers	1
Station Skew	-0.724	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.579	Missing Events	1
Adopted Skew	-0.579	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
30,525.1	37,123.1	0.2	62,777.7	17,735.2
20,637.8	23,919.2	0.5	39,749.0	12,557.7
14,973.5	16,797.2	1.0	27,359.3	9,452.7
10,568.9	11,518.3	2.0	18,263.6	6,934.3
7,194.7	7,645.3	4.0	11,716.9	4,914.3
6,294.8	6,639.9	5.0	10,049.5	4,357.1
3,989.3	4,124.9	10.0	5,972.9	2,878.6
2,308.8	2,349.0	20.0	3,235.1	1,732.7
824.5	824.5	50.0	1,076.6	631.0
300.8	295.9	80.0	401.0	214.5
179.1	173.6	90.0	247.8	119.9
117.2	111.6	95.0	168.5	74.0
53.5	48.3	99.0	83.5	29.9

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (5-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

==
Statistical Analysis of 6-day Maximum values
==

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
08 Apr 1929	4,350.7	1	1978	5,337.7	1.72
12 Apr 1930	722.7	2	1928	4,350.7	3.45
25 Mar 1931	648.8	3	1937	3,369.2	5.17
15 Feb 1932	1,715.7	4	1977	2,886.7	6.90
06 Apr 1933	558.5	5	1972	2,723.3	8.62
03 Aug 1933	32.8	6	1979	2,506.8	10.34
31 May 1935	---	7	1965	2,479.5	12.07

17 Apr 1936	1,236.7	8	1951	2,405.3	13.79
19 Mar 1937	1,465.0	9	1966	2,388.5	15.52
07 Mar 1938	3,369.2	10	1956	1,993.7	17.24
08 Apr 1939	835.8	11	1931	1,715.7	18.97
05 Mar 1940	341.5	12	1964	1,691.7	20.69
08 May 1941	1,426.7	13	1968	1,669.3	22.41
08 Apr 1942	1,070.2	14	1981	1,605.2	24.14
12 Mar 1943	856.0	15	1944	1,538.3	25.86
10 Apr 1944	1,092.7	16	1936	1,465.0	27.59
24 Apr 1945	1,538.3	17	1948	1,428.3	29.31
14 Apr 1946	252.7	18	1940	1,426.7	31.03
30 Nov 1946	444.0	19	1961	1,381.7	32.76
14 Apr 1948	1,119.5	20	1967	1,296.7	34.48
18 Apr 1949	1,428.3	21	1935	1,236.7	36.21
05 Mar 1950	533.3	22	1975	1,134.0	37.93
10 May 1951	282.8	23	1947	1,119.5	39.66
24 Jan 1952	2,405.3	24	1943	1,092.7	41.38
31 Mar 1953	418.5	25	1959	1,082.2	43.10
29 Mar 1954	974.8	26	1941	1,070.2	44.83
24 Mar 1955	57.3	27	1971	1,034.7	46.55
27 Aug 1955	517.5	28	1957	1,009.0	48.28
14 Jan 1957	1,993.7	29	1953	974.8	50.00
22 Apr 1958	1,009.0	30	1970	936.7	51.72
03 Oct 1958	428.8	31	1942	856.0	53.45
28 Mar 1960	1,082.2	32	1963	855.5	55.17
10 Apr 1961	593.2	33	1938	835.8	56.90
12 Apr 1962	1,381.7	34	1929	722.7	58.62
02 Apr 1963	151.5	35	1974	674.8	60.34
18 Apr 1964	855.5	36	1930	648.8	62.07
24 Apr 1965	1,691.7	37	1960	593.2	63.79
04 Jan 1966	2,479.5	38	1932	558.5	65.52
12 Dec 1966	2,388.5	39	1949	533.3	67.24
03 Apr 1968	1,296.7	40	1955	517.5	68.97
29 Jan 1969	1,669.3	41	1946	444.0	70.69
23 Mar 1970	141.5	42	1958	428.8	72.41
11 Sep 1970	936.7	43	1952	418.5	74.14
01 Jan 1972	1,034.7	44	1973	405.7	75.86
01 May 1973	2,723.3	45	1982	404.3	77.59
24 Mar 1974	405.7	46	1939	341.5	79.31
27 Apr 1975	674.8	47	1950	282.8	81.03
27 Apr 1976	1,134.0	48	1945	252.7	82.76
15 Apr 1977	219.5	49	1984	250.2	84.48
06 Mar 1978	2,886.7	50	1976	219.5	86.21
23 Dec 1978	5,337.7	51	1980	173.3	87.93
21 Feb 1980	2,506.8	52	1962	151.5	89.66
13 Apr 1981	173.3	53	1969	141.5	91.38
17 Mar 1982	1,605.2	54	1954	57.3	93.10
29 Dec 1982	404.3	55	1933	32.8	94.83
26 Jan 1984	3.8	56	1983	3.8*	96.55
28 Mar 1985	250.2	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,046.3	3,056.4	0.2	4,517.2	2,206.4
3,011.9	3,025.0	0.5	4,459.8	2,183.4
2,964.8	2,981.9	1.0	4,381.3	2,151.8
2,885.7	2,905.4	2.0	4,250.0	2,098.7
2,753.3	2,775.6	4.0	4,031.4	2,009.3
2,694.0	2,718.0	5.0	3,934.2	1,969.2

2,434.3	2,452.7	10.0	3,512.1	1,791.8
2,007.7	2,020.1	20.0	2,835.0	1,495.3
1,038.4	1,038.4	50.0	1,388.4	790.0
328.3	319.7	80.0	436.8	236.9
143.1	134.7	90.0	201.2	93.7
63.4	57.1	95.0	96.5	36.8
9.9	7.5	99.0	18.8	4.2

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.869	Historic Events	0
Standard Dev	0.540	High Outliers	0
Station Skew	-1.742	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.742	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
3,045.6	---	0.2	---	---
3,010.7	---	0.5	---	---
2,962.8	---	1.0	---	---
2,882.9	---	2.0	---	---
2,748.6	---	4.0	---	---
2,687.6	---	5.0	---	---
2,423.5	---	10.0	---	---
1,991.8	---	20.0	---	---
1,012.7	---	50.0	---	---
297.5	---	80.0	---	---
115.0	---	90.0	---	---
39.0	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 22.47

1 low outlier(s) identified below test value of 22.47

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs	Number of Events

Mean	2.925	Historic Events	1
Standard Dev	0.454	High Outliers	0
Station Skew	-0.775	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.742	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 15,797.87

0 high outlier(s) identified above input threshold of 5,337.7

Statistics and frequency curve adjusted for 0 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.918	Historic Events	1
Standard Dev	0.448	High Outliers	0
Station Skew	-0.796	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.742	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Events Analyzed				Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
08	Apr	1929	4,350.7	1	1978	5,337.7	0.95
12	Apr	1930	722.7	2	1978	5,337.7	2.29
25	Mar	1931	648.8	3	1928	4,350.7	4.01
15	Feb	1932	1,715.7	4	1937	3,369.2	5.73
06	Apr	1933	558.5	5	1977	2,886.7	7.45
03	Aug	1933	32.8	6	1972	2,723.3	9.17
31	May	1935	---	7	1979	2,506.8	10.89
17	Apr	1936	1,236.7	8	1965	2,479.5	12.61
19	Mar	1937	1,465.0	9	1951	2,405.3	14.34
07	Mar	1938	3,369.2	10	1966	2,388.5	16.06
08	Apr	1939	835.8	11	1956	1,993.7	17.78
05	Mar	1940	341.5	12	1931	1,715.7	19.50
08	May	1941	1,426.7	13	1964	1,691.7	21.22
08	Apr	1942	1,070.2	14	1968	1,669.3	22.94
12	Mar	1943	856.0	15	1981	1,605.2	24.66
10	Apr	1944	1,092.7	16	1944	1,538.3	26.38
24	Apr	1945	1,538.3	17	1936	1,465.0	28.10
14	Apr	1946	252.7	18	1948	1,428.3	29.82
30	Nov	1946	444.0	19	1940	1,426.7	31.55

14 Apr 1948	1,119.5	20	1961	1,381.7	33.27
18 Apr 1949	1,428.3	21	1967	1,296.7	34.99
05 Mar 1950	533.3	22	1935	1,236.7	36.71
10 May 1951	282.8	23	1975	1,134.0	38.43
24 Jan 1952	2,405.3	24	1947	1,119.5	40.15
31 Mar 1953	418.5	25	1943	1,092.7	41.87
29 Mar 1954	974.8	26	1959	1,082.2	43.59
24 Mar 1955	57.3	27	1941	1,070.2	45.31
27 Aug 1955	517.5	28	1971	1,034.7	47.03
14 Jan 1957	1,993.7	29	1957	1,009.0	48.76
22 Apr 1958	1,009.0	30	1953	974.8	50.48
03 Oct 1958	428.8	31	1970	936.7	52.20
28 Mar 1960	1,082.2	32	1942	856.0	53.92
10 Apr 1961	593.2	33	1963	855.5	55.64
12 Apr 1962	1,381.7	34	1938	835.8	57.36
02 Apr 1963	151.5	35	1929	722.7	59.08
18 Apr 1964	855.5	36	1974	674.8	60.80
24 Apr 1965	1,691.7	37	1930	648.8	62.52
04 Jan 1966	2,479.5	38	1960	593.2	64.24
12 Dec 1966	2,388.5	39	1932	558.5	65.96
03 Apr 1968	1,296.7	40	1949	533.3	67.69
29 Jan 1969	1,669.3	41	1955	517.5	69.41
23 Mar 1970	141.5	42	1946	444.0	71.13
11 Sep 1970	936.7	43	1958	428.8	72.85
01 Jan 1972	1,034.7	44	1952	418.5	74.57
01 May 1973	2,723.3	45	1973	405.7	76.29
24 Mar 1974	405.7	46	1982	404.3	78.01
27 Apr 1975	674.8	47	1939	341.5	79.73
27 Apr 1976	1,134.0	48	1950	282.8	81.45
15 Apr 1977	219.5	49	1945	252.7	83.17
01 Jan 1978	5,337.7	50	1984	250.2	84.90
06 Mar 1978	2,886.7	51	1976	219.5	86.62
23 Dec 1978	5,337.7	52	1980	173.3	88.34
21 Feb 1980	2,506.8	53	1962	151.5	90.06
13 Apr 1981	173.3	54	1969	141.5	91.78
17 Mar 1982	1,605.2	55	1954	57.3	93.50
29 Dec 1982	404.3	56	1933	32.8	95.22
26 Jan 1984	3.8	57	1983	3.8*	96.94
28 Mar 1985	250.2	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 1
Weighting factor for systematic events (W) = 1.807

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew = 0.098
Mean-square error of regional skew = 0.302

<< Frequency Curve >>

Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
7,598.7	8,154.4	0.2	12,369.3	5,223.0
6,511.4	6,901.7	0.5	10,345.8	4,550.5
5,667.3	5,956.3	1.0	8,814.2	4,018.4
4,809.8	5,008.7	2.0	7,298.3	3,467.3
3,945.4	4,072.7	4.0	5,816.7	2,898.7
3,666.9	3,775.7	5.0	5,350.6	2,712.2
2,805.8	2,861.4	10.0	3,949.2	2,123.0
1,958.8	1,981.2	20.0	2,641.5	1,519.8
879.1	879.1	50.0	1,115.8	696.4
336.4	330.5	80.0	432.0	251.2
190.5	183.5	90.0	254.7	132.8

114.9	108.0	95.0	161.1	74.5
40.7	35.1	99.0	64.0	22.3

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.895	Historic Events	1
Standard Dev	0.463	High Outliers	0
Station Skew	-0.810	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.635	Missing Events	1
Adopted Skew	-0.635	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
28,657.3	34,851.6	0.2	58,936.3	16,650.0
19,375.0	22,455.6	0.5	37,316.8	11,789.3
14,057.3	15,769.4	1.0	25,685.2	8,874.3
9,922.2	10,813.5	2.0	17,146.0	6,510.0
6,754.4	7,177.5	4.0	11,000.0	4,613.6
5,909.6	6,233.6	5.0	9,434.6	4,090.5
3,745.2	3,872.5	10.0	5,607.4	2,702.5
2,167.6	2,205.3	20.0	3,037.1	1,626.7
774.1	774.1	50.0	1,010.7	592.4
282.4	277.8	80.0	376.5	201.4
168.1	163.0	90.0	232.6	112.6
110.0	104.8	95.0	158.2	69.5
50.2	45.4	99.0	78.4	28.1

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (6-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

Statistical Analysis of 7-day Maximum values

Note: Data is missing for all or part of 6 years in analysis period.

--- Preliminary Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Events Analyzed	Ordered Events

Day Mon Year	FLOW cfs	Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
08 Apr 1929	3,857.9	1	1978	4,647.4*	1.72
12 Apr 1930	690.4	2	1928	3,857.9	3.45
25 Mar 1931	643.9	3	1937	2,983.0	5.17
15 Feb 1932	1,537.1	4	1977	2,671.4	6.90
06 Apr 1933	551.7	5	1972	2,604.3	8.62
03 Aug 1933	28.1	6	1979	2,345.9	10.34
31 May 1935	---	7	1965	2,177.6	12.07
18 Apr 1936	1,204.3	8	1951	2,099.6	13.79
19 Mar 1937	1,402.9	9	1966	2,066.1	15.52
07 Mar 1938	2,983.0	10	1956	1,786.6	17.24
08 Apr 1939	776.9	11	1964	1,632.9	18.97
05 Mar 1940	322.6	12	1968	1,560.9	20.69
09 May 1941	1,398.6	13	1931	1,537.1	22.41
09 Apr 1942	1,005.3	14	1944	1,481.4	24.14
12 Mar 1943	846.3	15	1981	1,464.3	25.86
10 Apr 1944	1,040.9	16	1936	1,402.9	27.59
26 Apr 1945	1,481.4	17	1940	1,398.6	29.31
15 Apr 1946	225.9	18	1948	1,392.9	31.03
01 Dec 1946	396.6	19	1961	1,342.9	32.76
17 Apr 1948	1,084.4	20	1967	1,241.0	34.48
18 Apr 1949	1,392.9	21	1935	1,204.3	36.21
06 Mar 1950	505.7	22	1947	1,084.4	37.93
11 May 1951	254.9	23	1975	1,064.6	39.66
25 Jan 1952	2,099.6	24	1959	1,064.4	41.38
01 Apr 1953	393.6	25	1943	1,040.9	43.10
30 Mar 1954	871.4	26	1941	1,005.3	44.83
24 Mar 1955	52.4	27	1957	967.7	46.55
27 Aug 1955	486.4	28	1971	903.3	48.28
15 Jan 1957	1,786.6	29	1953	871.4	50.00
23 Apr 1958	967.7	30	1942	846.3	51.72
03 Oct 1958	384.6	31	1963	841.9	53.45
28 Mar 1960	1,064.4	32	1970	809.9	55.17
10 Apr 1961	559.9	33	1938	776.9	56.90
13 Apr 1962	1,342.9	34	1929	690.4	58.62
02 Apr 1963	150.7	35	1930	643.9	60.34
19 Apr 1964	841.9	36	1974	642.4	62.07
25 Apr 1965	1,632.9	37	1960	559.9	63.79
05 Jan 1966	2,177.6	38	1932	551.7	65.52
13 Dec 1966	2,066.1	39	1949	505.7	67.24
04 Apr 1968	1,241.0	40	1955	486.4	68.97
29 Jan 1969	1,560.9	41	1946	396.6	70.69
14 Apr 1970	133.6	42	1973	394.7	72.41
12 Sep 1970	809.9	43	1952	393.6	74.14
02 Jan 1972	903.3	44	1958	384.6	75.86
01 May 1973	2,604.3	45	1982	368.0	77.59
25 Mar 1974	394.7	46	1939	322.6	79.31
28 Apr 1975	642.4	47	1950	254.9	81.03
28 Apr 1976	1,064.6	48	1984	233.3	82.76
16 Apr 1977	205.9	49	1945	225.9	84.48
07 Mar 1978	2,671.4	50	1976	205.9	86.21
24 Dec 1978	4,647.4	51	1980	170.0	87.93
22 Feb 1980	2,345.9	52	1962	150.7	89.66
14 Apr 1981	170.0	53	1969	133.6	91.38
18 Mar 1982	1,464.3	54	1954	52.4	93.10
30 Dec 1982	368.0	55	1933	28.1	94.83
27 Jan 1984	3.7	56	1983	3.7*	96.55
25 Mar 1985	233.3	57	1934	---	98.28

* Outlier

Note: Adopted skew equals station skew and preliminary frequency statistics are for the conditional frequency curve because of zero or missing events.

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,753.6	2,761.4	0.2	4,062.2	2,001.5
2,726.6	2,737.0	0.5	4,017.3	1,983.4
2,688.7	2,702.5	1.0	3,954.6	1,957.9
2,623.7	2,639.9	2.0	3,847.1	1,914.0
2,512.3	2,531.1	4.0	3,664.1	1,838.5
2,461.7	2,482.2	5.0	3,581.6	1,804.1
2,236.6	2,252.7	10.0	3,217.2	1,649.9
1,858.3	1,869.4	20.0	2,618.5	1,386.3
973.7	973.7	50.0	1,300.5	741.8
310.0	301.8	80.0	411.7	224.2
135.1	127.1	90.0	189.6	88.6
59.7	53.7	95.0	90.7	34.7
9.3	6.9	99.0	17.5	3.9

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.839	Historic Events	0
Standard Dev	0.537	High Outliers	0
Station Skew	-1.776	Low Outliers	0
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.776	Systematic Events	57

<< Conditional Probability Adjusted Ordinates >>

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
2,753.1	---	0.2	---	---
2,725.7	---	0.5	---	---
2,687.1	---	1.0	---	---
2,621.4	---	2.0	---	---
2,508.3	---	4.0	---	---
2,456.2	---	5.0	---	---
2,227.1	---	10.0	---	---
1,844.0	---	20.0	---	---
949.9	---	50.0	---	---
280.9	---	80.0	---	---
108.5	---	90.0	---	---
36.6	---	95.0	---	---
---	---	99.0	---	---

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 21.34

1 low outlier(s) identified below test value of 21.34

Based on statistics after 0 zero events and 1 missing events were deleted.

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.894	Historic Events	1
Standard Dev	0.452	High Outliers	0
Station Skew	-0.866	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.776	Systematic Events	57
		Historic Period	104

<< High Outlier Test >>

Based on 55 events, 10 percent outlier test deviate K(N) = 2.804
Computed high outlier test value = 14,510.71

1 high outlier(s) identified above input threshold of 4,647.4

* *
* Note - Collection of historical information and *
* comparison with similar data should be explored, *
* if not incorporated in this analysis. *
* *

Statistics and frequency curve adjusted for 1 high outlier(s)
and 1 historic event(s)

<< Conditional Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.882	Historic Events	1
Standard Dev	0.443	High Outliers	1
Station Skew	-0.917	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	---	Missing Events	1
Adopted Skew	-1.776	Systematic Events	57
		Historic Period	104

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Events Analyzed Day Mon Year	FLOW cfs	Ordered Events Rank	Analysis Year	FLOW cfs	Weibull Plot Pos
08 Apr 1929	3,857.9	1	1978	4,647.4*	0.95
12 Apr 1930	690.4	2	1978	4,647.4	1.90
25 Mar 1931	643.9	3	1928	3,857.9	3.25

15 Feb 1932	1,537.1	4	1937	2,983.0	4.98
06 Apr 1933	551.7	5	1977	2,671.4	6.72
03 Aug 1933	28.1	6	1972	2,604.3	8.45
31 May 1935	---	7	1979	2,345.9	10.19
18 Apr 1936	1,204.3	8	1965	2,177.6	11.92
19 Mar 1937	1,402.9	9	1951	2,099.6	13.66
07 Mar 1938	2,983.0	10	1966	2,066.1	15.39
08 Apr 1939	776.9	11	1956	1,786.6	17.13
05 Mar 1940	322.6	12	1964	1,632.9	18.86
09 May 1941	1,398.6	13	1968	1,560.9	20.60
09 Apr 1942	1,005.3	14	1931	1,537.1	22.33
12 Mar 1943	846.3	15	1944	1,481.4	24.06
10 Apr 1944	1,040.9	16	1981	1,464.3	25.80
26 Apr 1945	1,481.4	17	1936	1,402.9	27.53
15 Apr 1946	225.9	18	1940	1,398.6	29.27
01 Dec 1946	396.6	19	1948	1,392.9	31.00
17 Apr 1948	1,084.4	20	1961	1,342.9	32.74
18 Apr 1949	1,392.9	21	1967	1,241.0	34.47
06 Mar 1950	505.7	22	1935	1,204.3	36.21
11 May 1951	254.9	23	1947	1,084.4	37.94
25 Jan 1952	2,099.6	24	1975	1,064.6	39.68
01 Apr 1953	393.6	25	1959	1,064.4	41.41
30 Mar 1954	871.4	26	1943	1,040.9	43.15
24 Mar 1955	52.4	27	1941	1,005.3	44.88
27 Aug 1955	486.4	28	1957	967.7	46.62
15 Jan 1957	1,786.6	29	1971	903.3	48.35
23 Apr 1958	967.7	30	1953	871.4	50.09
03 Oct 1958	384.6	31	1942	846.3	51.82
28 Mar 1960	1,064.4	32	1963	841.9	53.55
10 Apr 1961	559.9	33	1970	809.9	55.29
13 Apr 1962	1,342.9	34	1938	776.9	57.02
02 Apr 1963	150.7	35	1929	690.4	58.76
19 Apr 1964	841.9	36	1930	643.9	60.49
25 Apr 1965	1,632.9	37	1974	642.4	62.23
05 Jan 1966	2,177.6	38	1960	559.9	63.96
13 Dec 1966	2,066.1	39	1932	551.7	65.70
04 Apr 1968	1,241.0	40	1949	505.7	67.43
29 Jan 1969	1,560.9	41	1955	486.4	69.17
14 Apr 1970	133.6	42	1946	396.6	70.90
12 Sep 1970	809.9	43	1973	394.7	72.64
02 Jan 1972	903.3	44	1952	393.6	74.37
01 May 1973	2,604.3	45	1958	384.6	76.11
25 Mar 1974	394.7	46	1982	368.0	77.84
28 Apr 1975	642.4	47	1939	322.6	79.57
28 Apr 1976	1,064.6	48	1950	254.9	81.31
16 Apr 1977	205.9	49	1984	233.3	83.04
01 Jan 1978	4,647.4	50	1945	225.9	84.78
07 Mar 1978	2,671.4	51	1976	205.9	86.51
24 Dec 1978	4,647.4	52	1980	170.0	88.25
22 Feb 1980	2,345.9	53	1962	150.7	89.98
14 Apr 1981	170.0	54	1969	133.6	91.72
18 Mar 1982	1,464.3	55	1954	52.4	93.45
30 Dec 1982	368.0	56	1933	28.1	95.19
27 Jan 1984	3.7	57	1983	3.7*	96.92
25 Mar 1985	233.3	58	1934	---	98.66

Note: Plotting positions based on historic period (H) = 104
Number of historic events plus high outliers (Z) = 2
Weighting factor for systematic events (W) = 1.8214

* Outlier

<< Skew Weighting >>

Based on 104 events, mean-square error of station skew =	0.113
Mean-square error of regional skew =	0.302

<< Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
6,300.8	6,701.2	0.2	10,090.8	4,380.4
5,494.7	5,785.7	0.5	8,614.6	3,875.7
4,848.8	5,071.0	1.0	7,458.5	3,464.4
4,174.4	4,331.7	2.0	6,279.4	3,027.4
3,474.9	3,578.8	4.0	5,090.8	2,564.2
3,245.3	3,335.1	5.0	4,709.0	2,409.6
2,520.9	2,568.0	10.0	3,536.6	1,912.0
1,786.6	1,806.1	20.0	2,405.9	1,387.8
815.5	815.5	50.0	1,034.5	646.9
311.8	306.2	80.0	399.8	233.3
175.0	168.5	90.0	233.9	122.2
104.4	98.0	95.0	146.4	67.6
35.8	30.7	99.0	56.5	19.5

<< Synthetic Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	2.857	Historic Events	1
Standard Dev	0.461	High Outliers	1
Station Skew	-0.940	Low Outliers	1
Regional Skew	-0.100	Zero Events	0
Weighted Skew	-0.711	Missing Events	1
Adopted Skew	-0.711	Systematic Events	57
		Historic Period	104

<< User Frequency Curve >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Computed Curve FLOW, cfs	Expected Probability FLOW, cfs	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	Confidence Limits 0.95 FLOW, cfs
26,254.3	31,929.1	0.2	53,994.3	15,253.8
17,750.3	20,572.6	0.5	34,187.7	10,800.7
12,878.6	14,447.1	1.0	23,531.4	8,130.2
9,090.2	9,906.8	2.0	15,708.3	5,964.1
6,188.0	6,575.6	4.0	10,077.6	4,226.7
5,414.1	5,710.9	5.0	8,643.5	3,747.5
3,431.1	3,547.8	10.0	5,137.2	2,475.8
1,985.8	2,020.3	20.0	2,782.5	1,490.3
709.2	709.2	50.0	926.0	542.7
258.7	254.5	80.0	344.9	184.5
154.0	149.3	90.0	213.1	103.1
100.8	96.0	95.0	144.9	63.6
46.0	41.6	99.0	71.8	25.7

<< User Statistics >>
Clear Creek near Winslow 09399000-Clear Creek near Winslow-FLOW (7-day Max)

Log Transform: FLOW, cfs		Number of Events	
Mean	---	Equiv Number Events	---
Standard Dev	0.526		
User Skew	0.075		

Note: No ordinates specified for graphical frequency curve

Appendix D

Analysis of Magnitude and Frequency of Peak Discharges for Ruby Wash - Technical Memorandum

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U.S. Army Corps
of Engineers
Los Angeles District

Little Colorado River at Winslow Feasibility Study Analysis of Magnitude and Frequency of Peak Discharges for Ruby Wash - Technical Memorandum

FINAL Submittal

Prepared For:
U.S. Army Corps of Engineers
Los Angeles District

September 2010

TETRA TECH, INC.

Appendix D

Little Colorado River at Winslow Feasibility Study

Analysis of Magnitude and Frequency of Peak Discharges for Ruby Wash -

Technical Memorandum

Final Submittal

September 2010

Prepared For:
U.S. Army Corps of Engineers
Los Angeles District

Prepared by:
Tetra Tech, Inc.
4801 E. Broadway, Suite 521
Tucson, Arizona 85711

Registered Professional Engineer (Civil)
CERTIFICATE NO.
28850
DOUGLAS G.
LANTZ
Date Signed 9-7-10
ARIZONA U.S.A.
Exp. 3-31-2013

Registered Professional Engineer (Civil)
CERTIFICATE NO.
47811
MD FAYZUL
KABIR PASHA
Date Signed 9-7-10
ARIZONA U.S.A.
Expires 03-31-2011

Appendix D

Appendix D

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Appendices

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1. INTRODUCTION

Ruby Wash, Icehouse Wash, and four other small washes combine at the 5.3-mile-long Ruby Wash Diversion Levee (RWDL), which lies south of Winslow, Arizona (Figure 1). These six washes flow from southwest to northeast, and are diverted east by the levee to the Little Colorado River (LCR). For convenience, the concentration points for the six washes at points located upstream of the levee are designated as A, B, C, D, E (Ruby Wash), and F (Icehouse Wash). In addition, this analysis considers two other small drainage areas (designated as G and H). These two small drainage areas have concentrations points at the Santa Fe Railroad, below the diversion levee.

1.1. Previous Studies

The *Little Colorado River at Winslow Feasibility Study, Baseline and Future Without-Project-Conditions Hydrology Report* (Tetra Tech, 2010) developed peak-discharge calculations at all of these concentration points using regional regression equations (RREs) developed by the United States Geological Survey (USGS) as found in *Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States* (Thomas, et. al., 1997) and *Analysis of the Magnitude and Frequency of Peak Discharge for the Navajo Nation in Arizona, Utah, Colorado, and New Mexico*, (Waltemeyer, 2006). The equations developed in the two studies are herein referred to as the "Region-11" and "Navajo-11" respectively.

The previous study by the Corps (USACE, 1961) and the General Design Memorandum (GDM) (USACE, 1969) estimated peak discharges for Ice House Wash and Ruby Wash using Regional Regression Equations (RREs) that were developed from limited data at three USGS gages:

- Show Low Creek, near Show Low (09392500)
- Clear Creek, near Winslow (09399000)
- Chevelon Creek, near Winslow (09398000)

1.2. Purpose

The purpose of this technical memorandum is to develop discharge-frequency relationships and RREs that are more specific to the smaller drainages at the Ruby Wash Diversion Levee (RWDL). The frequency discharges for use in the regression analysis are developed from new gage data that is comparable to the smaller washes being considered, as well as updates to gage data used in the Corps 1961 and 1969 studies. The new RREs are used to estimate peak discharges for the 2-, 5- 10-, 25-, 50-, 100-, 200-, and 500-year events at the individual concentration points (A through H) and for the cumulative drainage areas at concentration points located at the RWDL (A through E). The computed peak discharges are compared to results obtained from applying the Region-11 and Navajo-11 RREs.

2. WATERSHED CHARACTERISTICS

Watershed characteristics necessary for applying the Region-11 and Navajo-11 RREs include drainage area, mean-annual evaporation, average basin slope, and basin development (Table 1). The inputs are based on the following sources.

- The drainage areas of the ungaged watersheds were obtained from the 1969 Corps Study.
- Mean-annual evaporation information that is required for the USGS RREs was obtained from Figure 1 of the USGS Fact Sheet 111-98 (USGS, 1999).
- Average basin slope for each watershed was estimated from USGS quadrangles.
- The subareas within each watershed are largely undeveloped, and are therefore defined as "rural."

The new RREs for peak discharge, which were developed for this Technical Memorandum, are a function of drainage area only.

3. DISHCHARGE-FREQUENCY ANALYSIS

3.1. Data Collection

A data search for existing USGS stream gage data (http://nwis.waterdata.usgs.gov/az/nwis/peak) revealed that 61 stream gage records are available with a 150-mile radius of Winslow, Arizona. The locations, record years, maximum annual peaks, contributing drainage areas, and other important information related to these gages are summarized in Table 2. The gage records were reviewed and screened based on the following criteria:

- Minimum record length of 10 years with no missing data and no zero flows for any water year.
- Drainage area less than 100 square miles. However, an exception was made for two stream gage records with drainage areas greater than 100 square miles. These two stream gage records are for (1) Clear Creek, near Winslow – 09399000; and (2) Chevelon Creek, near Winslow - 09398000. These two stream gage records were retained because they were used in the 1969 Corps Study.

Based upon these preceding criteria, a total of 29 out of the 61 available stream gage records were carried forward for discharge-frequency analysis.

3.2. Discharge-Frequency Analysis

Discharge-frequency analyses for the 29 stream gage records were developed using the *Statistical Software Package HEC-SSP* (USACE, 2009), which is based on *Bulletin 17B* procedures (U. S. Department of the Interior, 1982). The analyses were based on the systematic record length, and did not include historical adjustments for high outliers. The station skew was weighted with the generalized skew coefficient of -0.1 as specified in Plate I of Bulletin 17B.

The computed statistics and discharge-frequency plots for the 29 records were reviewed for consistency. One gage (09392000) located downstream of a dam was clearly affected by regulated flows, and was therefore discarded. Three other records (09400300, 09400650, and 09395850) had vary flat discharge-frequency curves (i.e., very low variability), and were discarded because they appeared to be anomalies. The remaining 25 gage records, and their corresponding statistics, are summarized in Table 3. The discharges for the 2-, 5- 10-, 25-, 50-, 100-, 200-, and 500-year events calculated using *HEC-SSP* are summarized in Table 4, and plots of discharge-frequency curves for each record are provided in Figures 2a through Figure 2y.

4. REGIONAL REGRESSION EQUATIONS

4.1. Development

Single-variable regression analyses were performed for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year events using drainage area (square miles) as the explanatory variable. Figure 3a though Figure 3h show relationships between drainage areas and peak discharge for each return period. The resulting regression equations and the coefficient of determination (R-squared) values are summarized in Table 5. In this study R-squared values[1] range from 0.47 to 0.60.

Figure 4 shows the regression lines and the respective data points for each return interval and confirms that the relationships between peak discharge and drainage area are consistent for the range of return intervals.

4.2. Application and Results

The RREs developed during this study were applied to each of the subareas (A through F) shown in Figure 1. The computed peak discharges are compared with the results from the Region-11 and Navajo-11 equations in Table 6. The RREs were also applied to the cumulative drainage areas for concentration

[1] The potential values for R-squared vary from 1.0 for a perfect correlation to 0.0 for no correlation.

points A through F. Results are compared with those from the Region-11 and Navajo-11 equations in Table 7.

In general, the peak discharges computed from the RREs developed during this technical memorandum are roughly one-half the peak-discharge values obtained from the Region-11 and Navajo-11 RREs. The differences are likely attributable to the underlying data sets used for each method. The Region-11 and Navajo-11 analyses were based on larger data sets that covered a broad geographic area, and the records therefore include more variation in drainage area and topography. The analyses in this technical memorandum include some data from larger watersheds in the previous Corps study, but are primarily focused on a limited data set from smaller watersheds within a 150-mile radius of Winslow. Figure 5 compares the relative percentage of drainage areas for the records used in each of the three regional analyses. For this study, the majority of the records (85 percent) are for drainage areas less than 50 square miles in size. Conversely, in the Region-11 and Navajo-11 studies, 67 percent and 56 percent (respectively) of the records were for drainage areas less than 50 square miles in size.

Figures 6a through 6h compare discharge-frequency curves from the RREs in this study with those from the Region-11 and Navajo-11 RREs using the cumulative drainage areas at concentration points (A through H). In addition, the Standard Project Flood (SPF) computed in Corps 1969 GDM are plotted for comparison. As shown in the figures, SPF events are approximately 2.0 to 3.0 times higher than the 500-year flows calculated by the regression equations for all the concentration points considered. The GDM states that the SPF event was calculated using rainfall-runoff analyses based on the August 5, 1939 Parker Creek Storm which had a rainfall depth of 5.02 inches over a period of 3 hours. The modeling included conservative assumptions for the rainfal1 pattern, depth-area reduction relationships, and conservative loss rates. Even though GDM reports that SPF is equivalent to the flow of 250-year return period, the conservative assumptions in the rainfall-runoff modeling resulted in SPF peak discharges that are well above the 500-year peak discharges found using the RREs.

Figure 6h for Ice House Wash (concentration point H) includes a 100-year peak discharge shown in the 2008 Flood Insurance Study (Federal Emergency Management Agency, 2008). The 100-year peak discharge from the Flood Insurance Study, which was calculated using rainfall-runoff modeling, is fairly close to the results for the Region-11 and Navajo-11 RREs but is almost 70 percent higher than the 100-year peak discharge for RRE found in this study.

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Tables

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Table 1: Explanatory Variables for Regional Regression Equations for Ruby Wash

Concentration Point*	Concentration Points	Input Parameters			
		DA* (sm)	Cumulative DA (sm)	Annual Mean Evaporation (inch)	Average Basin Slope (percent)
A	Downstream of the diversion levee	3.2	20.1	55	0.1
B	West of subarea A	5.3	16.9	55	0.1
C	West of subarea B	1.8	11.6	55	0.1
D	West of subarea C	1.2	9.8	55	0.1
E	Ruby Wash at the diversion levee	3.8	8.6	55	0.1
F	Upstream of the diversion levee	4.8	4.8	55	0.1
G	Original Ice House Wash at Santa Fe Railroad Bridge	2.7	2.7	55	0.1
H	Original Ruby Wash at Santa Fe Railroad Bridge	2.9	2.9	55	0.1

*Concentration points and drainage areas are taken from the study report of USACE, 1969. Refer to Appendix A for the excerpt.

Table 2: Available Stream Gage Records

Watershed Name	USGS Gage Number	Latitude, Longitude	DA (sm)	Number of Record Years	Period of Record	Missing Record	Zero Record	Maximum Peak Discharge (cfs)	Date of Maximum Peak Discharge
NORTH FORK WHITE R TRIB N WHITERIVER, AZ	09491800	33°55'44", 109°56'19"	2.27	11	1965-1975	0	5	120	1965
KLETHLA VALLEY TRIB NEAR KAYENTA, AZ	09401245	36°29'53", 110°37'15"	0.79	15	1962-1976	0	0	290	1971-08
CASTLE BUTTE WASH NR WINSLOW, ARIZ.	09400580	35°19'30", 110°25'20"	5.57	13	1964 -1976	0	2	860	7/15/1975
POLACCA WASH TRIB NR CHINLE, ARIZ.	09400565	36°02'50", 110°04'50"	6.45	13	1964-1976	0	0	1,130	9/7/1975
ORAIBI WASH TRIB NR ORAIBI, ARIZ.	09400560	35°52'20", 110°33'20"	1.78	14	1963-1976	0	0	383	9/19/1965
TESHBITO WASH NR HOLBROOK, ARIZ.	09400300	35°26'55", 110°04'05"	49.6	14	1963-1976	0	0	1,580	1967
TESHBITO WASH TRIB NR HOLBROOK, ARIZ.	09400290	35°28'50", 110°05'15"	9.3	14	1963-1976	0	0	890	9/5/1970
BROOKBANK CANYON NEAR HEBER, ARIZ.	09397800	34°28'20", 110°38'50"	27.9	13	1964-1976	0	0	666	1964-08
PENZANCE WASH NEAR JOSEPH CITY, ARIZ.	09397200	34°55'08", 110°15'13"	0.17	14	1963-1976	0	1	120	9/9/1964
DECKER WASH NEAR SNOWFLAKE, ARIZ.	09395200	34°27'40", 110°24'15"	16.5	14	1963-1976	3	1	1,170	12/30/1965
CARR LAKE DRAW TRIBUTARY NEAR HOLBROOK, ARIZ.	09395100	34°50'05", 109°56'00"	1.28	13	1964-1976	0	3	140	8/12/1966
LONG LAKE TRIBUTARY NEAR SHOW LOW, ARIZ.	09392800	34°15'40", 109°59'41"	5.22	12	1965-1976	0	5	530	12/26/1971
EL CAPITAN WASH NEAR KAYENTA, ARIZ.	09379560	36°51'32", 110°15'55"	5.88	14	1963-1976	0	0	2,340	8/26/1971
LONG HOUSE WASH NEAR KAYENTA, ARIZ.	09379100	36°34'02", 110°29'17"	1.38	15	1962-1976	0	1	2,060	7/30/1967
SHOW LOW CREEK AT SHOW LOW ARIZ	*09392500	34°15'10", 110°01'40"	90.2	14	1941-1954	0	0	6,250	1/18/1952

Table 2: Available Stream Gage Records (Continued)

Watershed Name	USGS Gage Number	Latitude, Longitude	DA (sm)	Number of Record Years	Period of Record	Missing Record	Zero Record	Maximum Peak Discharge (cfs)	Date of Maximum Peak Discharge
SHOW LOW CR BL JAQUES DAM, NR SHOW LOW, AZ	09392000	34°11'47", 110°00'13"	73	53	1943, 1954-2005	0	0	3,080	12/28/1984
SHOW LOW CREEK NEAR LAKESIDE, AZ	09390500	34°10'46", 109°59'14"	68.6	56	1954-2009	0	0	5,550	12/18/1978
CLEAR CREEK NEAR WINSLOW, AZ	*09399000	34°58'10", 110°38'40"	621	54	1929-1982, 2005-2006	0	0	50,000	4/4/1929
CLEAR CREEK BELOW WILLOW CREEK, N WINSLOW, AZ.	09398500	34°40'03", 111°00'25"	317	45	1948-1993	0	0	29,100	1/8/1993
CHEVELON CREEK NEAR WINSLOW, AZ	*09398000	34°55'35", 110°31'51"	785	50	1916-1919, 1929-1970, 1971,1978, 2006	0	0	33,600	12/18/1978
CHEVELON FORK BELOW WILDCAT CANYON, NR WINSLOW, AZ	09397500	34°38'11", 110°42'49"	271	49	1948-1970, 1978,1982-2009	0	0	24,700	1/8/1993
DIRTY NECK CANYON NEAR CLINTS WELL, ARIZ.	09505600	34°30'45", 111°21'30"	3.42	12	1965-1975, 1978	1	1	210	9/5/1970
ROCKY GULCH NR RIMROCK, AZ	09505220	34°44'49", 111°29'38"	1.4	30	1960-1982, 1986-1991	0	0	1,550	9/5/1970
MUNDS CANYON TRIB NEAR SEDONA, ARIZ.	09504400	34°55'20", 111°38'40"	1.15	16	1964-1980	0	0	705	9/5/1970
HELL CANYON NEAR WILLIAMS, ARIZ.	09503720	35°09'37", 112°12'35"	14.9	13	1965-1978	0	1	1,080	11/25/1965
LITTLE RED HORSE WASH NEAR GRAND CANYON, ARIZ	09404070	35°50'45", 112°07'55"	21.8	14	1963-1976	0	9	62	1967
SPRING VALLEY WASH TRIB NEAR WILLIAMS, ARIZ.	09404050	35°34'28", 112°09'12"	3.93	14	1963-1976	0	2	190	1968

Table 2: Available Stream Gage Records (Continued)

Watershed Name	USGS Gage Number	Latitude, Longitude	DA (sm)	Number of Record Years	Period of Record	Missing Record	Zero Record	Maximum Peak Discharge (cfs)	Date of Maximum Peak Discharge
WEST CATARACT CREEK NEAR WILLIAMS, ARIZ.	09403930	35°14'52", 112°13'28"	3.18	13	1964-1976	0	0	151	12/6/1966
SAGEBRUSH DRAW NEAR FREDONIA, ARIZ.	09403750	36°54'05", 112°22'35"	0.68	15	1960, 1963-1976	0	8	150	1960
FOREST BOUNDARY WASH NEAR CAMERON, ARIZ.	09402100	35°55'25", 111°44'15"	0.72	14	1963-1976	0	8	115	9/11/1969
HAMBLIN WASH TRIB NO 2 NEAR TUBA CITY, ARIZ.	09401370	36°03'20", 111°23'35"	2.16	13	1963-1975	0	2	350	10/19/1972
HAMBLIN WASH TRIB NEAR CEDAR RIDGE, ARIZ.	09401300	36°20'55", 111°30'15"	0.1	14	1963-1976	0	5	110	1976
SLATE MOUNTAIN WASH NEAR FLAGSTAFF, ARIZ.	09401210	35°30'55", 111°50'05"	5.43	14	1962-1975	0	6	88	04/1973
FAY CANYON NEAR FLAGSTAFF, ARIZ.	09400910	35°08'06", 111°37'48"	3.28	16	1964-1980	0	0	87	12/30/1965
HARENBERG WASH AT FLAGSTAFF,ARIZ	09400740	35°13'09", 111°35'16"	2.41	12	1969-1980	0	0	183	9/12/1969
LOCKETT FANNING DIVERSION AT FLAGSTAFF, ARIZ.	09400730	35°13'19", 111°35'58"	1.05	12	1969-1980	0	3	85	9/12/1969
SWITZER CANYON TRIB AT FLAGSTAFF, ARIZ.	09400700	35°12'01", 111°36'57"	4.52	13	1968-1980	0	0	262	8/2/1968
SWITZER CANYON AT FLAGSTAFF, ARIZ.	09400680	35°12'44", 111°38'21"	1.87	12	1969-1980	0	0	135	12/18/1978
BOW AND ARROW WASH AT FLAGSTAFF, ARIZ.	09400660	35°09'58", 111°39'10"	2.06	12	1969-1980	0	0	73	8/15/1971
SINCLAIR WASH AT FLAGSTAFF, ARIZ.	09400650	35°09'50", 111°40'48"	8.11	11	1970-1980	0	0	401	9/5/1970
SCHULTZ CANYON AT FLAGSTAFF, ARIZ.	09400595	35°13'37", 111°39'29"	6.09	11	1970-1980	0	6	48	4/28/1973

Table 2: Available Stream Gage Records (Continued)

Watershed Name	USGS Gage Number	Latitude, Longitude	DA (sm)	Number of Record Years	Period of Record	Missing Record	Zero Record	Maximum Peak Discharge (cfs)	Date of Maximum Peak Discharge
RIO DE FLAG @ HIDDEN HOLLOW RD @ FLAGSTAFF, AZ	09400590	35°14'31", 111°41'02"	31.5	13	1970-1982	0	2	153	4/28/1973
COW CANYON NR WINSLOW ARIZ.	09400530	35°06'00", 110°59'15"	3.57	15	1962-1976	0	2	253	7/30/1964
JACKS CANYON TRIB NO. 3 NR WINSLOW, ARIZ.	09399420	34°56'08", 110°47'18"	0.25	7	1970-1976	0	0	285	7/16/1972
JACKS CANYON TRIB NR WINSLOW, ARIZ.	09399300	34°49'27", 110°57'26"	0.29	6	1963-1968	0	2	192	02/1968
JACKS CANYON TRIBUTARY NO. 2 NEAR WINSLOW, AR	09399250	34°45'56", 111°00'44"	31.8	15	1963-1976, 1978	1	9	9,330	8/21/1963
HOUSE ROCK WASH TRIB NR MARBLE CANYON, AZ.	09383020	36°42'05", 111°55'45"	3.54	14	1934, 1963-1975	0	0	1,610	1934
JACK BENCH WASH TRIBUTARY NEAR PAGE, ARIZ.	09379980	36°42'50", 111°35'30"	0.98	15	1962-1976	0	5	200	1962
EAST FORK WHITE RIVER NEAR FORT APACHE, AZ.	09492400	33°49'20", 109°48'50"	38.8	52	1958-2009	0	0	2,700	10/1/1983
NORTH FORK WHITE RIVER NR. GREER, ARIZ.	09490800	34°00'50", 109°38'30"	40.2	13	1966-1978	0	0	510	4/28/1973
PACHETA CREEK AT MAVERICK, AZ	09489200	33°44'23", 109°32'24"	14.8	23	1958-1980	0	0	323	5/13/1973
NORTH FORK OF EAST FORK BLACK R NR ALPINE, AZ	09489070	33°54'11", 109°19'20"	38.1	13	1966-1978	0	0	1,070	4/17/1973
STEAMBOAT WASH TRIB NR GANADO, ARIZ.	09400200	35°45'50", 109°48'00"	0.32	14	1963-1976	1	0	383	8/13/1964
GANADO WASH TRIB NR GANADO, ARIZ.	09400100	35°42'40", 109°29'50"	7.85	14	1963-1976	0	1	1,680	7/17/1965

Table 2: Available Stream Gage Records (Continued)

Watershed Name	USGS Gage Number	Latitude, Longitude	DA (sm)	Number of Record Years	Period of Record	Missing Record	Zero Record	Maximum Peak Discharge (cfs)	Date of Maximum Peak Discharge
DEAD WASH TRIBUTARY NEAR HOLBROOK, ARIZ.	09396400	35°04'30", 109°45'00"	1.22	13	1963-1975	0	0	743	08/1967
BLACK CREEK TRIBUTARY NEAR WINDOW ROCK, AZ	09395850	35°39'15", 109°05'20"	0.33	14	1963-1976	0	0	171	8/6/1968
LITTLE COLORADO R TRIB NR ST JOHNS, AZ	09385800	34°27'04", 109°15'23"	0.35	14	1963-1976	0	1	326	9/4/1965
LYMAN RESERVOIR TRIB NR ST JOHNS, AZ	09384200	34°23'30", 109°22'48"	0.24	14	1963-1976	0	1	101	8/26/1963
FISH CREEK NEAR EAGAR ARIZ.	09383600	34°04'35", 109°27'45"	14.4	13	1963-1975	0	1	236	8/1/1964
LITTLE COLORADO RIVER AT GREER, ARIZ.	09383400	34°01'00", 109°27'24"	29.1	25	1961-1983, 2008-2009	0	0	615	10/20/1972
LUKACHUKAI CREEK TRIBUTARY NEAR LUKACHUKAI, A	09379060	36°28'10", 109°24'20"	1.37	14	1963-1976	0	2	227	1/6/1965

*Data set used for the study of the "Review Report of the District Engineer on Survey for Flood Control, Winslow, Arizona and Vicinity, Little Colorado Arizona and New Mexico," Department of the Army, U.S. Army Corps of Engineers, Los Angeles District, December 1961.

Note: Data in shaded rows were used in Ruby Wash Regional Analysis

Table 3: Discharge-Frequency Statistics for Selected Records

USGS Gage No.	Watershed Name	Mean	Std Dev	Station Skew	Reg. Skew	Weighted Skew	Adopted Skew
09379560	EL CAPITAN WASH NEAR KAYENTA, ARIZ.	2.68	0.36	0.35	-0.10	0.10	0.10
09400290	TESHBITO WASH TRIB NR HOLBROOK, ARIZ.	2.53	0.48	-1.21	-0.10	-0.49	-0.49
*09392500	SHOW LOW CREEK AT SHOW LOW ARIZ	2.76	0.46	1.01	-0.10	0.33	0.33
*09398000	CHEVELON CREEK NEAR WINSLOW, AZ	3.42	0.47	0.45	-0.10	0.28	0.28
*09399000	CLEAR CREEK NEAR WINSLOW, AZ	3.39	0.59	-0.15	-0.10	-0.14	-0.14
09400740	HARENBERG WASH AT FLAGSTAFF,ARIZ	1.78	0.29	0.22	-0.10	0.04	0.04
09400700	SWITZER CANYON TRIB AT FLAGSTAFF, ARIZ.	1.89	0.24	0.85	-0.10	0.28	0.28
09400660	BOW AND ARROW WASH AT FLAGSTAFF, ARIZ.	1.34	0.31	0.07	-0.10	-0.03	-0.03
09396400	DEAD WASH TRIBUTARY NEAR HOLBROOK, ARIZ.	2.27	0.38	-0.41	-0.10	-0.23	-0.23
09489070	NORTH FORK OF EAST FORK BLACK R NR ALPINE, AZ	2.37	0.48	-0.85	-0.10	-0.40	-0.40
09489200	PACHETA CREEK AT MAVERICK, AZ	2.00	0.31	-0.53	-0.10	-0.33	-0.33
09490800	NORTH FORK WHITE RIVER NR. GREER, ARIZ.	2.27	0.19	0.66	-0.10	0.21	0.21
09383400	LITTLE COLORADO RIVER AT GREER, ARIZ.	2.20	0.32	-0.14	-0.10	-0.13	-0.13
09492400	EAST FORK WHITE RIVER NEAR FORT APACHE, AZ.	2.42	0.33	0.69	-0.10	0.42	-0.10
09401245	KLETHLA VALLEY TRIB NEAR KAYENTA, AZ	1.96	0.44	-1.37	-0.10	-0.52	-0.52
09400565	POLACCA WASH TRIB NR CHINLE, ARIZ.	2.40	0.60	-1.29	-0.10	-0.49	-0.49
09400560	ORAIBI WASH TRIB NR ORAIBI, ARIZ.	1.97	0.56	-1.23	-0.10	-0.49	-0.49
09397800	BROOKBANK CANYON NEAR HEBER, ARIZ.	1.84	0.89	-1.16	-0.10	-0.47	-0.47
09390500	SHOW LOW CREEK NEAR LAKESIDE, AZ	2.48	0.73	0.04	-0.10	0.01	0.01
09400680	SWITZER CANYON AT FLAGSTAFF, ARIZ.	1.56	0.49	-0.48	-0.10	-0.25	-0.25
09505220	ROCKY GULCH NR RIMROCK, AZ	1.60	0.58	0.66	-0.10	0.33	0.33
09504400	MUNDS CANYON TRIB NEAR SEDONA, ARIZ.	1.71	0.84	-0.99	-0.10	-0.47	-0.47
09403930	WEST CATARACT CREEK NEAR WILLIAMS, ARIZ.	1.35	0.74	-0.60	-0.10	-0.31	-0.31
09383020	HOUSE ROCK WASH TRIB NR MARBLE CANYON, AZ.	1.52	0.71	0.90	-0.10	0.31	0.31
09400910	FAY CANYON NEAR FLAGSTAFF, ARIZ.	0.89	0.66	-0.39	-0.10	-0.24	-0.24

*This data was used in the previous study (USACE, 1961 and 1969)

Table 4: Return-Period Peak-Discharge Data for Selected Records

USGS Gage Number	Watershed Name	DA (sm)	2-yr (cfs)	5-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100-yr (cfs)	200-yr (cfs)	500-yr (cfs)
09379560	EL CAPITAN WASH NEAR KAYENTA, ARIZ.	5.88	473	953	1,386	2,080	2,712	3,451	4,310	5,657
09400290	TESHBITO WASH TRIB NR HOLBROOK, ARIZ.	9.3	373	874	1,301	1,922	2,427	2,958	3,512	4,272
*09392500	SHOW LOW CREEK AT SHOW LOW ARIZ	90.2	539	1,373	2,316	4,151	6,140	8,817	12,382	18,884
*09398000	CHEVELON CREEK NEAR WINSLOW, AZ	785	2,493	6,461	10,945	19,640	29,015	41,567	58,174	88,231
*09399000	CLEAR CREEK NEAR WINSLOW, AZ	621	2,535	7,764	13,698	24,773	36,071	50,337	68,025	97,503
09400740	HARENBERG WASH AT FLAGSTAFF,ARIZ	2.41	60	106	143	197	243	293	348	430
09400700	SWITZER CANYON TRIB AT FLAGSTAFF, ARIZ.	4.52	75	123	162	218	267	321	382	474
09400660	BOW AND ARROW WASH AT FLAGSTAFF, ARIZ.	2.06	22	40	54	75	92	111	132	162
09396400	DEAD WASH TRIBUTARY NEAR HOLBROOK, ARIZ.	1.22	192	389	552	792	992	1,209	1,444	1,780
09489070	NORTH FORK OF EAST FORK BLACK R NR ALPINE, AZ	38.1	250	595	899	1,356	1,741	2,158	2,606	3,240
09489200	PACHETA CREEK AT MAVERICK, AZ	14.8	104	184	242	320	380	441	503	587
09490800	NORTH FORK WHITE RIVER NR. GREER, ARIZ.	40.2	183	266	326	408	473	542	615	719
09383400	LITTLE COLORADO RIVER AT GREER, ARIZ.	29.1	162	299	409	567	698	839	991	1,210
09492400	EAST FORK WHITE RIVER NEAR FORT APACHE, AZ.	38.8	266	502	694	976	1,213	1,471	1,753	2,164
09401245	KLETHLA VALLEY TRIB NEAR KAYENTA, AZ	0.79	100	219	313	445	548	654	761	905
09400565	POLACCA WASH TRIB NR CHINLE, ARIZ.	6.45	280	825	1,366	2,237	3,006	3,862	4,799	6,149
09400560	ORAIBI WASH TRIB NR ORAIBI, ARIZ.	1.78	103	279	445	702	922	1,163	1,421	1,787
09397800	BROOKBANK CANYON NEAR HEBER, ARIZ.	27.9	81	402	851	1,778	2,768	4,033	5,594	8,137
09390500	SHOW LOW CREEK NEAR LAKESIDE, AZ	68.6	302	1,238	2,592	5,706	9,503	15,042	22,904	38,138
09400680	SWITZER CANYON AT FLAGSTAFF, ARIZ.	1.87	38	96	151	239	319	411	515	672
09505220	ROCKY GULCH NR RIMROCK, AZ	1.4	37	121	235	490	803	1,268	1,948	3,321
09504400	MUNDS CANYON TRIB NEAR SEDONA, ARIZ.	1.15	60	268	542	1,082	1,640	2,336	3,178	4,520
09403930	WEST CATARACT CREEK NEAR WILLIAMS, ARIZ.	3.18	24	96	187	367	558	802	1,107	1,614
09383020	HOUSE ROCK WASH TRIB NR MARBLE CANYON, AZ.	3.54	30	126	279	678	1,227	2,123	3,549	6,715
09400910	FAY CANYON NEAR FLAGSTAFF, ARIZ.	3.28	8	28	52	97	143	201	272	390

*This data was used in the previous study (USACE, 1961 and 1969)

Table 5: New Regional Regression Equations for Ruby Wash

Exceedance Probability	Return Period (years)	New Regression Equations	R-Squared Value
0.5	2	$Q = 38*AREA^{0.553}$	0.584
0.2	5	$Q = 96*AREA^{0.552}$	0.595
0.1	10	$Q = 153*AREA^{0.556}$	0.580
0.04	25	$Q = 247*AREA^{0.564}$	0.553
0.02	50	$Q = 333*AREA^{0.571}$	0.532
0.01	100	$Q = 432*AREA^{0.578}$	0.511
0.005	200	$Q = 545*AREA^{0.586}$	0.491
0.002	500	$Q = 719*AREA^{0.596}$	0.467

Table 6: Regional Regression Analysis for Ruby Wash - Single Drainage Areas

Conc. point	DA (sm)	Regional Equation	2-yr (cfs)	5-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100-yr (cfs)	200-yr (cfs)	500-yr (cfs)
		This Study	72	182	292	476	647	846	1,077	1,438
A	3.2	Region-11	54	249	554	942	1,360	1,600	-	2,550*
		Navajo-11	131	325	526	887	1,240	1,670	-	3,040
		This Study	96	241	387	633	863	1,133	1,448	1,943
B	5.3	Region-11	73	331	720	1,220	1,790	2,150	-	3,470*
		Navajo-11	166	412	665	1,120	1,560	2,100	-	3,790
		This Study	53	133	212	344	466	607	769	1,021
C	1.8	Region-11	37	181	411	698	997	1,150	-	1,790*
		Navajo-11	100	248	402	681	954	1,290	-	2,360
		This Study	42	106	169	274	370	480	606	802
D	1.2	Region-11	29	144	333	565	801	908	-	1,400*
		Navajo-11	82	204	333	565	793	1,080	-	1,980
		This Study	80	201	321	524	714	935	1,192	1,593
E	3.8	Region-11	60	275	606	1,030	1,490	1,770	-	2,830*
		Navajo-11	142	352	569	960	1,340	1,810	-	3,280
		This Study	90	228	366	598	816	1,070	1,366	1,831
F	4.8	Region-11	69	313	684	1,160	1,690	2,030	-	3,270*
		Navajo-11	159	393	635	1,070	1,490	2,010	-	3,630
		This Study	66	166	266	433	587	767	975	1,300
G	2.7	Region-11	48	227	507	862	1,240	1,450	-	2,300*
		Navajo-11	121	300	486	820	1,150	1,550	-	2,820
		This Study	68	173	277	450	612	799	1,017	1,356
H	2.9	Region-11	50	236	526	895	1,290	1,510	-	2,400*
		Navajo-11	125	310	502	848	1,180	1,600	-	2,910

*USGS Region-11 equations do not include the 500-year return period. These values were extrapolated from the NSS Program.

Table 7: Regional Regression Analysis for Ruby Wash - Cumulative Drainage Areas

Conc. point	DA (sm)	Regional Equation	2-yr (cfs)	5-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100-yr (cfs)	200-yr (cfs)	500-yr (cfs)
		This Study	200	503	811	1,342	1,847	2,448	3,163	4,300
A	20.1	Region-11	167	698	1,440	2,450	3,670	4,660	-	7,880*
		Navajo-11	314	771	1,240	2,070	2,860	3,830	-	6,810
		This Study	181	457	737	1,217	1,673	2,214	2,857	3,877
B	16.9	Region-11	150	633	1,320	2,240	3,340	4,210	-	7,080*
		Navajo-11	289	711	1,140	1,910	2,640	3,540	-	6,310
		This Study	147	371	598	984	1,350	1,781	2,292	3,098
C	11.6	Region-11	119	513	1,080	1,840	2,730	3,380	-	5,620*
		Navajo-11	242	595	958	1,600	2,230	2,990	-	5,350
		This Study	134	338	544	895	1,226	1,616	2,076	2,802
D	9.8	Region-11	107	467	991	1,690	2,490	3,070	-	5,060*
		Navajo-11	223	550	885	1,480	2,060	2,770	-	4,970
		This Study	125	315	506	831	1,138	1,498	1,923	2,592
E	8.6	Region-11	99	434	926	1,570	2,320	2,850	-	4,670*
		Navajo-11	209	517	833	1,400	1,940	2,610	-	4,690
		This Study	90	228	366	598	816	1,070	1,366	1,831
F	4.8	Region-11	69	313	684	1,160	1,690	2,030	-	3,270*
		Navajo-11	159	393	635	1,070	1,490	2,010	-	3,630
		This Study	66	166	266	433	587	767	975	1,300
G	2.7	Region-11	48	227	507	862	1,240	1,450	-	2,300*
		Navajo-11	121	300	486	820	1,150	1,550	-	2,820
		This Study	68	173	277	450	612	799	1,017	1,356
H	2.9	Region-11	50	236	526	895	1,290	1,510	-	2,400*
		Navajo-11	125	310	502	848	1,180	1,600	-	2,910

*USGS Region-11 equations do not include the 500-year return period. These values were extrapolated from the NSS Program.

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Figures

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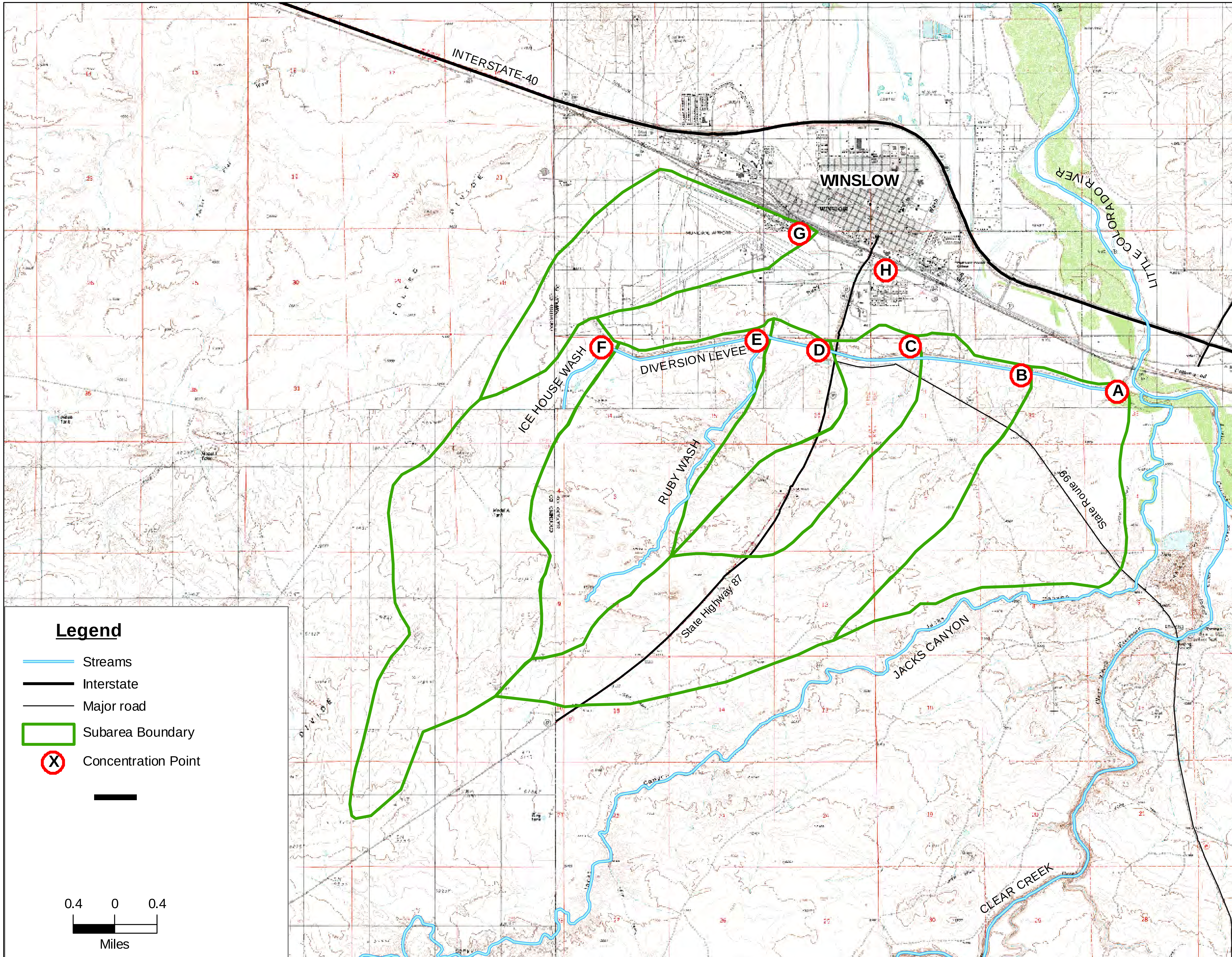


LITTLE COLORADO RIVER FEASIBILITY STUDY

FIGURE 1

RUBY WASH SUBAREA BOUNDARIES

U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

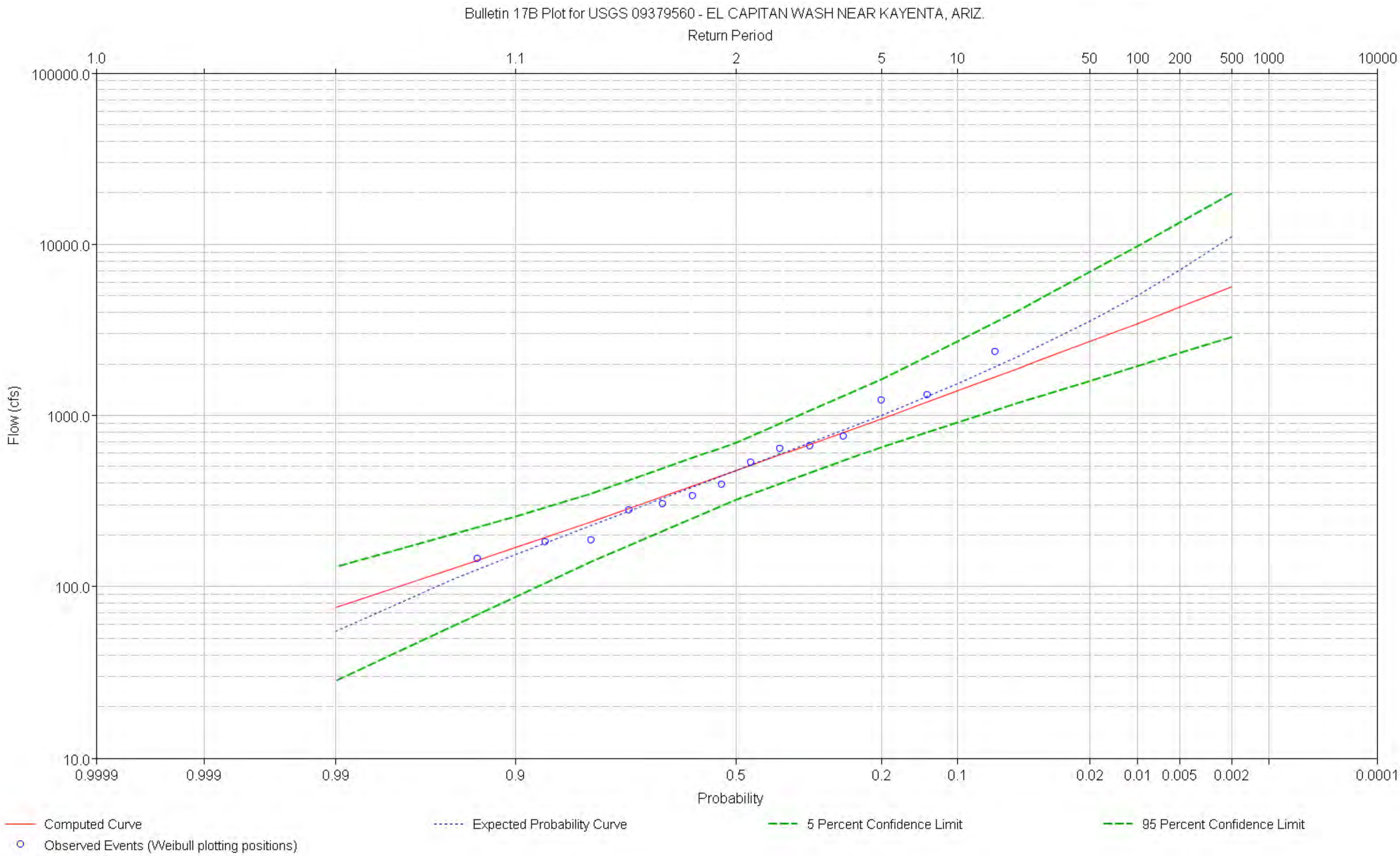


Figure 2a. Peak flow frequency analysis plot - 09379560

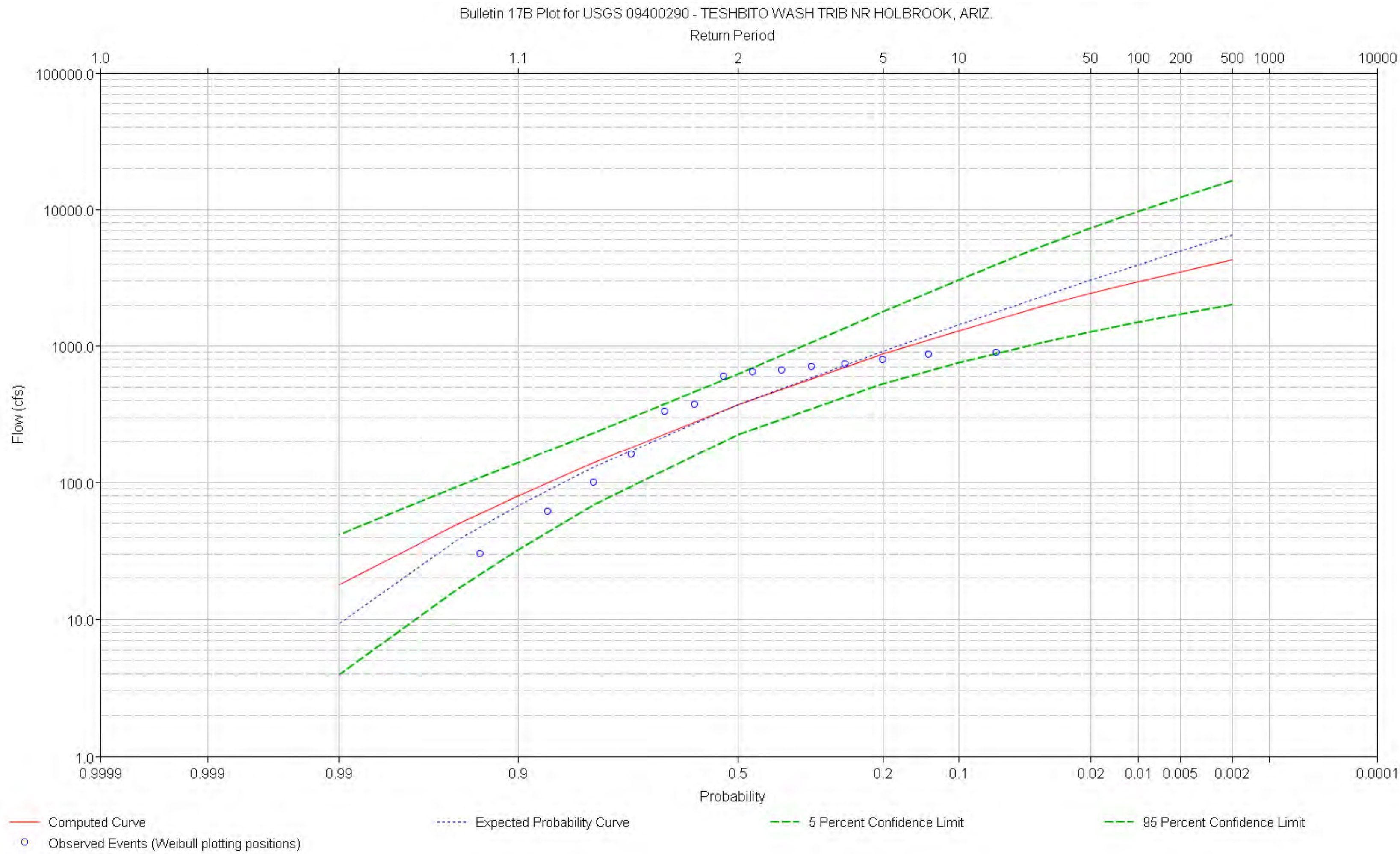


Figure 2b. Peak flow frequency analysis plot - 09400290

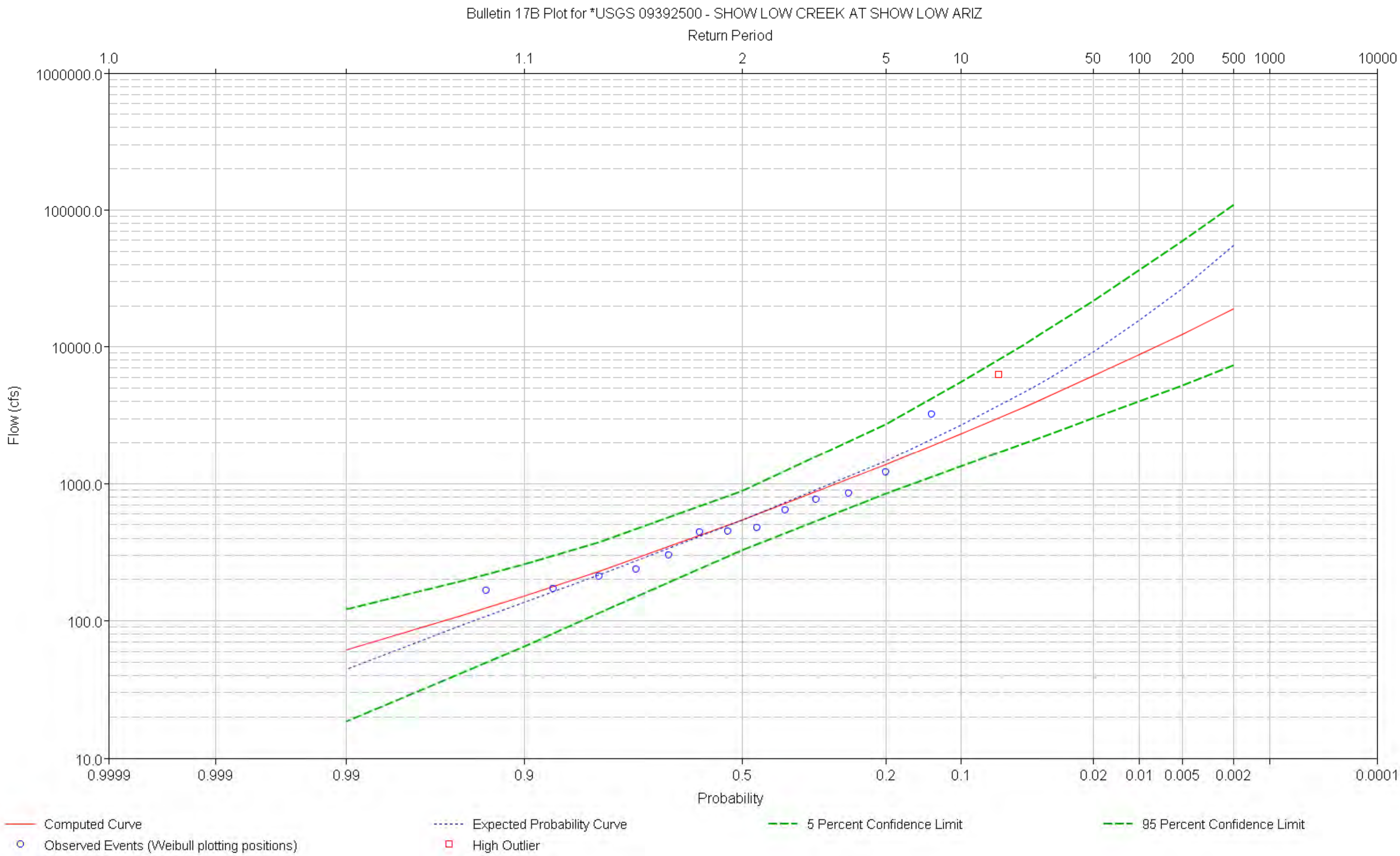


Figure 2c. Peak flow frequency analysis plot - 09392500

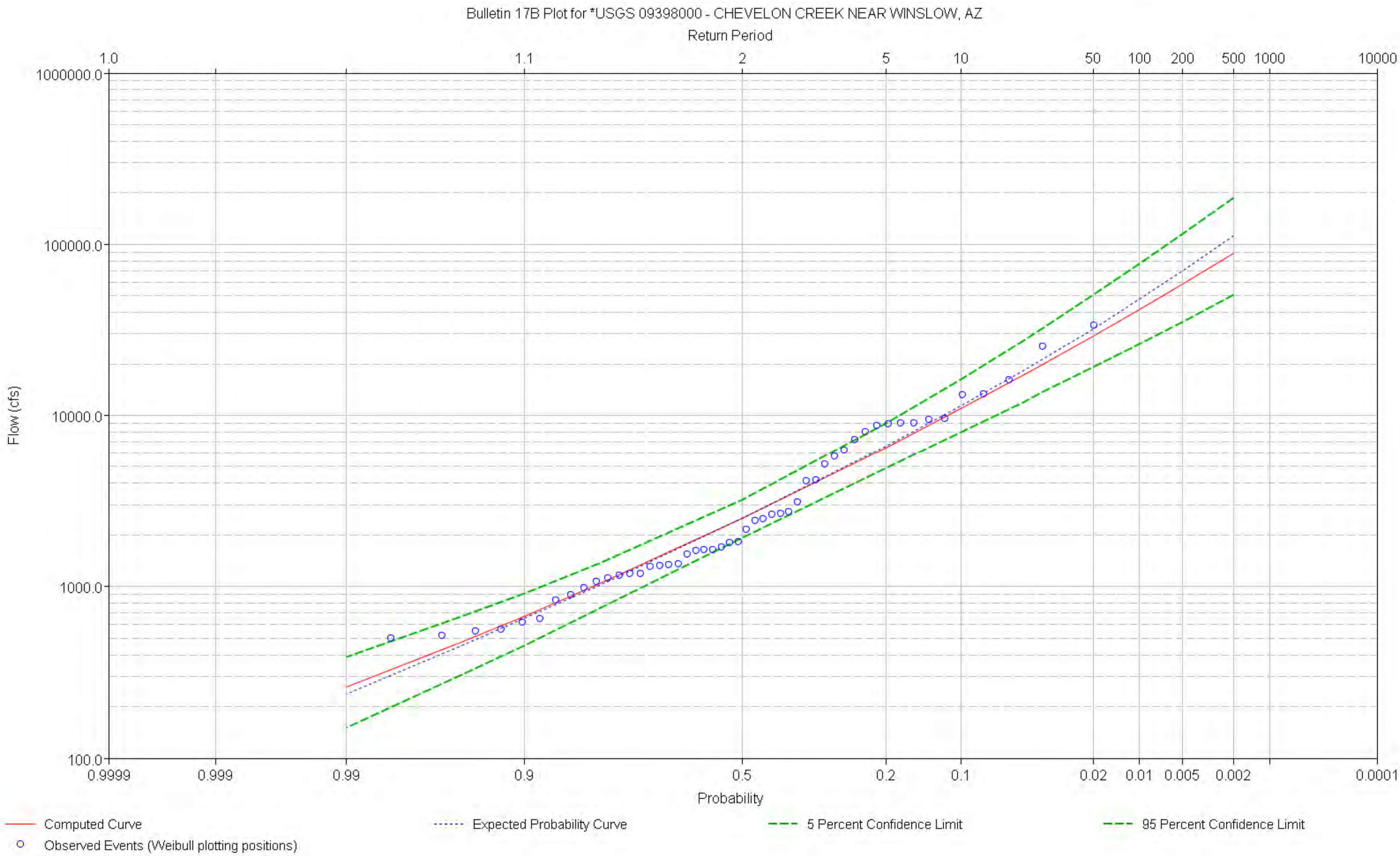


Figure 2d. Peak flow frequency analysis plot - 09398000

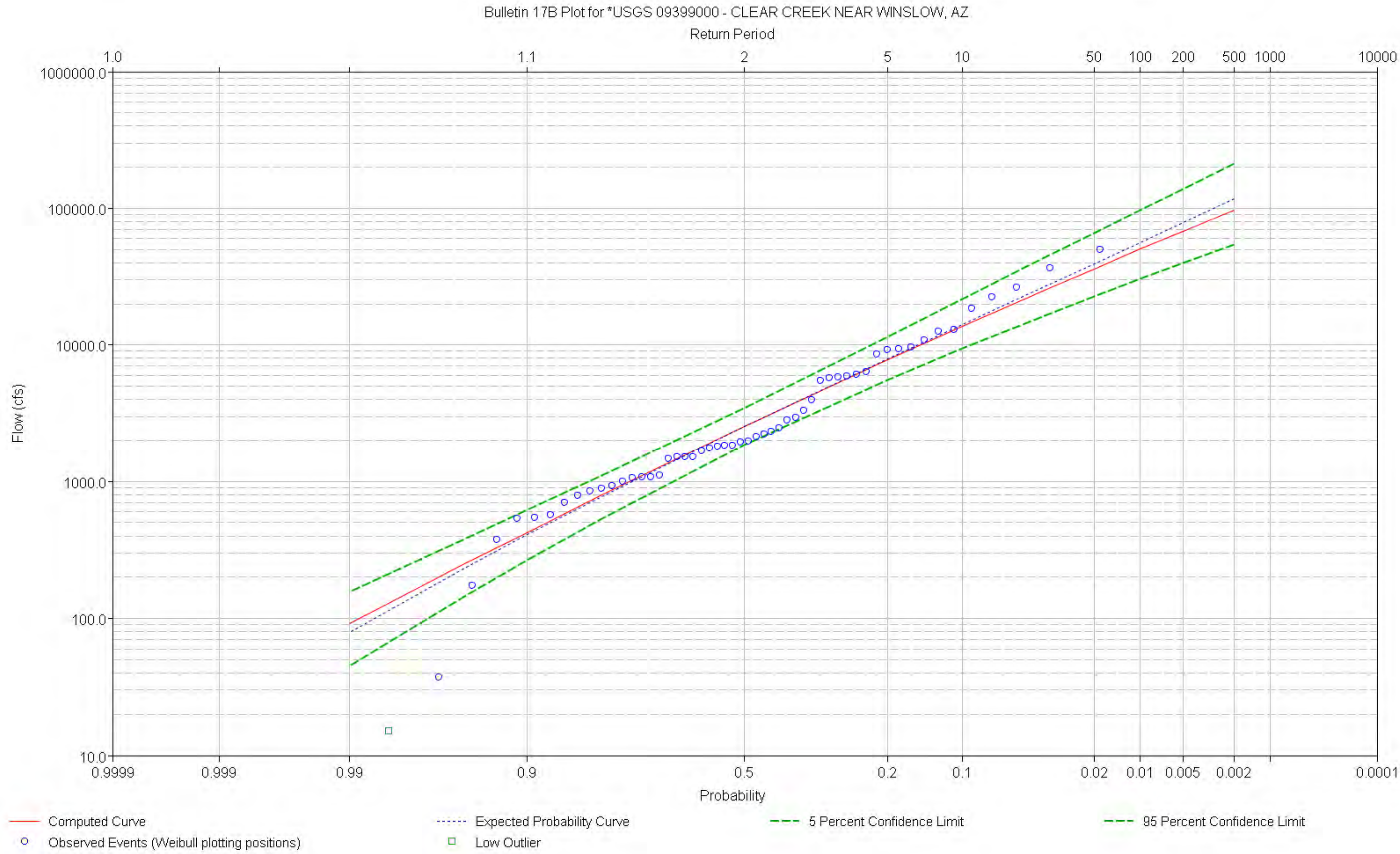


Figure 2e. Peak flow frequency analysis plot - 09399000

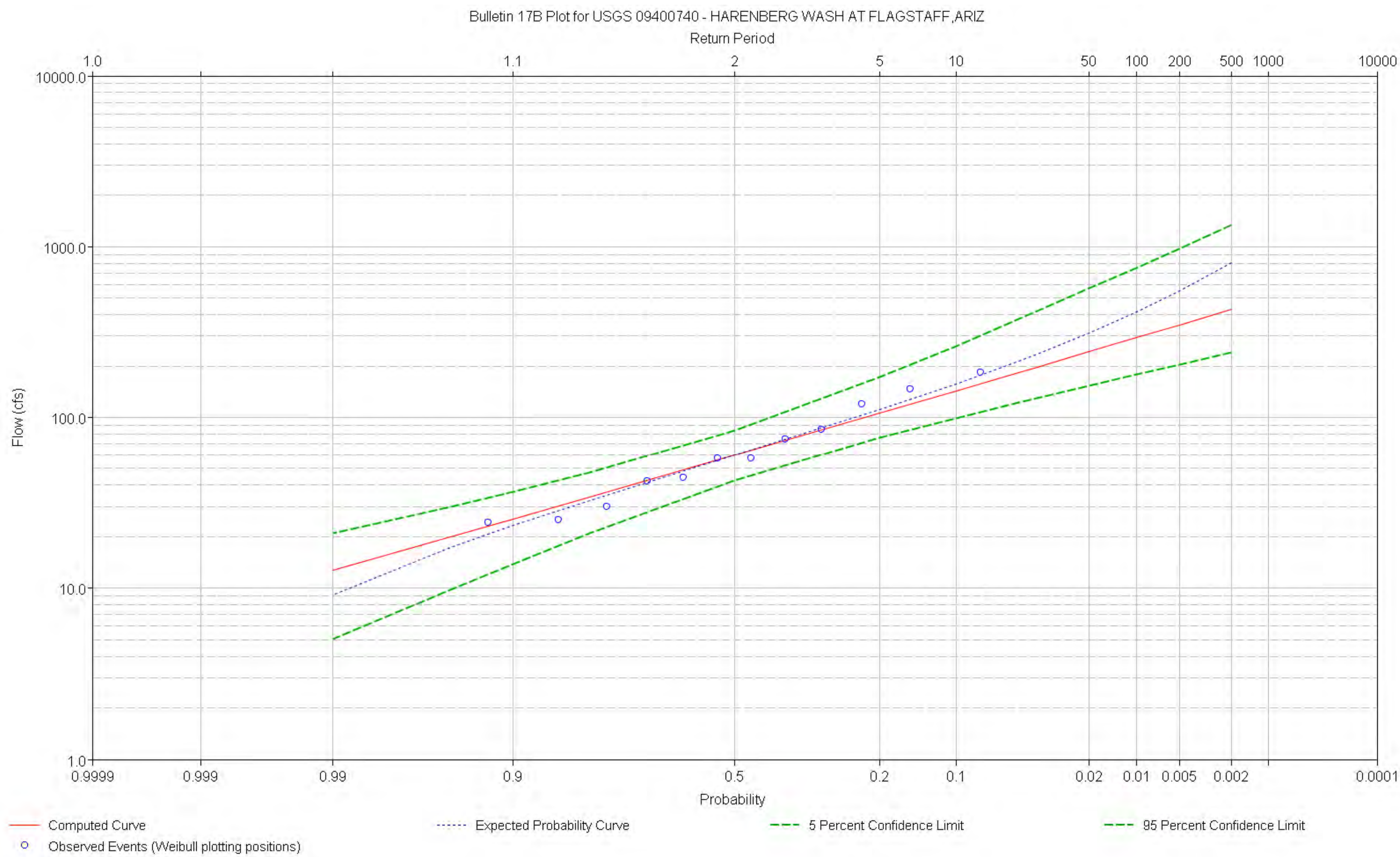


Figure 2f. Peak flow frequency analysis plot - 09400740

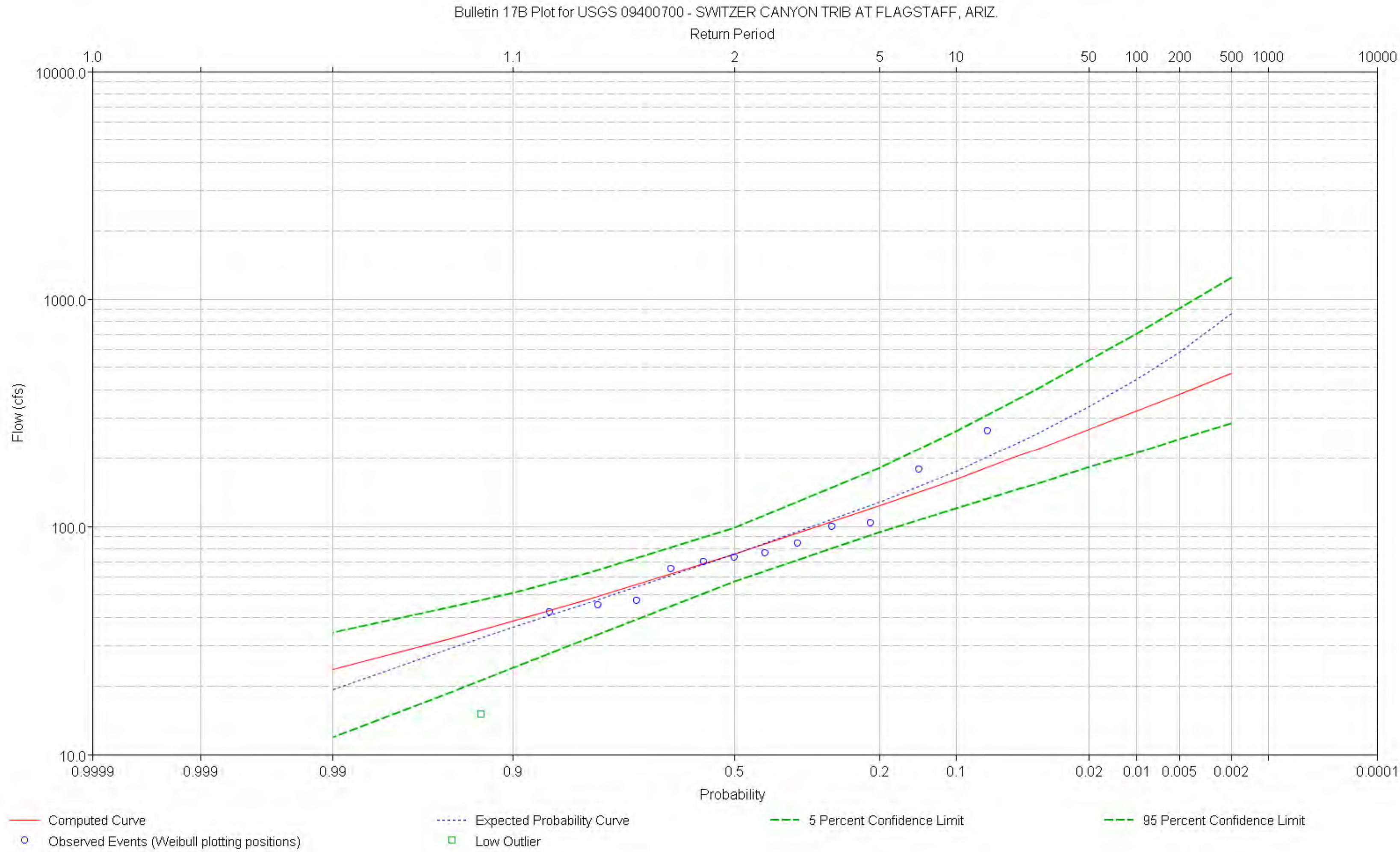


Figure 2g. Peak flow frequency analysis plot - 09400700

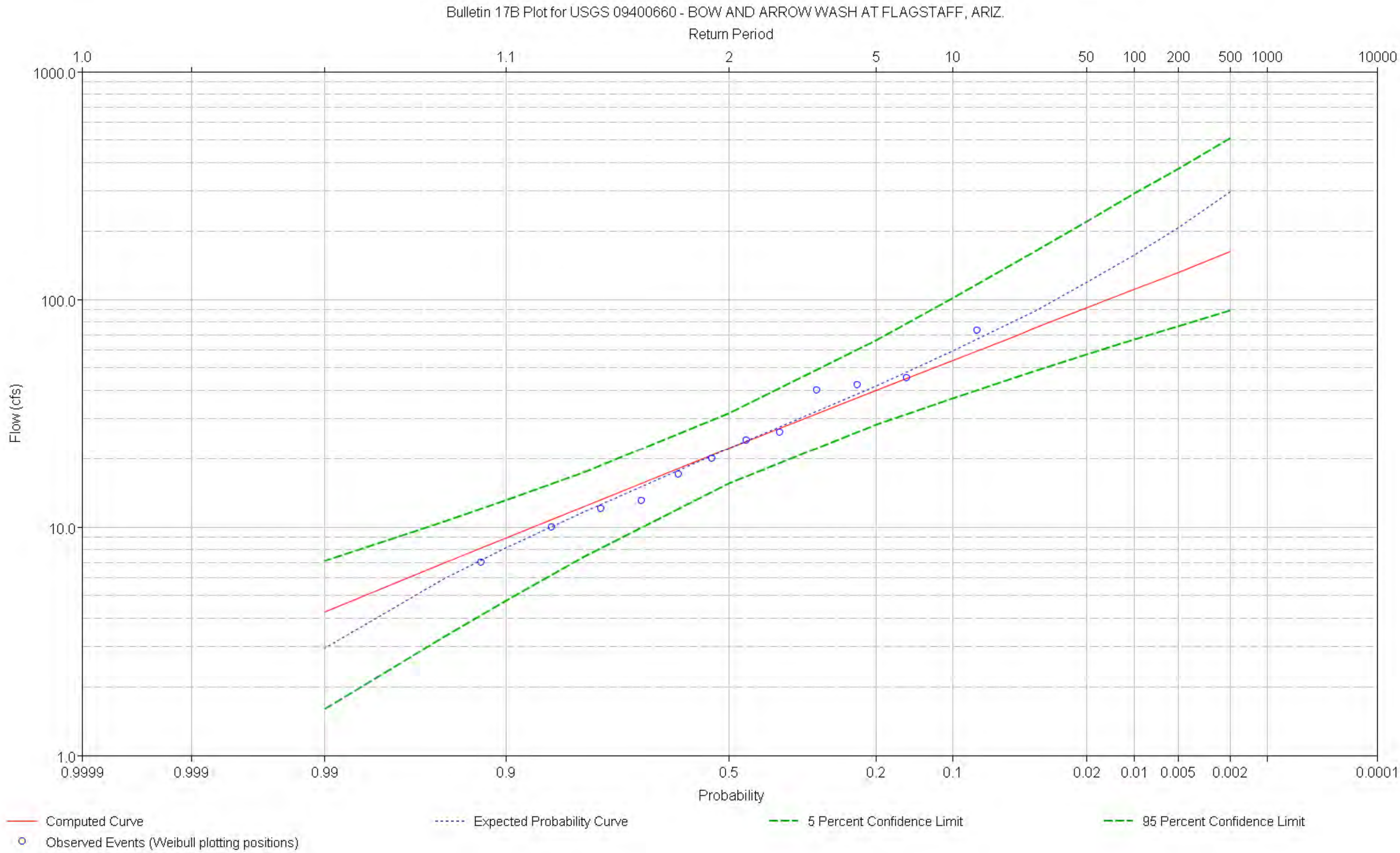


Figure 2h. Peak flow frequency analysis plot - 09400660

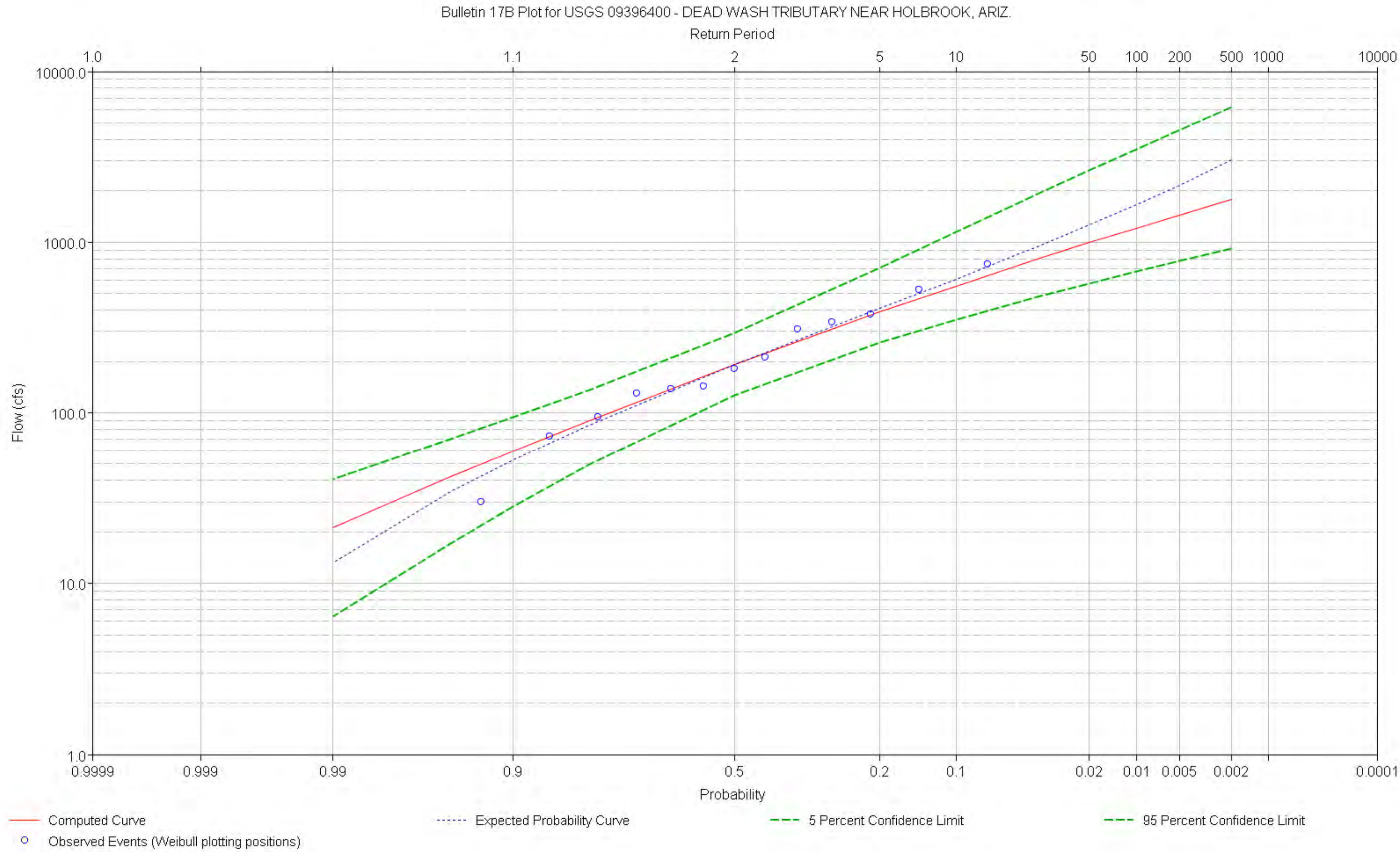


Figure 2i. Peak flow frequency analysis plot - 09396400

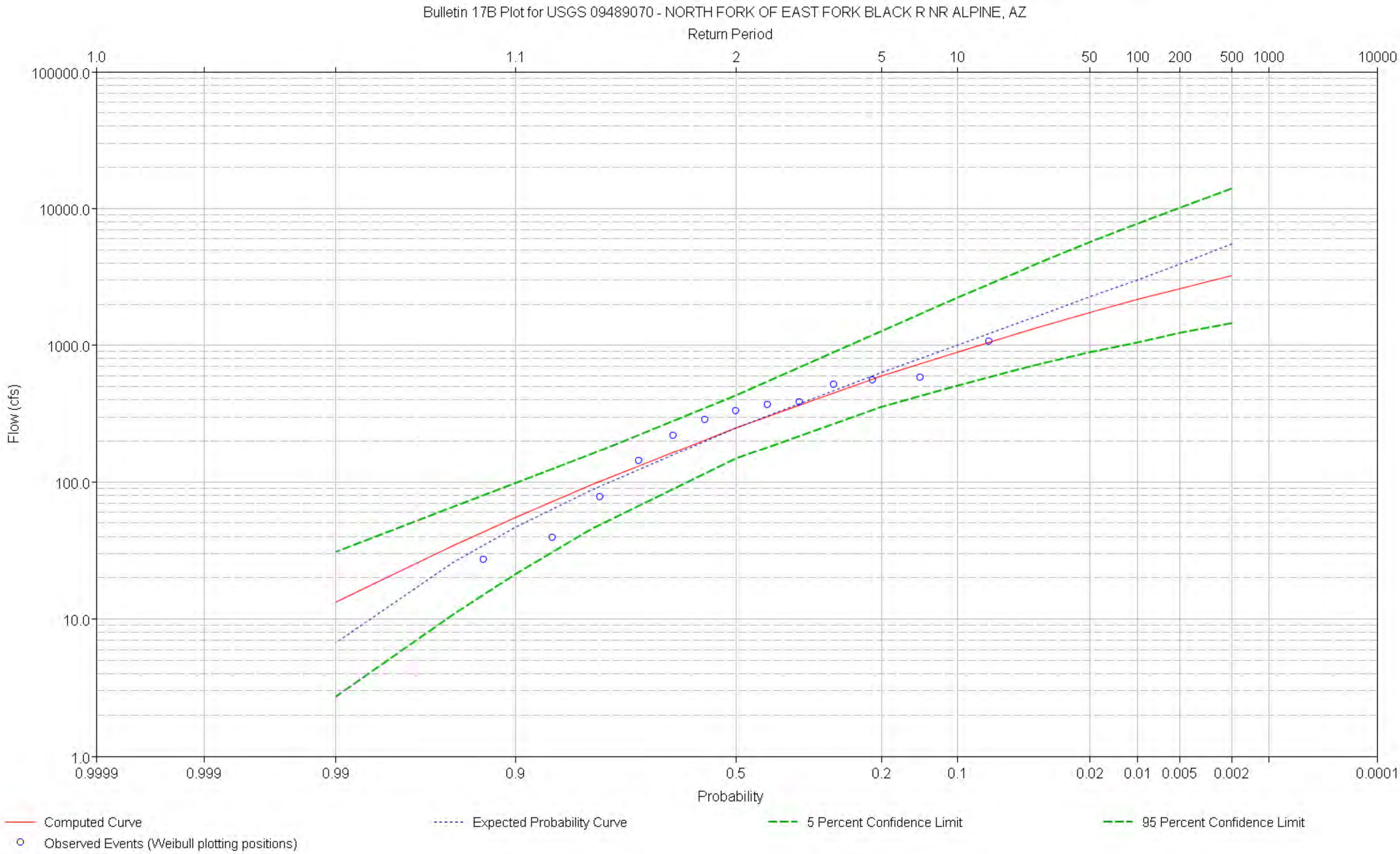


Figure 2j. Peak flow frequency analysis plot - 09489070

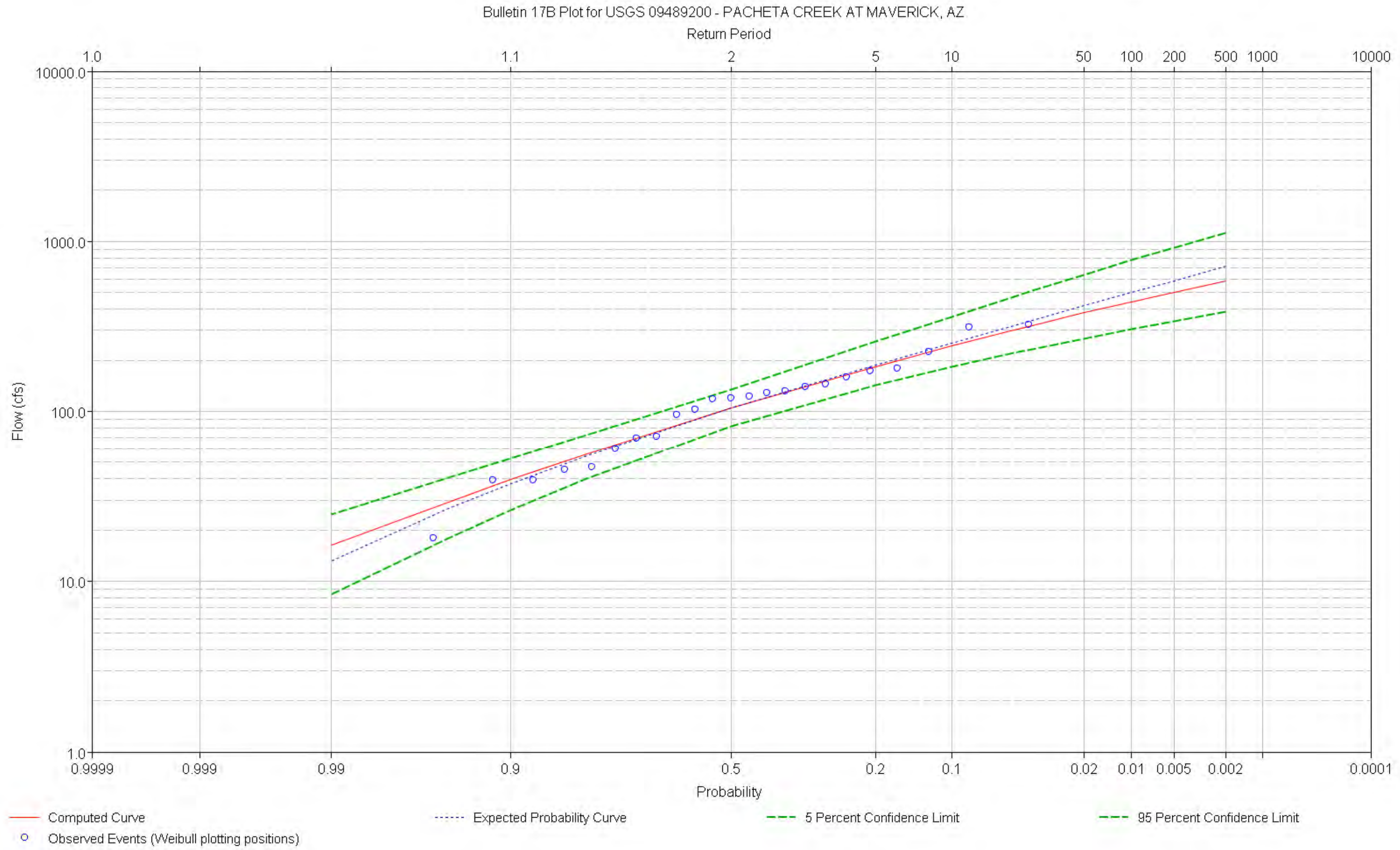


Figure 2k. Peak flow frequency analysis plot - 09489200

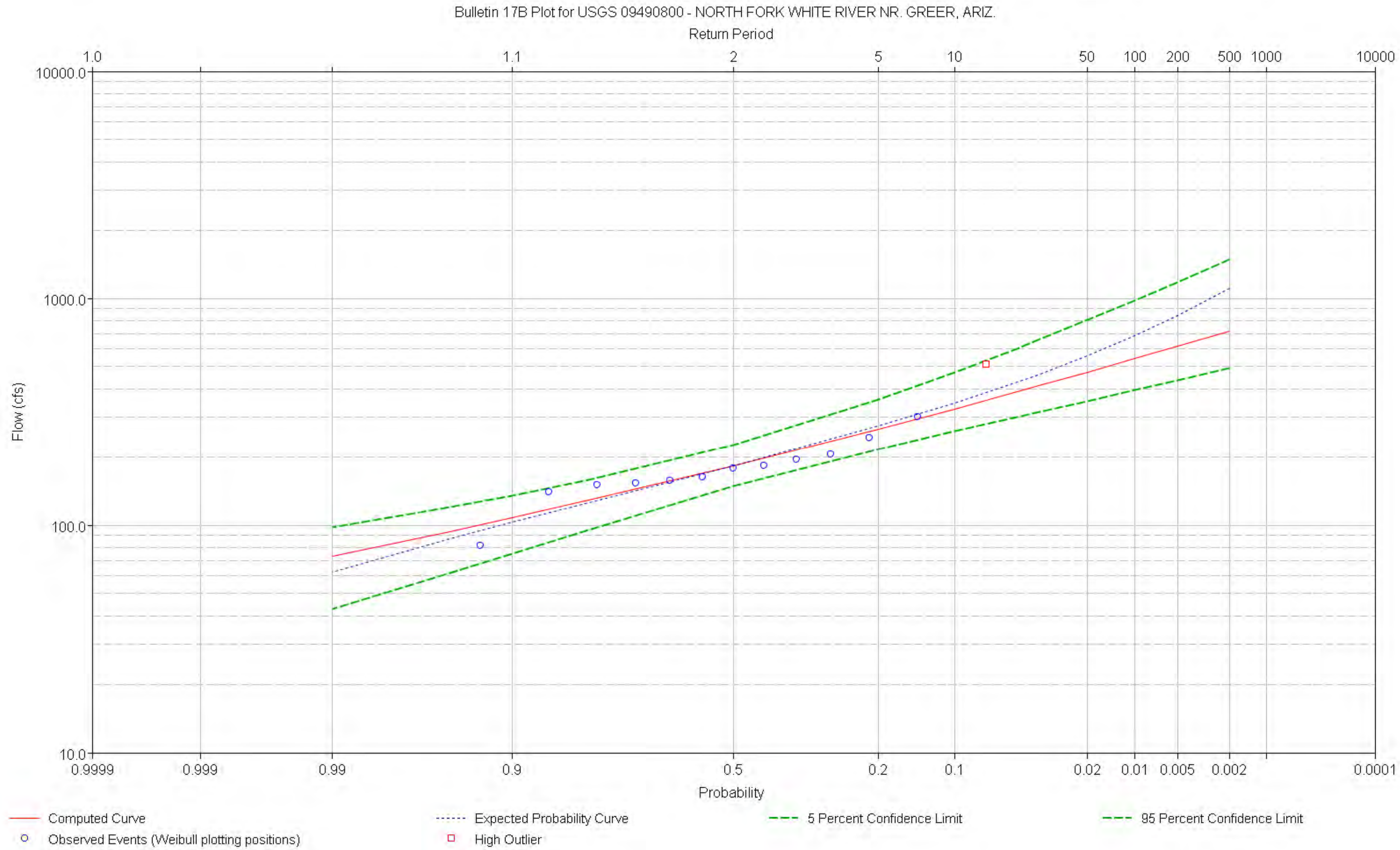


Figure 2l. Peak flow frequency analysis plot - 09490800

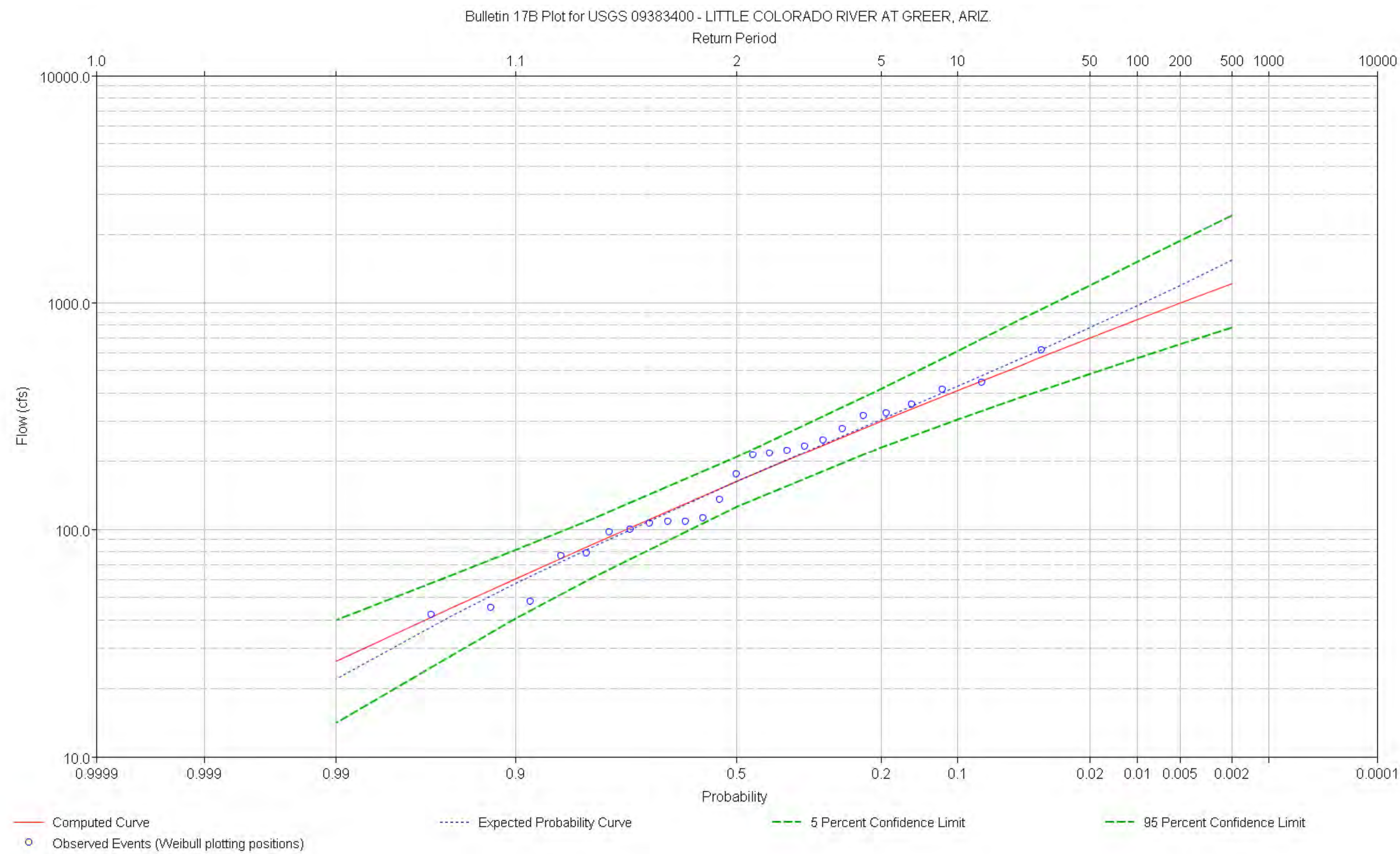


Figure 2m. Peak flow frequency analysis plot - 09383400

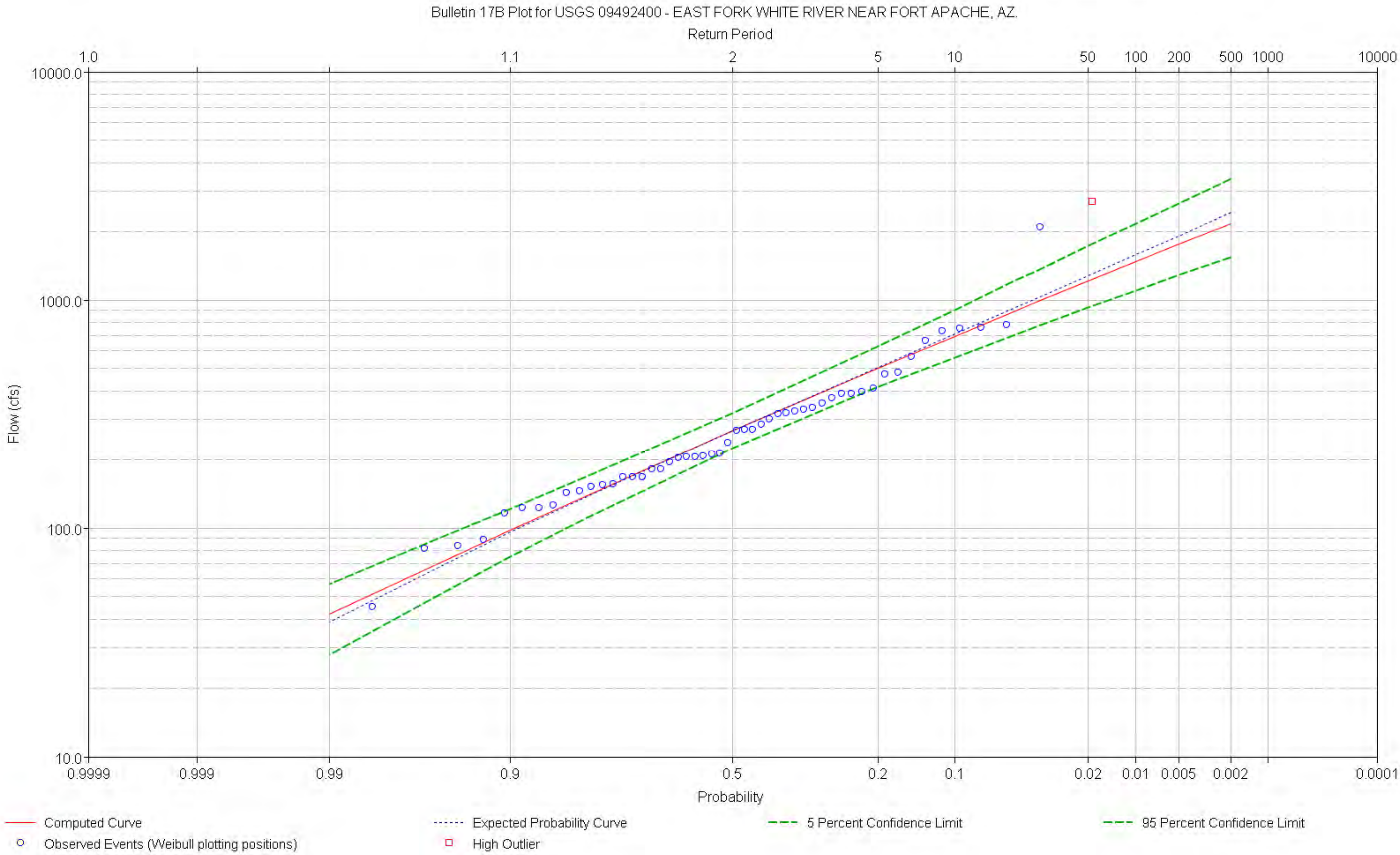


Figure 2n Peak flow frequency analysis plot - 09492400

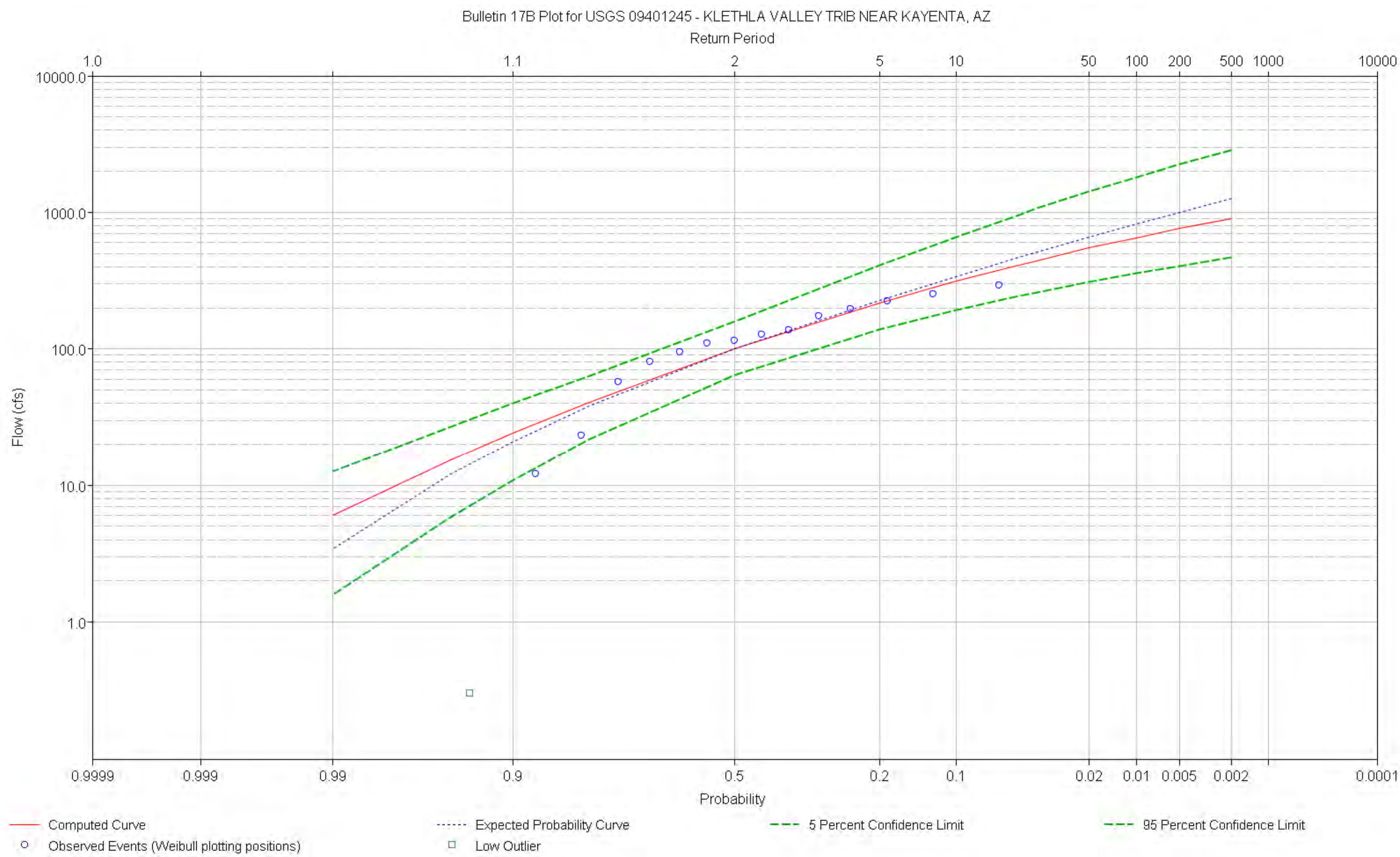


Figure 2o. Peak flow frequency analysis plot - 09401245

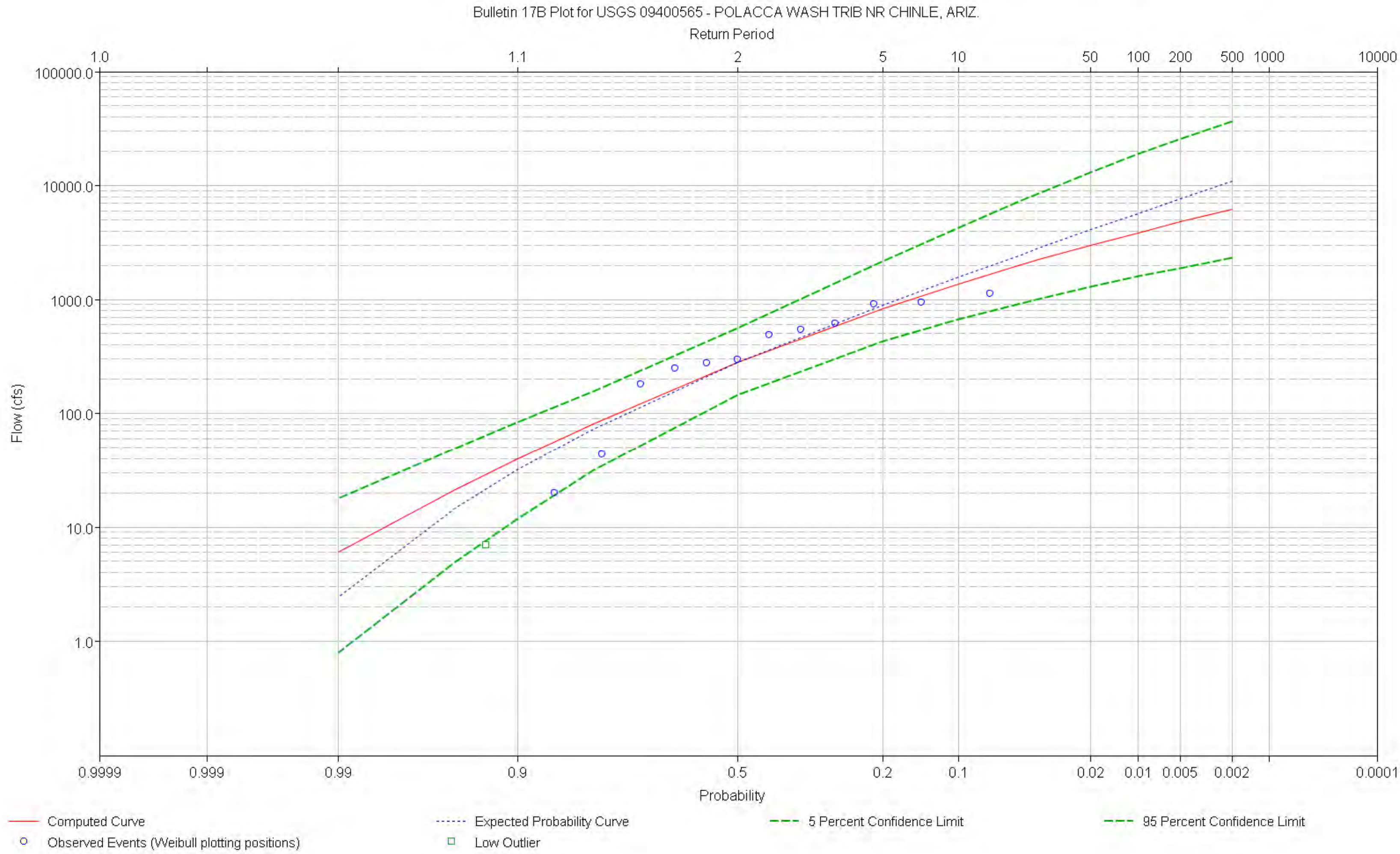


Figure 2p. Peak flow frequency analysis plot - 09400565

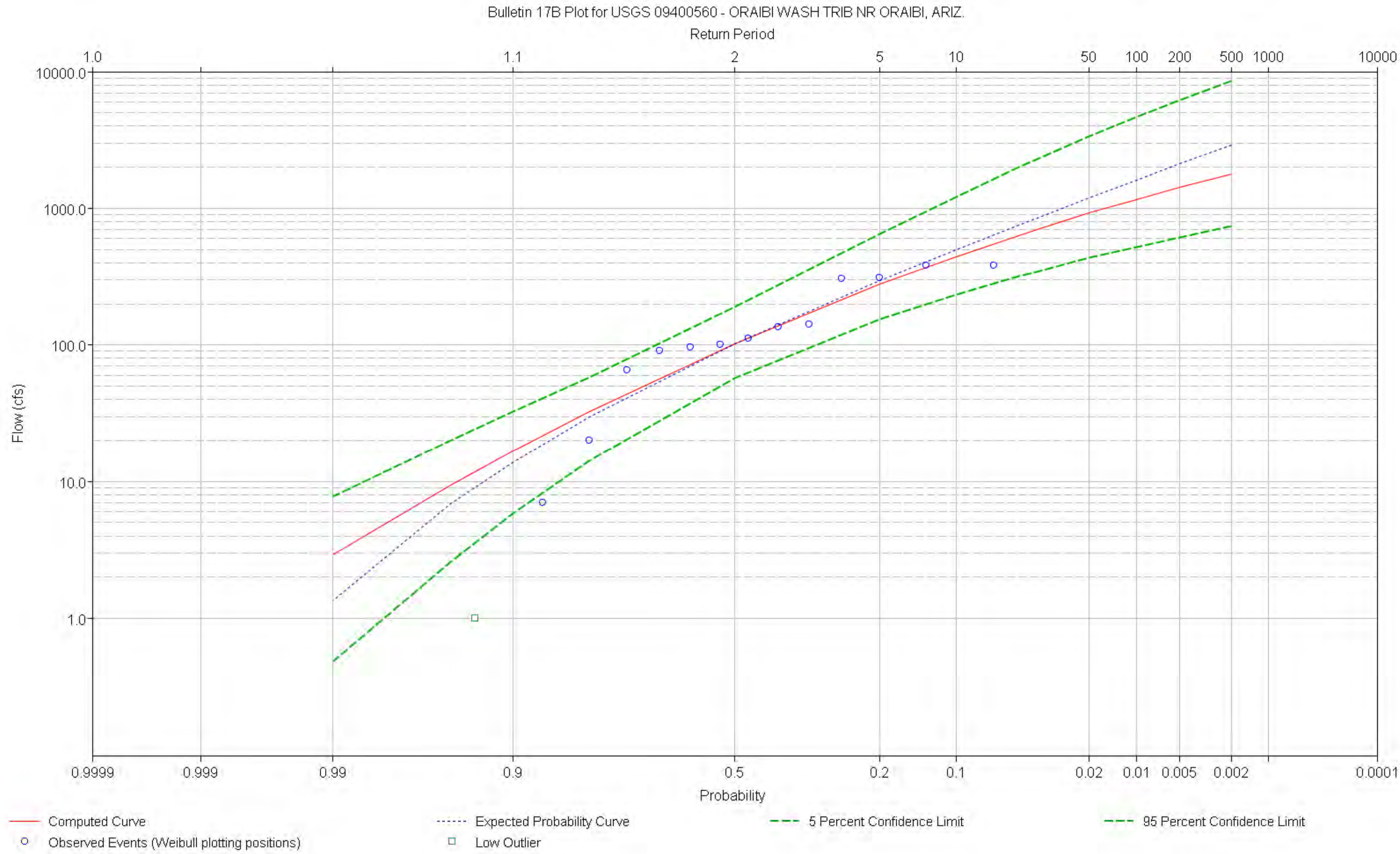


Figure 2q. Peak flow frequency analysis plot - 09400560

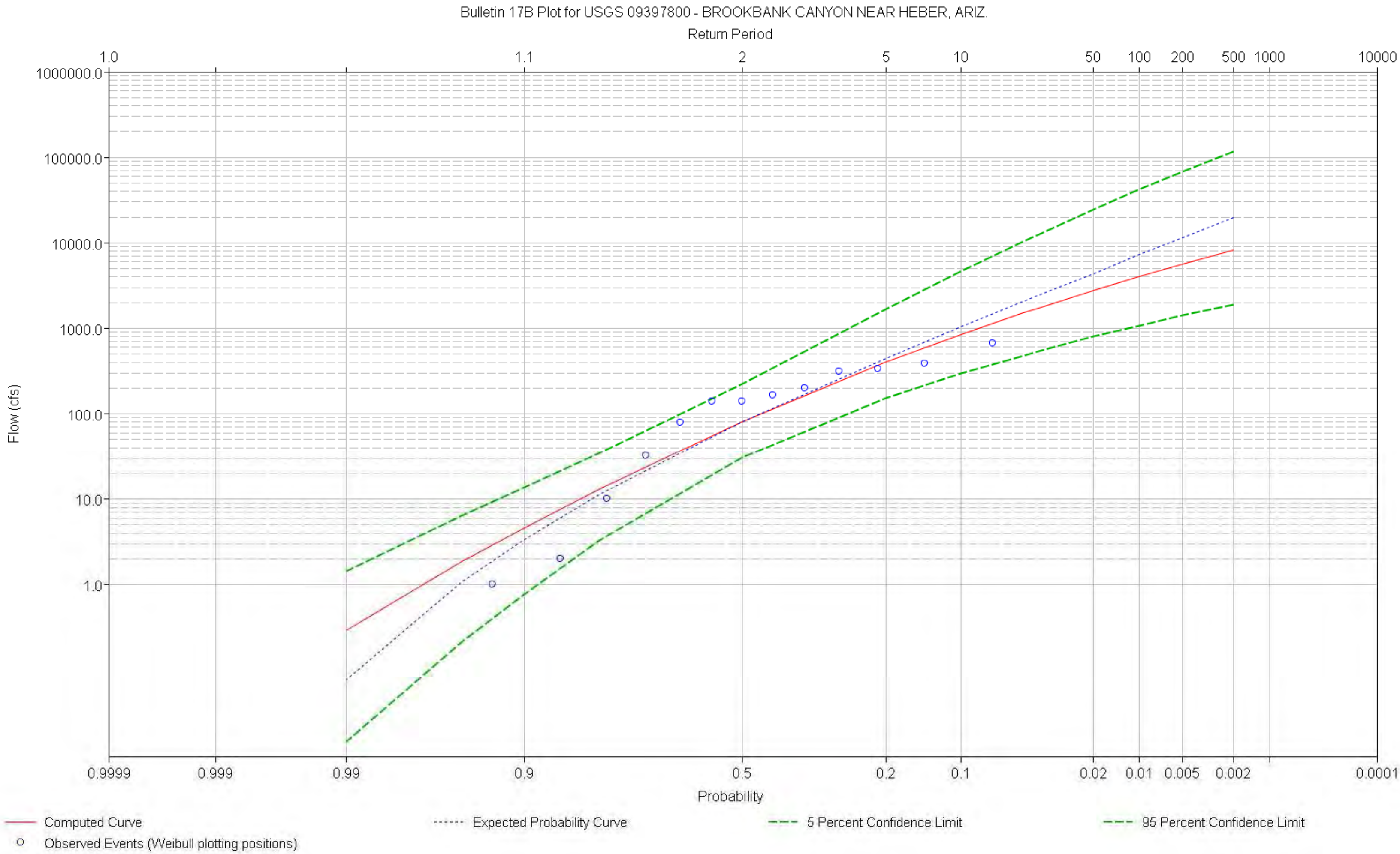


Figure 2r. Peak flow frequency analysis plot - 09397800

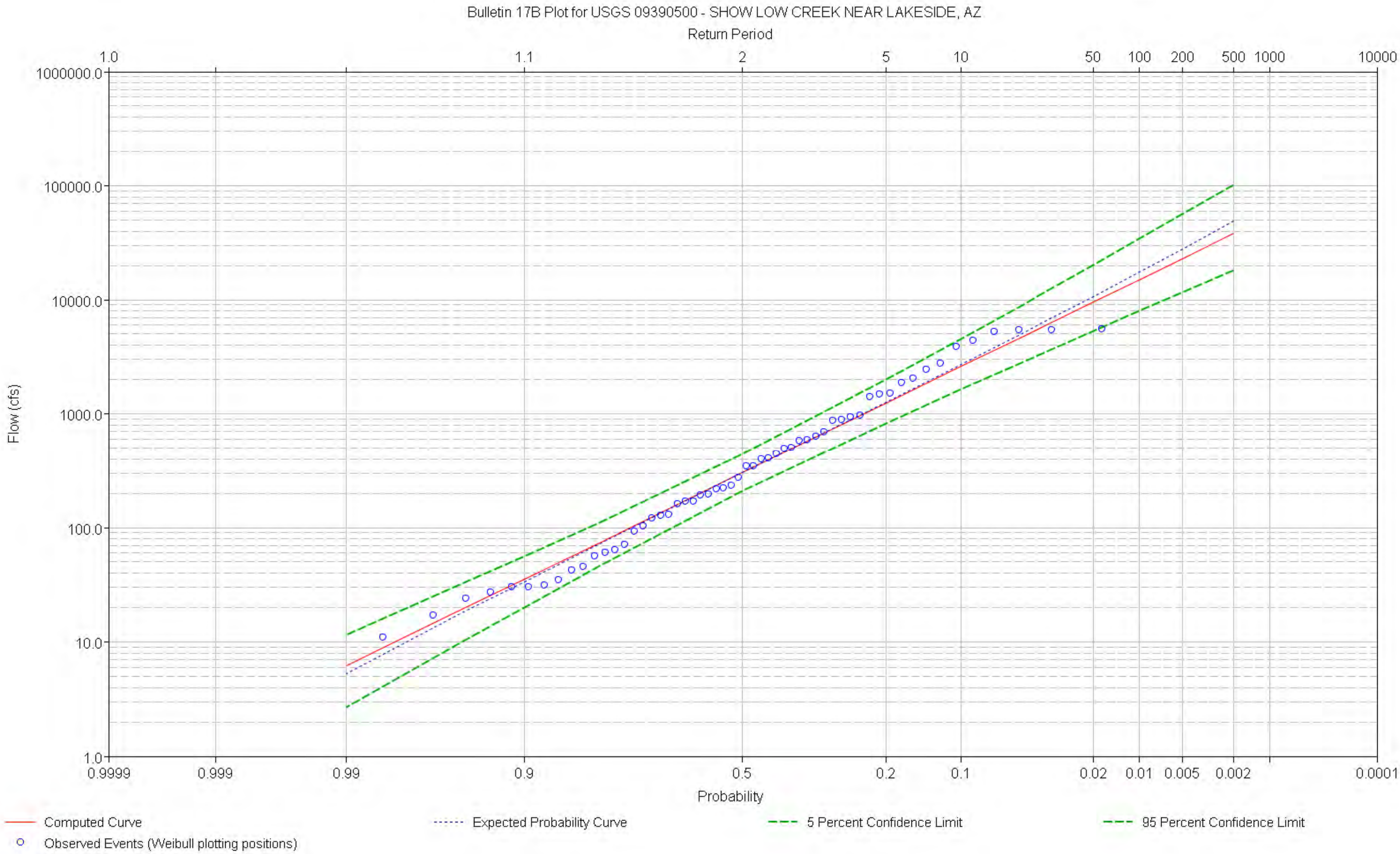


Figure 2s. Peak flow frequency analysis plot - 09390500

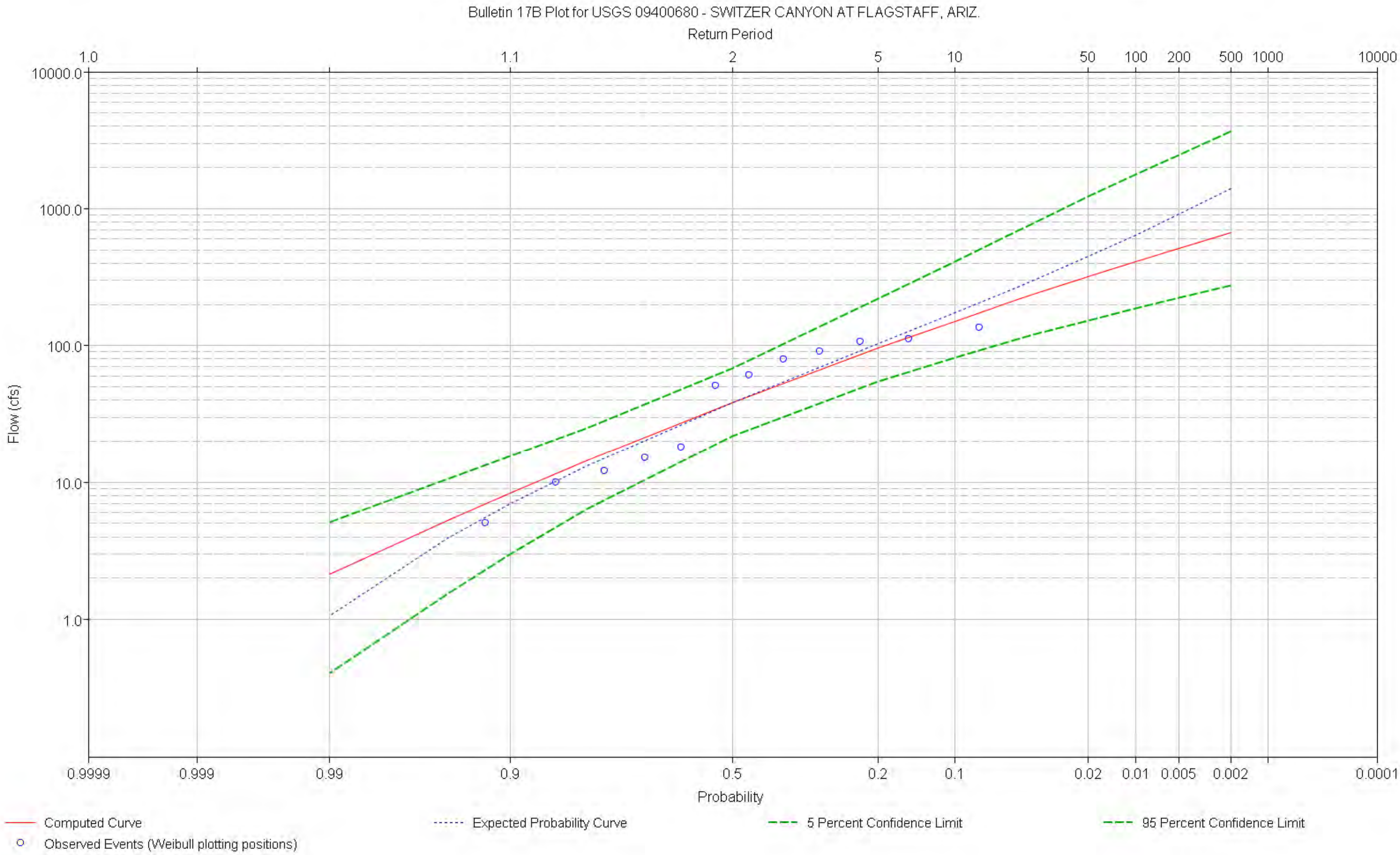


Figure 2t. Peak flow frequency analysis plot - 09400680

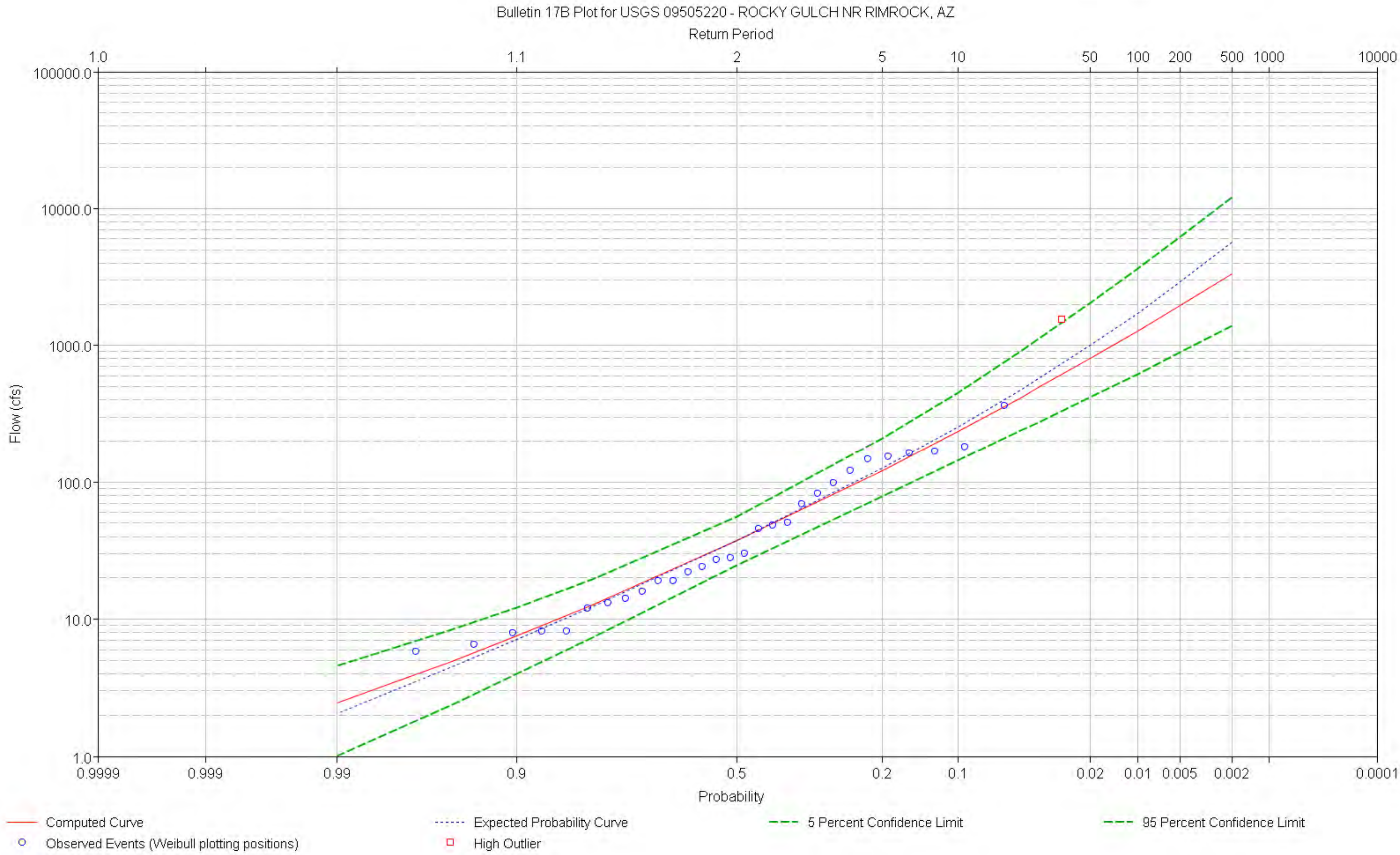


Figure 2u. Peak flow frequency analysis plot - 09505220

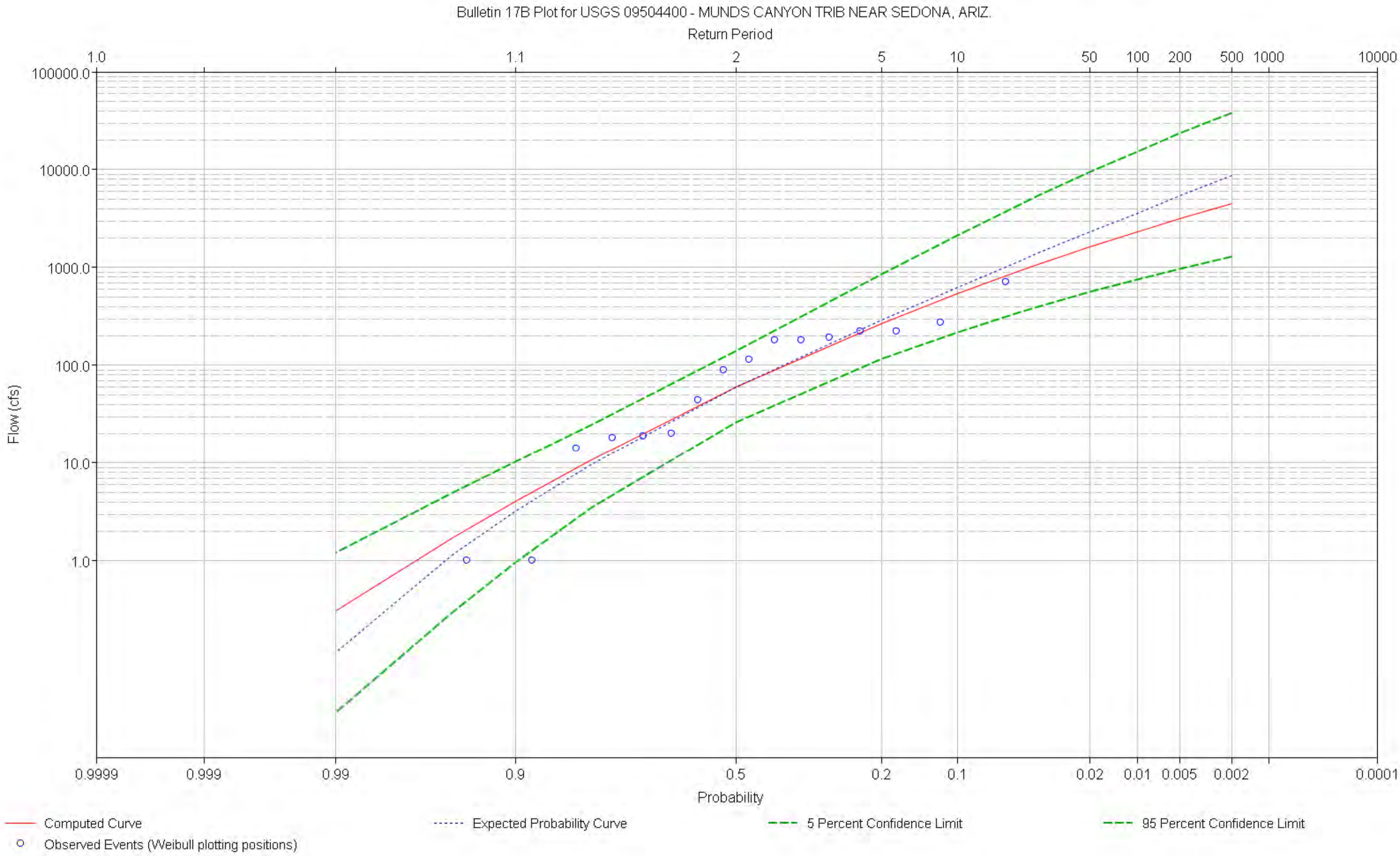


Figure 2v. Peak flow frequency analysis plot - 09504400

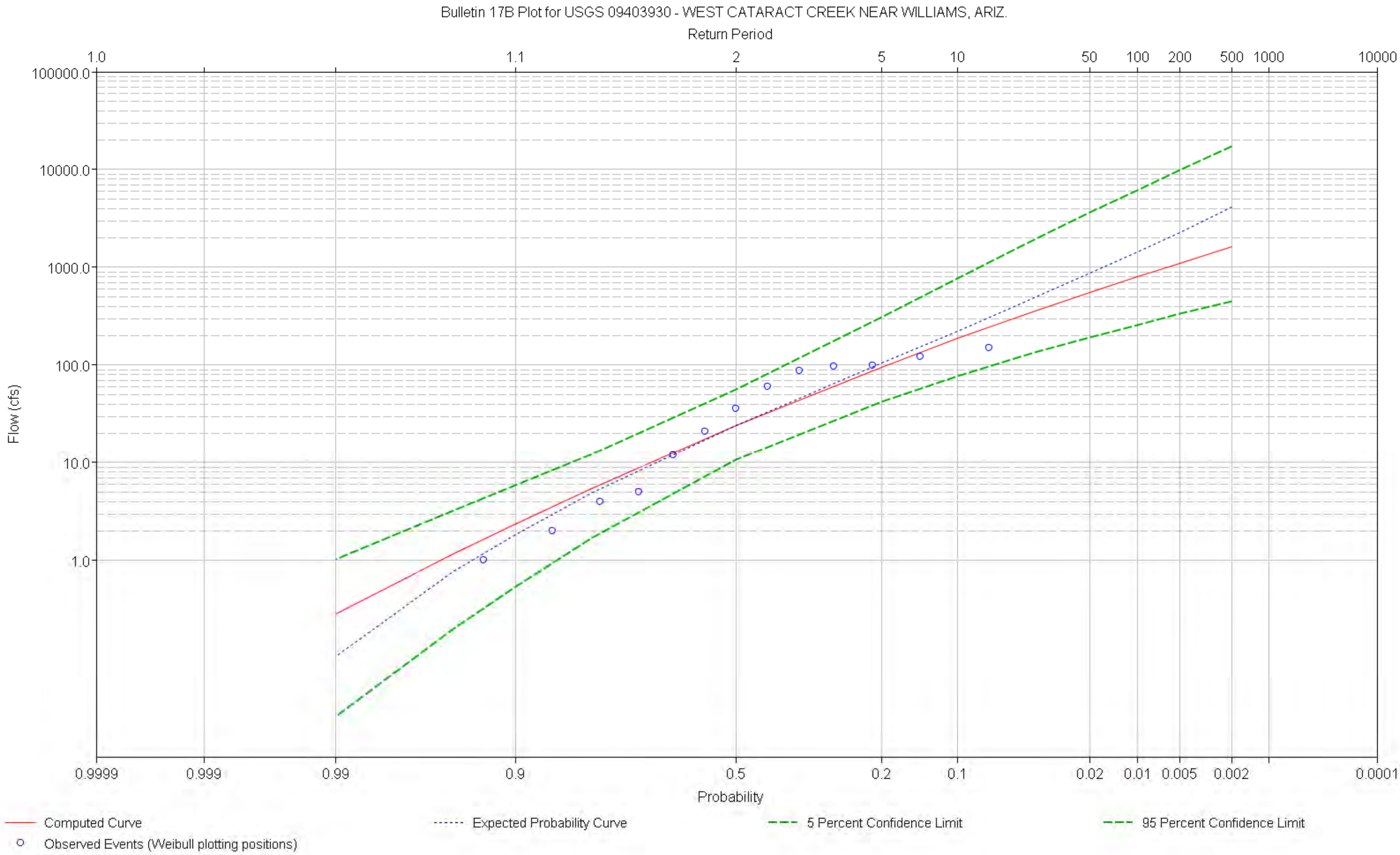


Figure 2w. Peak flow frequency analysis plot - 09403930

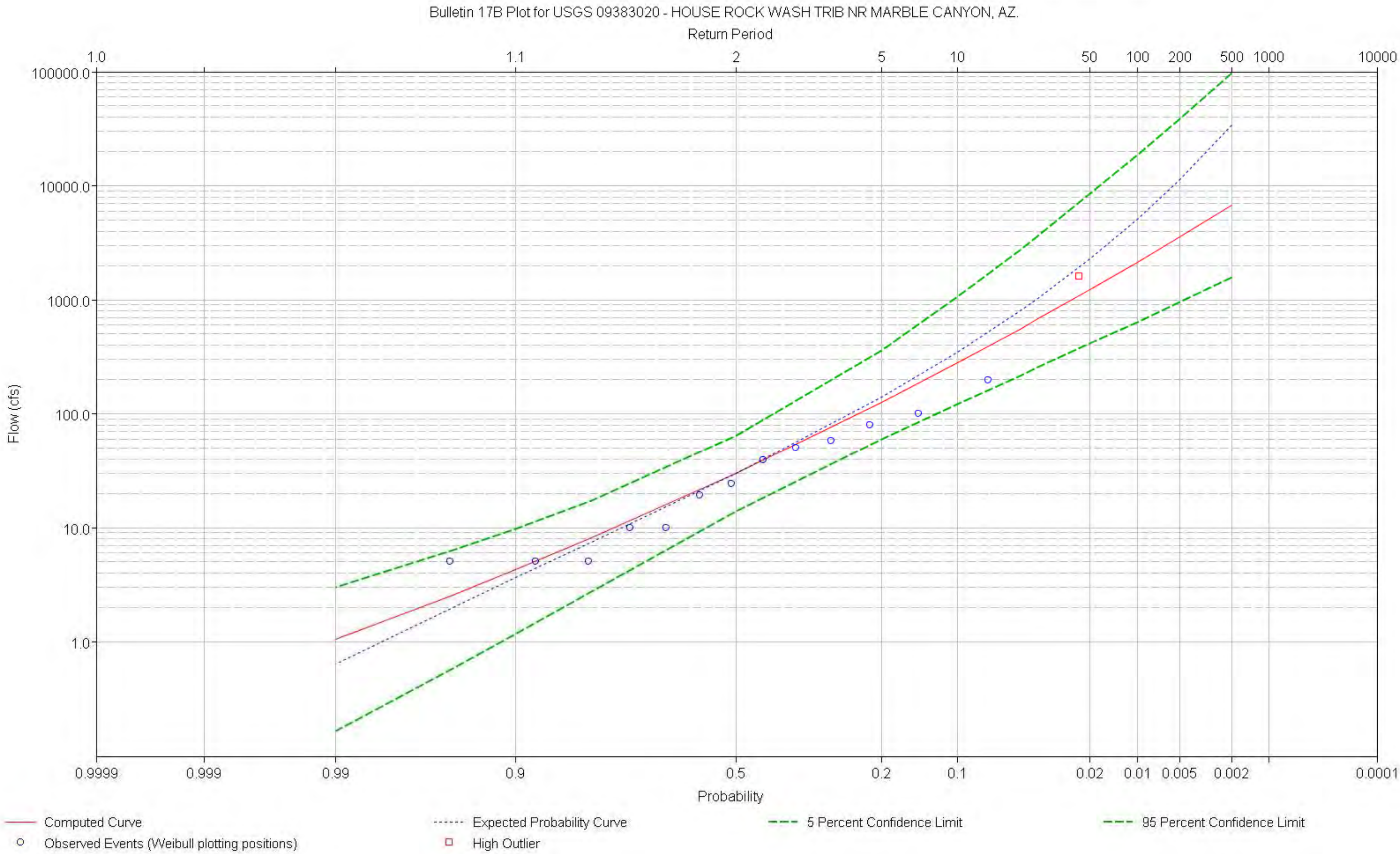


Figure 2x. Peak flow frequency analysis plot - 09383020

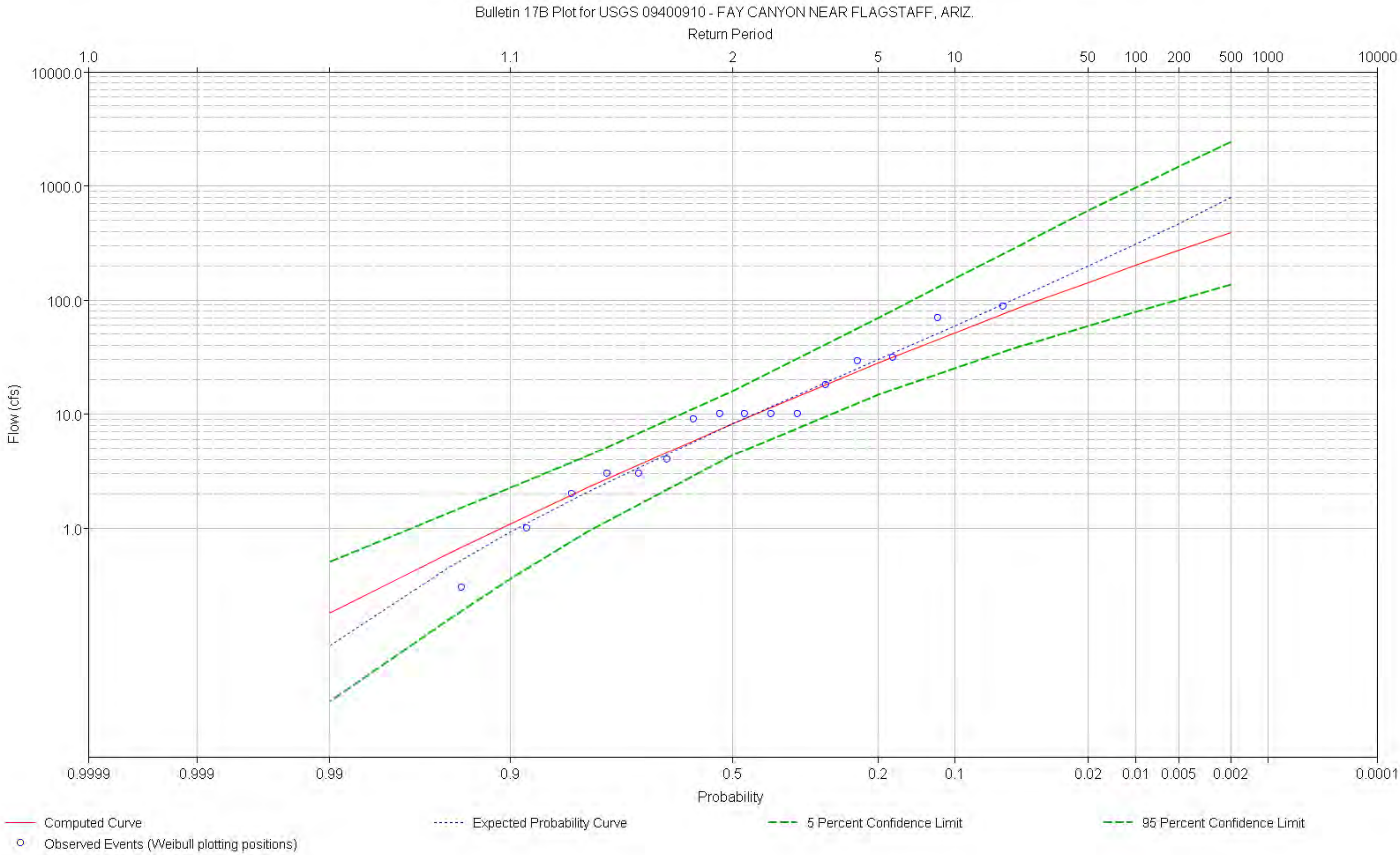


Figure 2y. Peak flow frequency analysis plot – 09400910

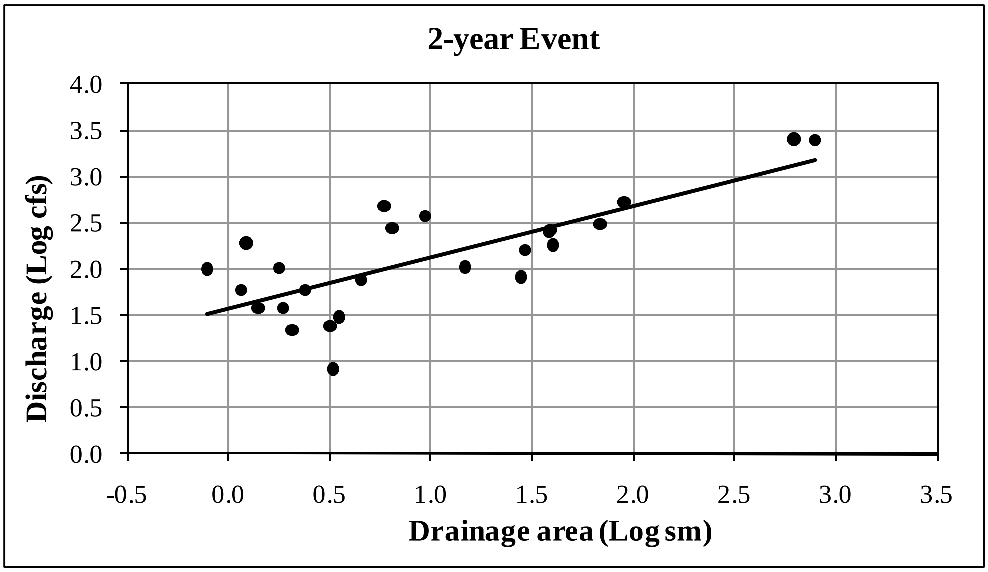


Figure 3a. Relations between 2-year peak discharge and drainage area

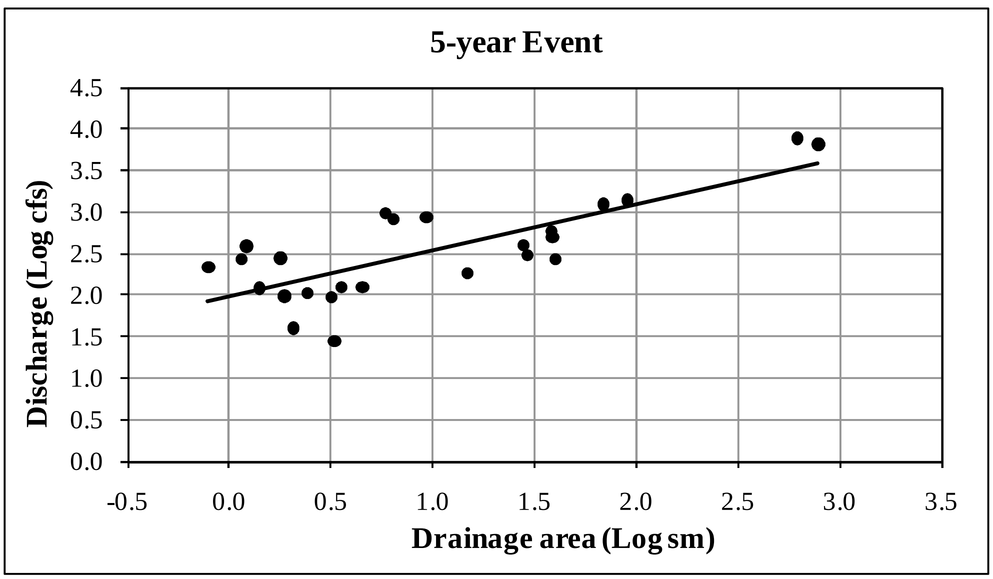


Figure 3b. Relations between 5-year peak discharge and drainage area

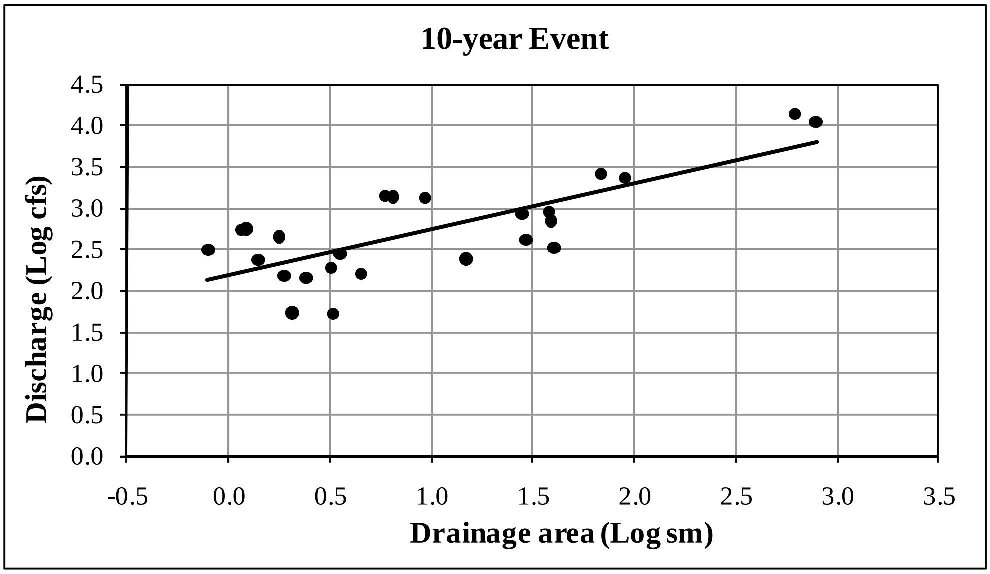


Figure 3c. Relations between 10-year peak discharge and drainage area

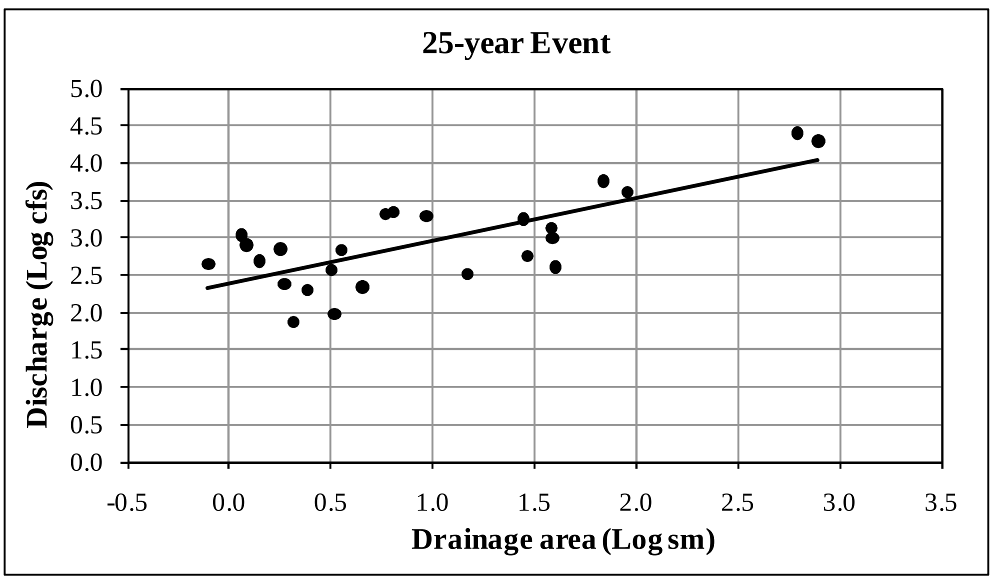


Figure 3d. Relations between 25-year peak discharge and drainage area

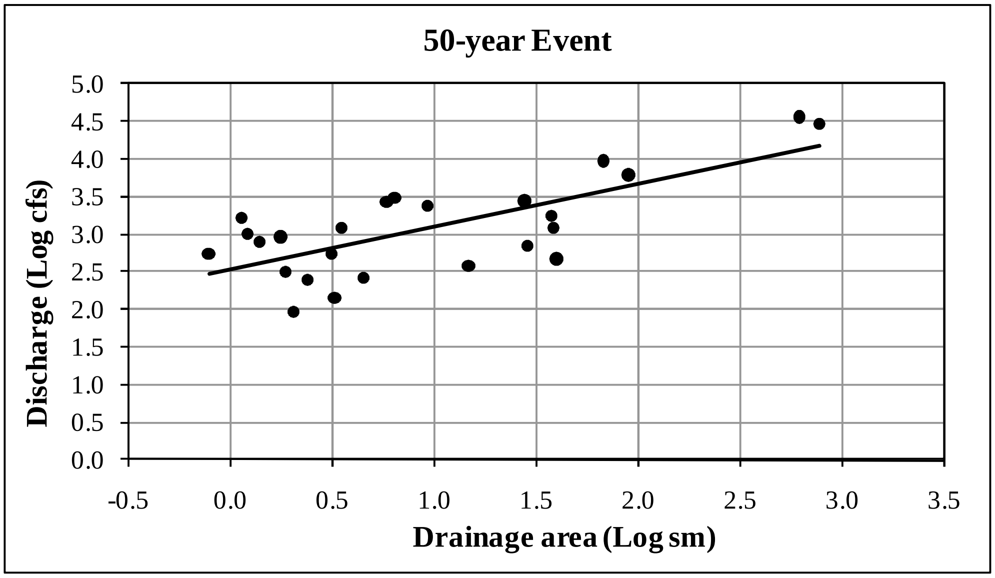


Figure 3e. Relations between 50-year peak discharge and drainage area

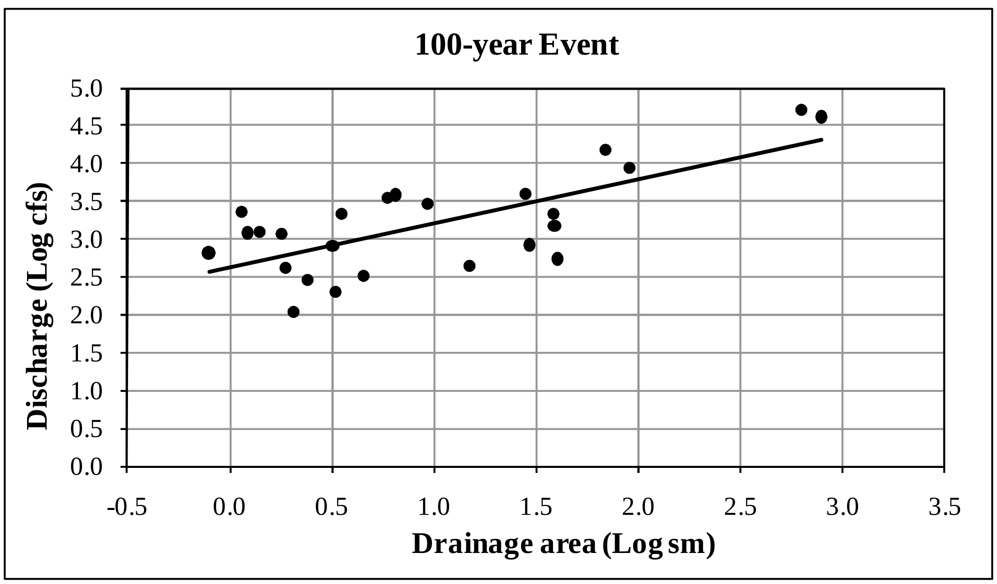


Figure 3f. Relations between 100-year peak discharge and drainage area

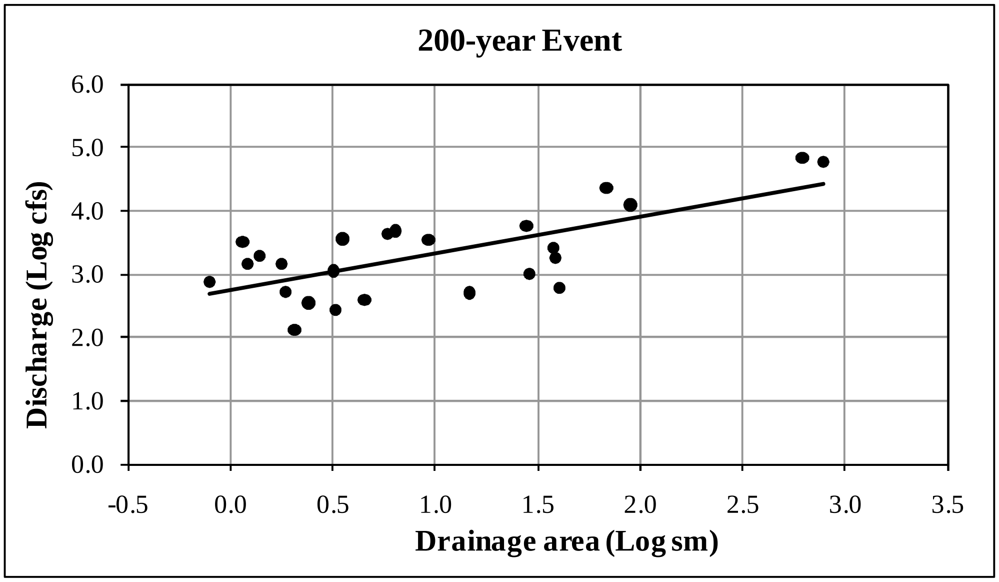


Figure 3g. Relations between 200-year peak discharge and drainage area

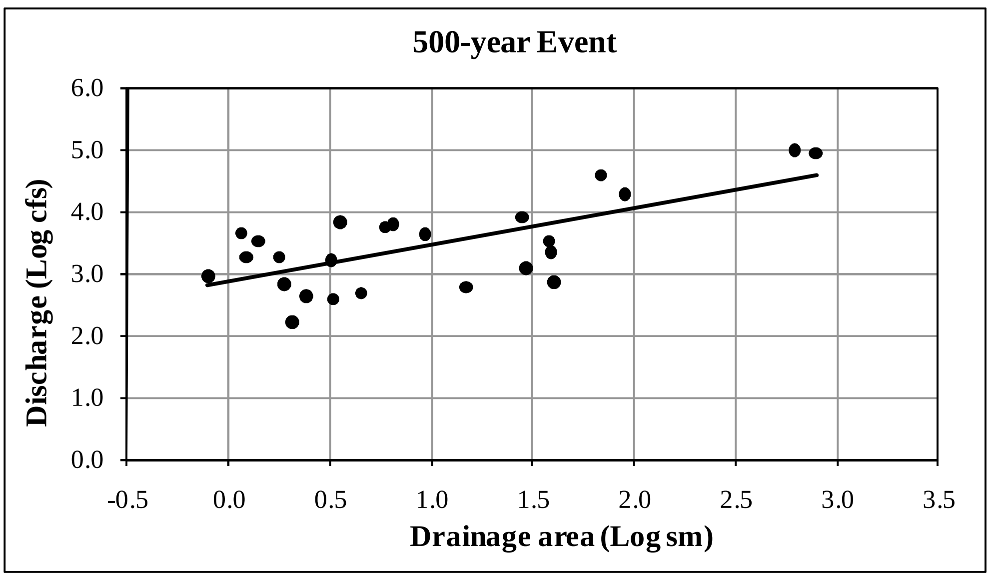


Figure 3h. Relations between 500-year peak discharge and drainage area

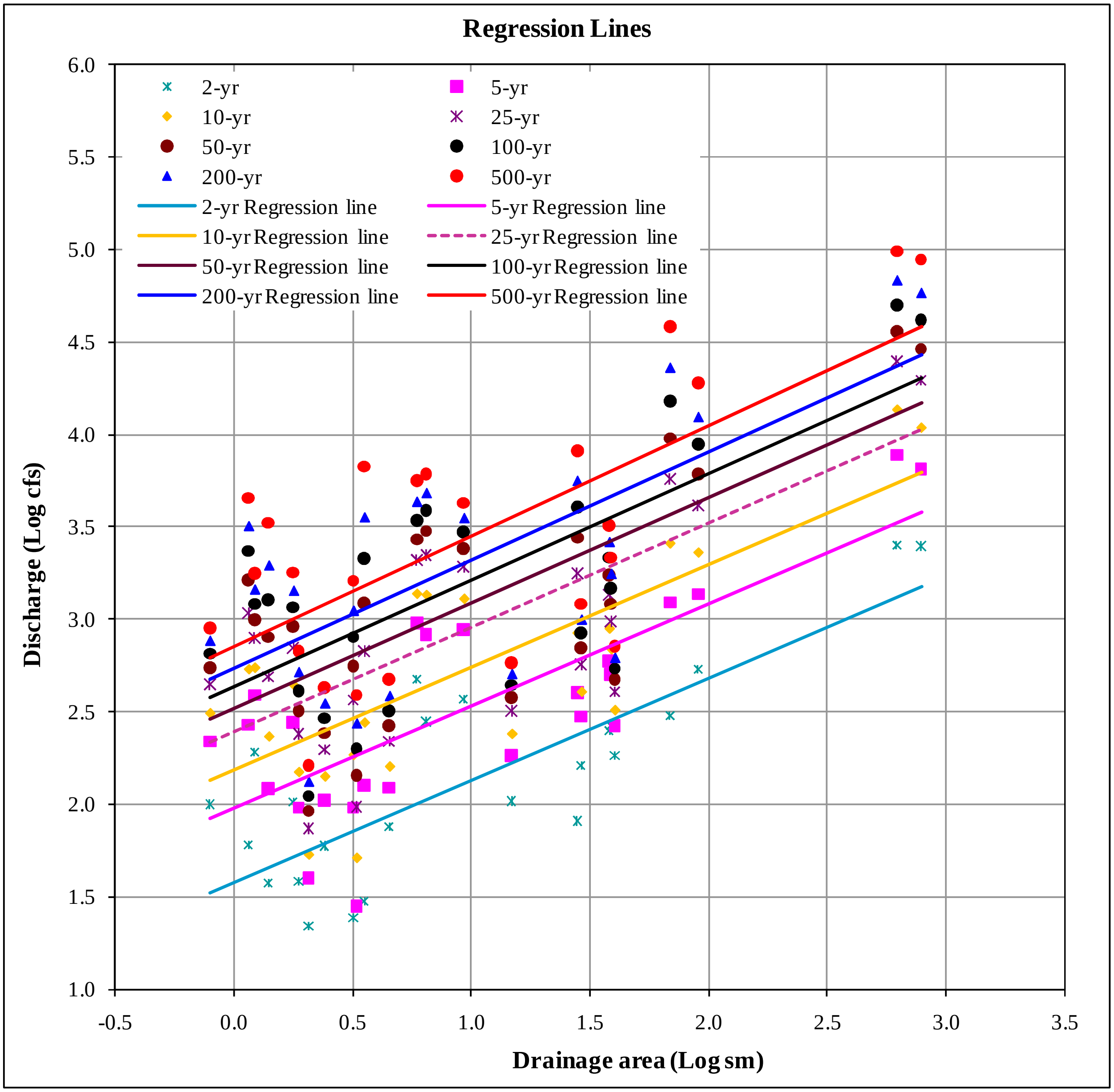


Figure 4. Regional Regression lines for Ruby Wash

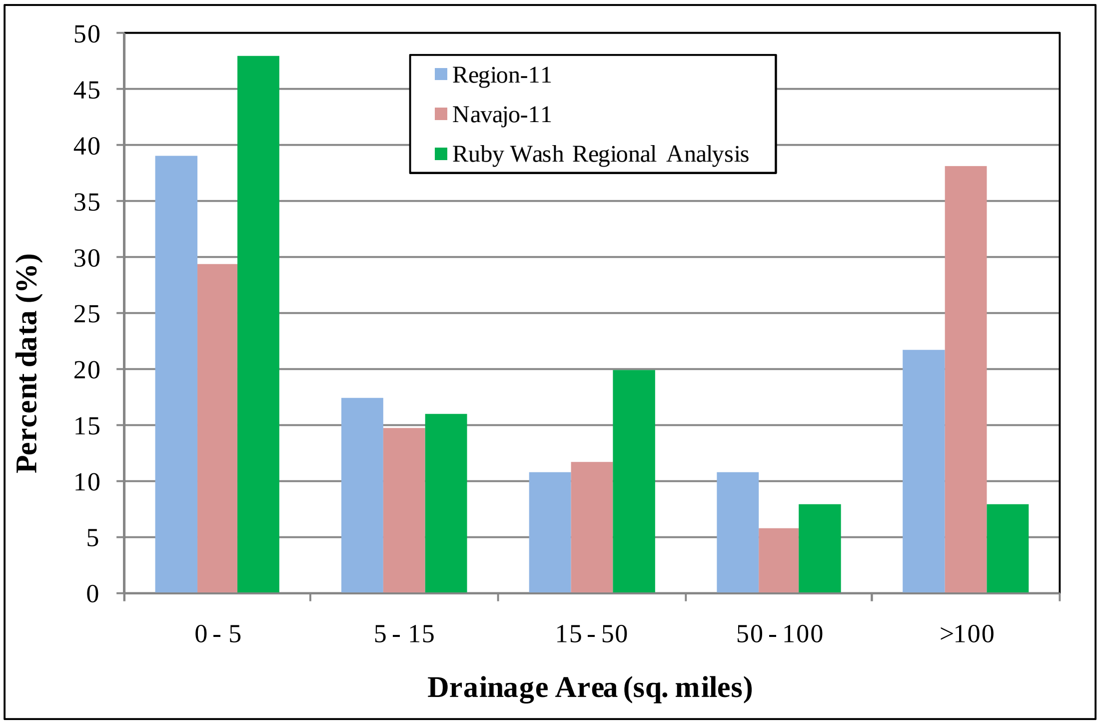
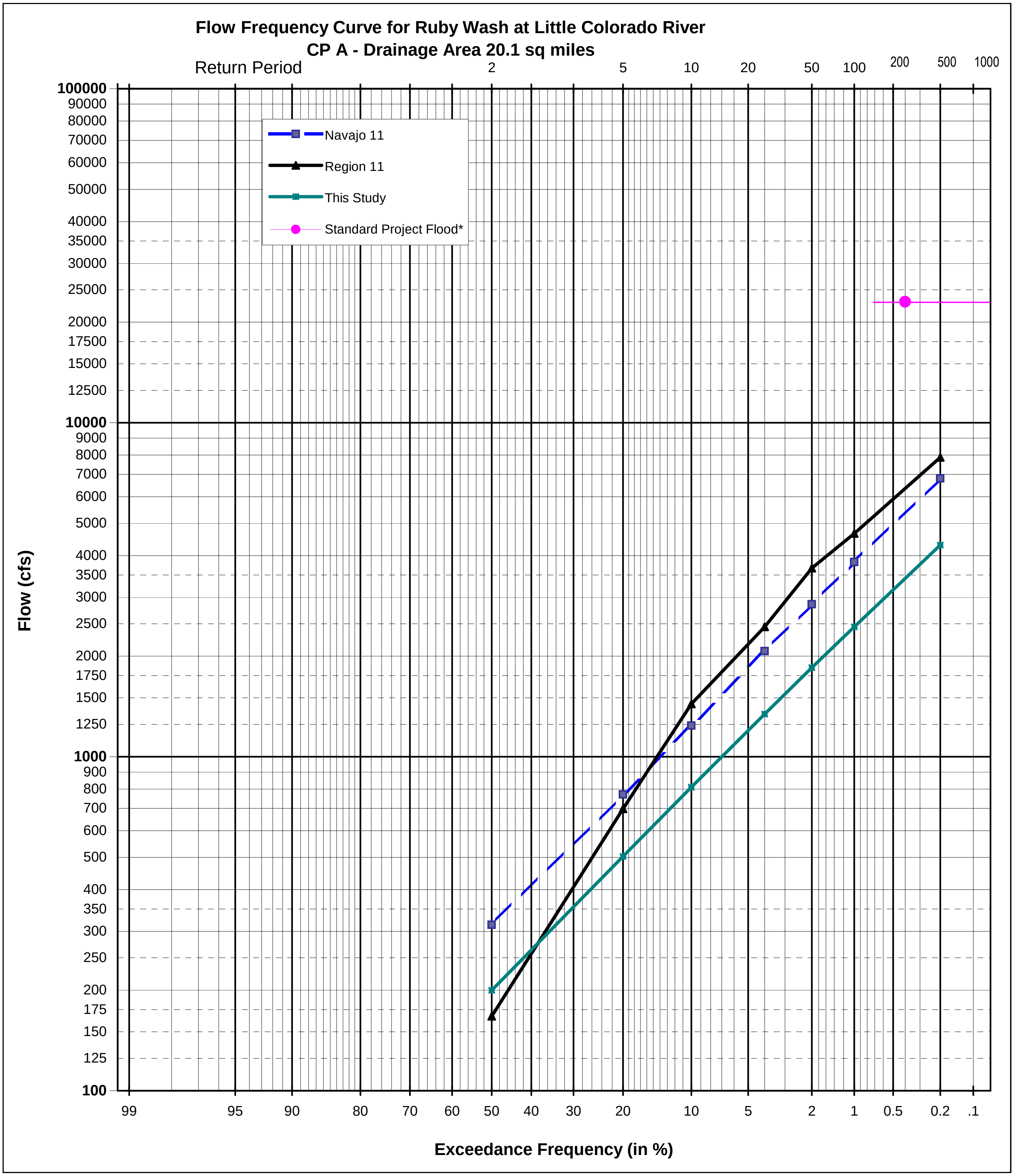
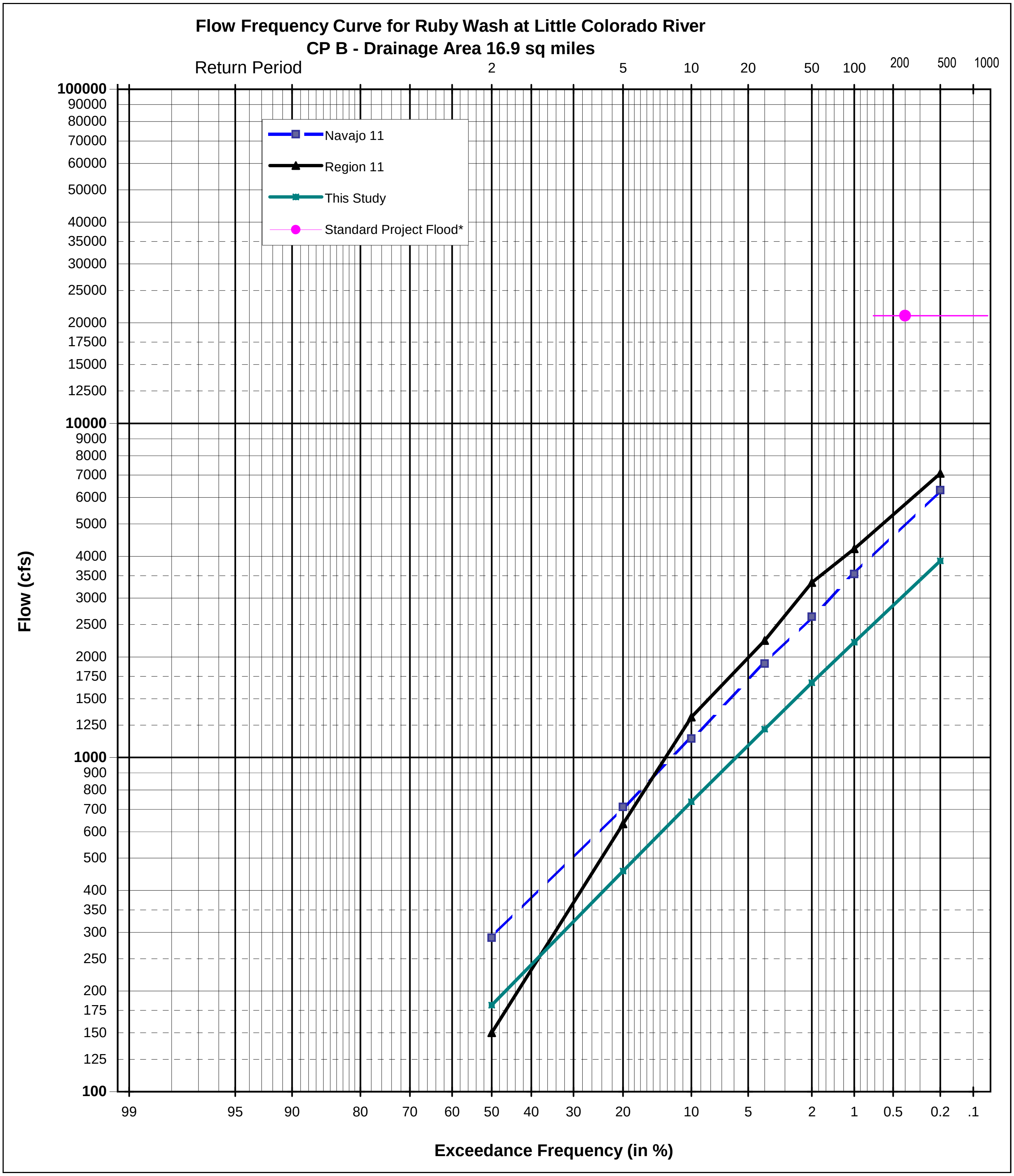


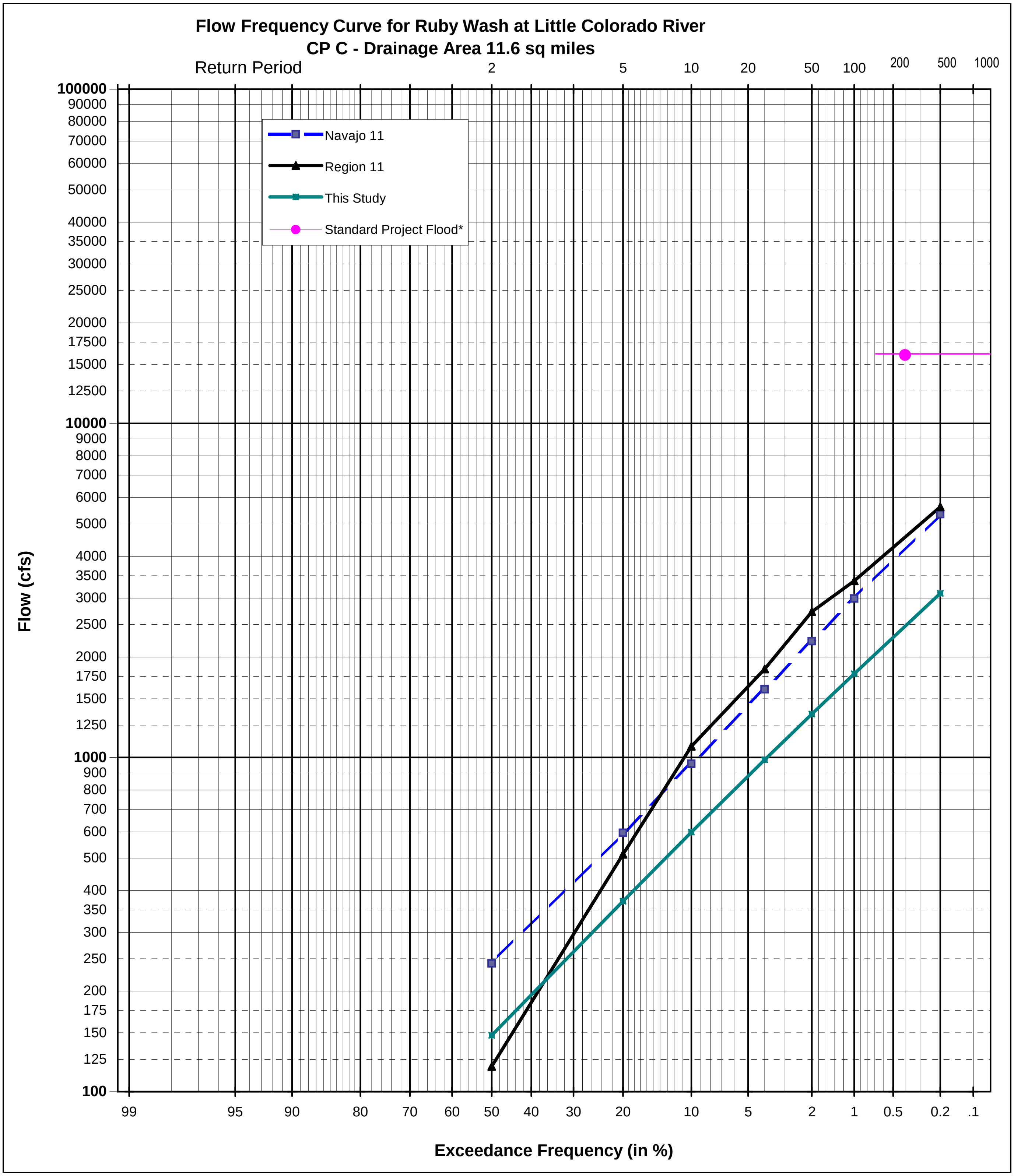
Figure 5. Histogram of drainage area used in different regression analysis



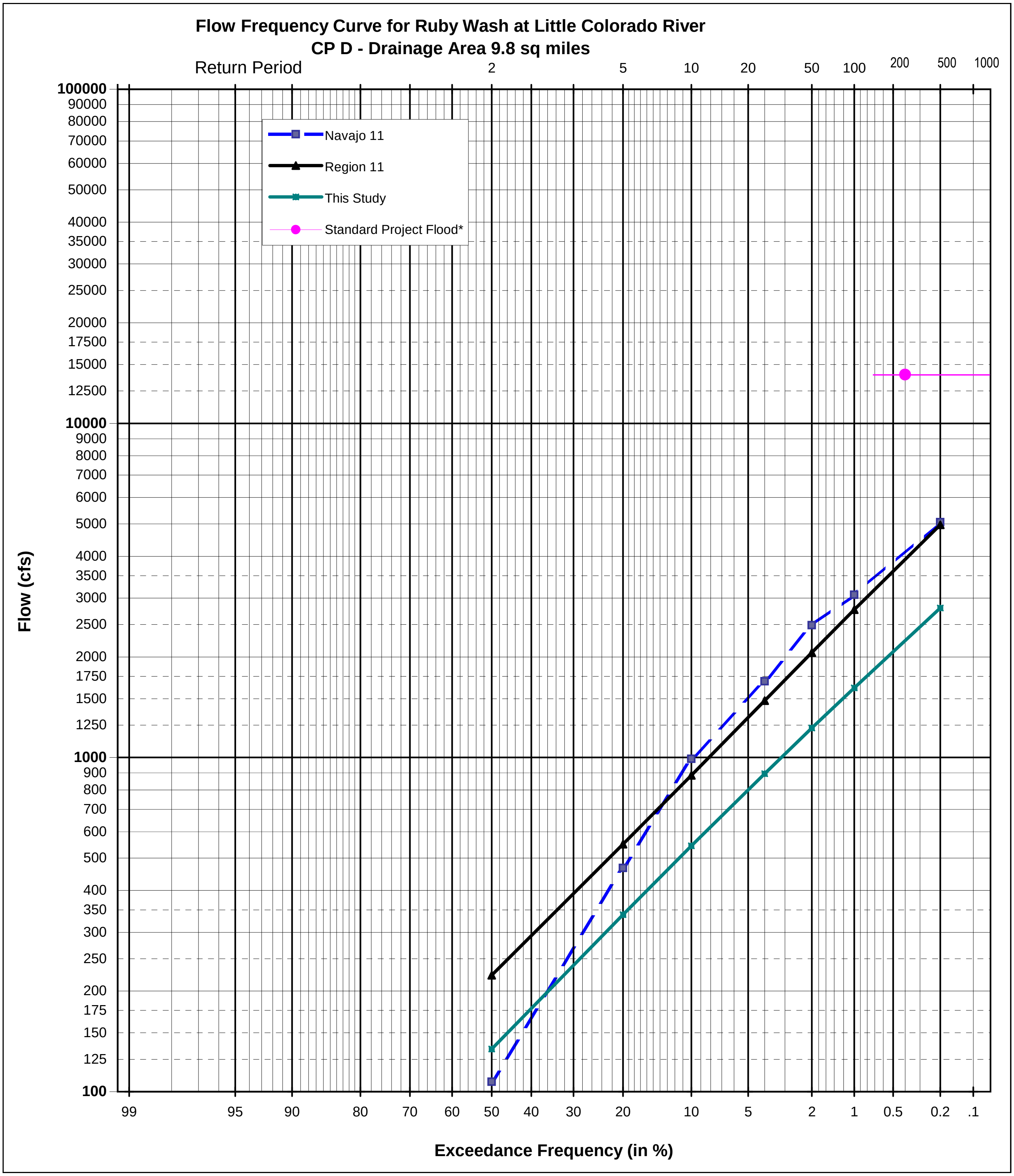
*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6a CONCENTRATION POINT A FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



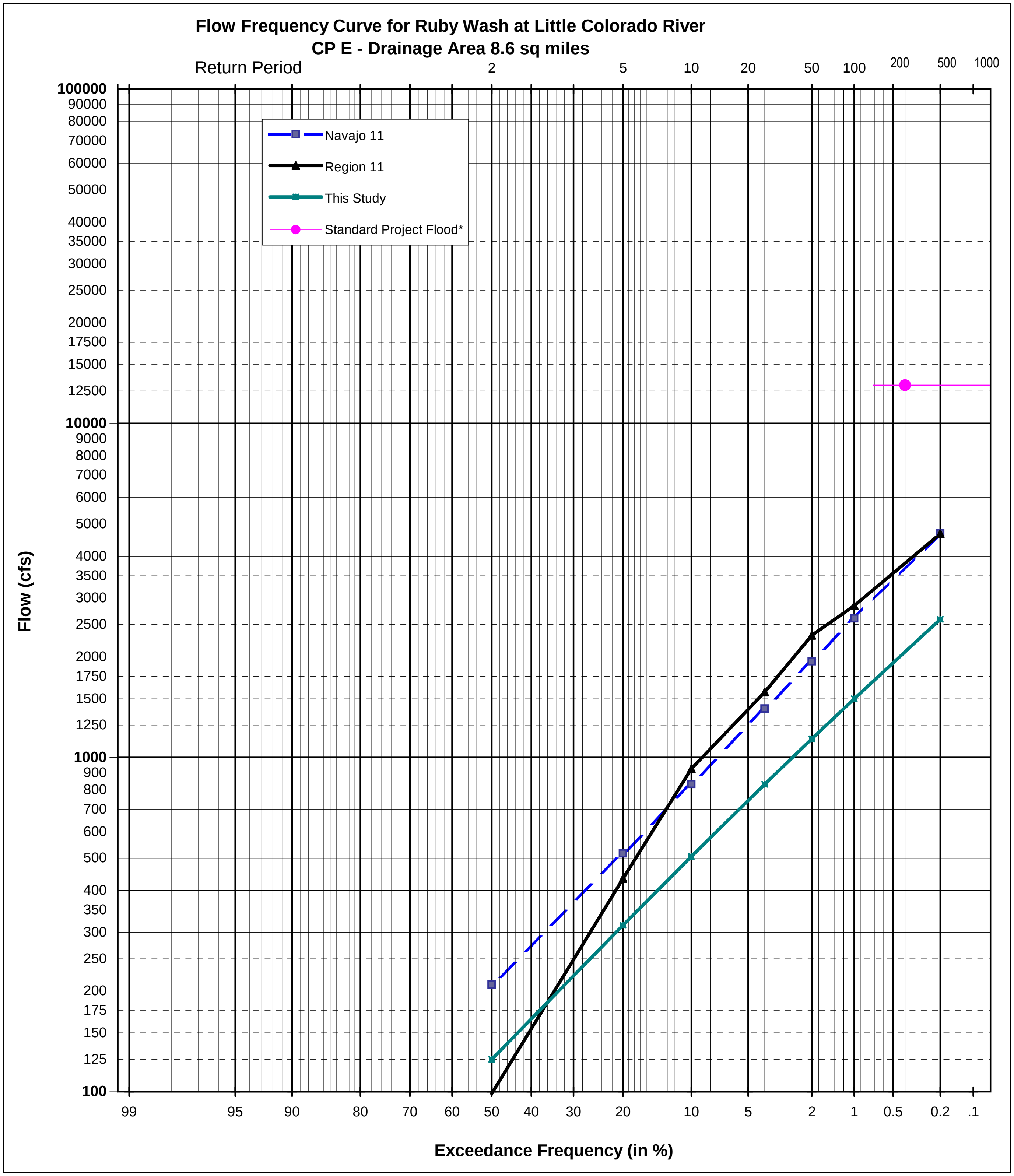
*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6b CONCENTRATION POINT B FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



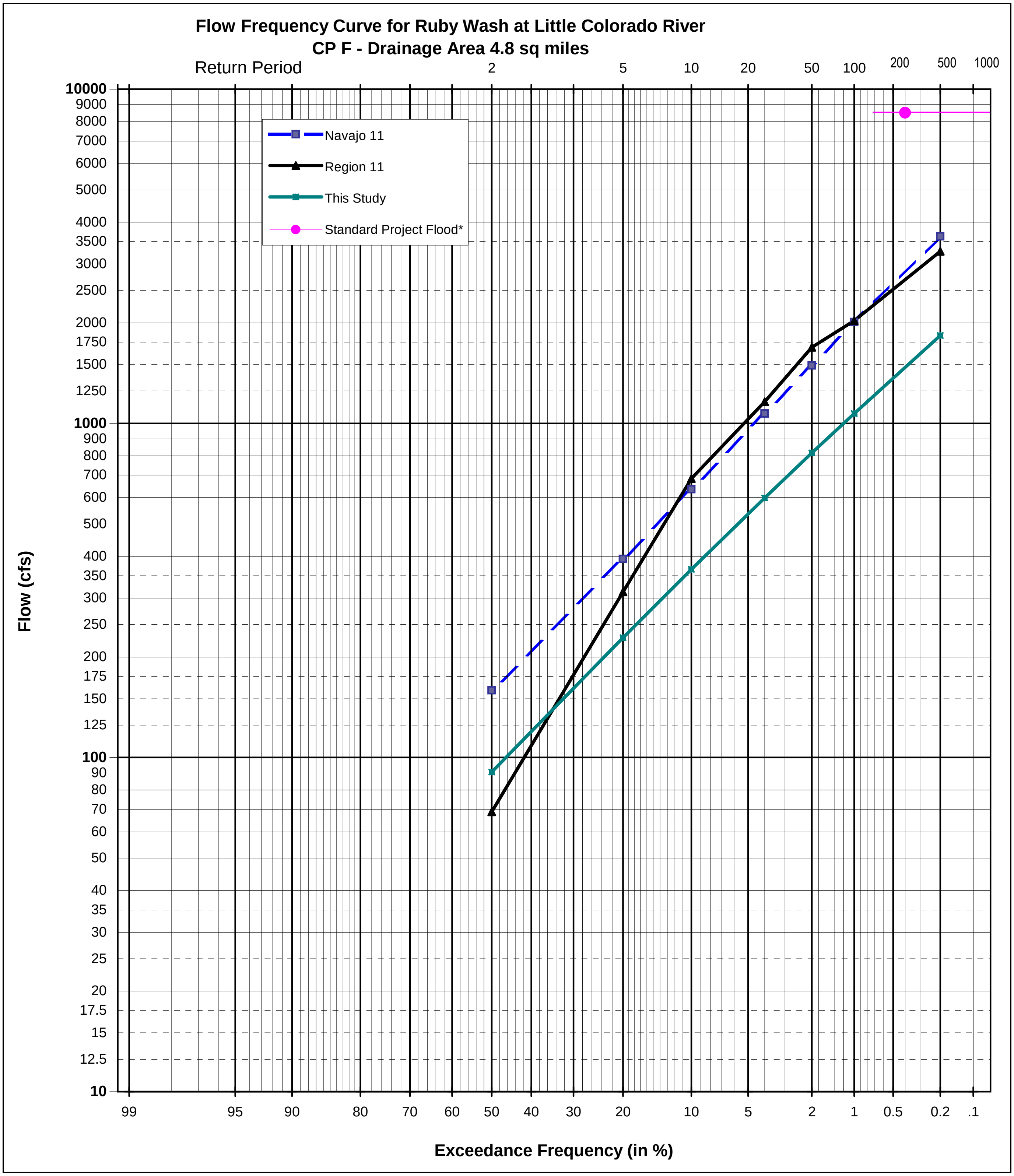
*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6c CONCENTRATION POINT C FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



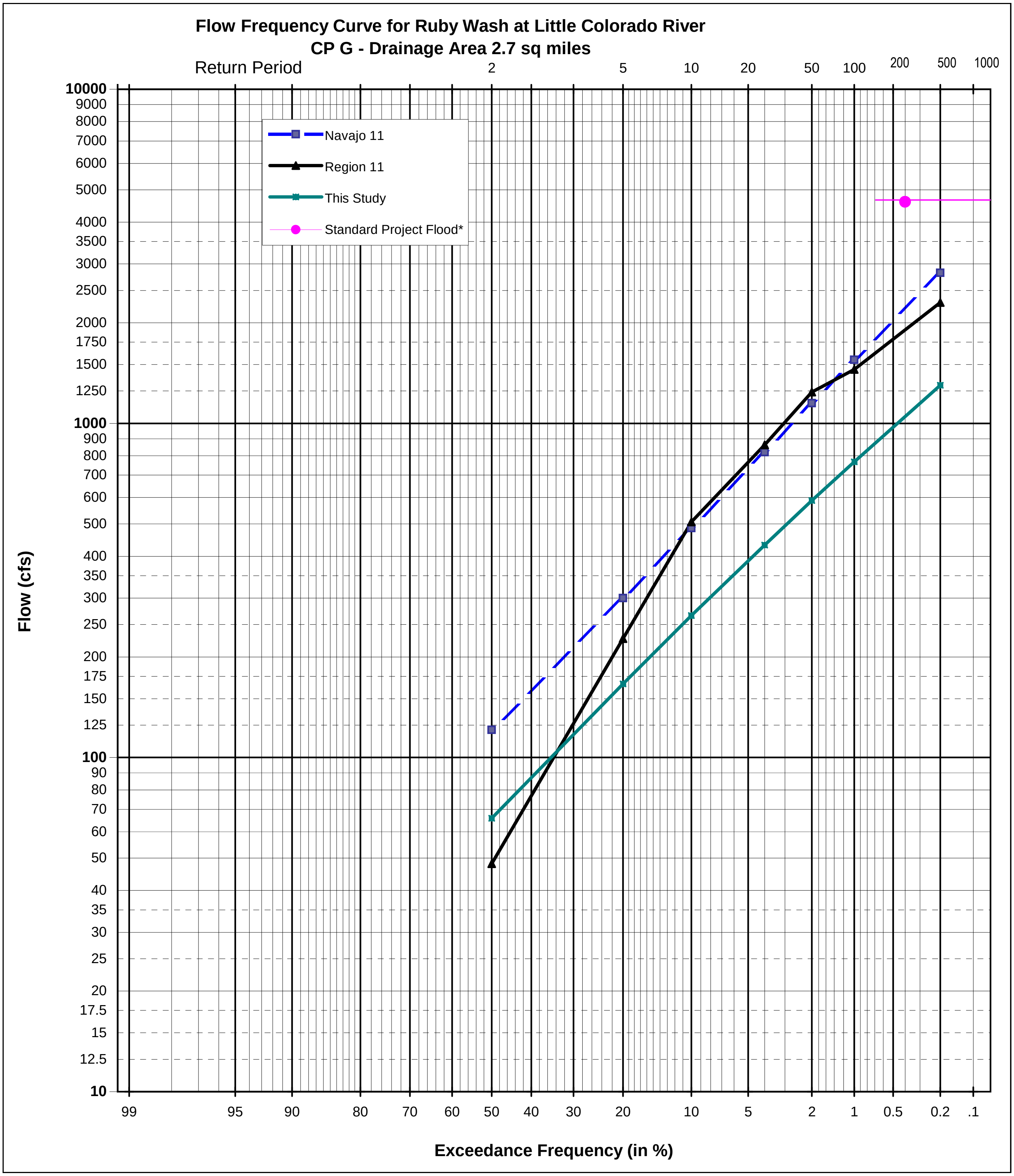
*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6d CONCENTRATION POINT D FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



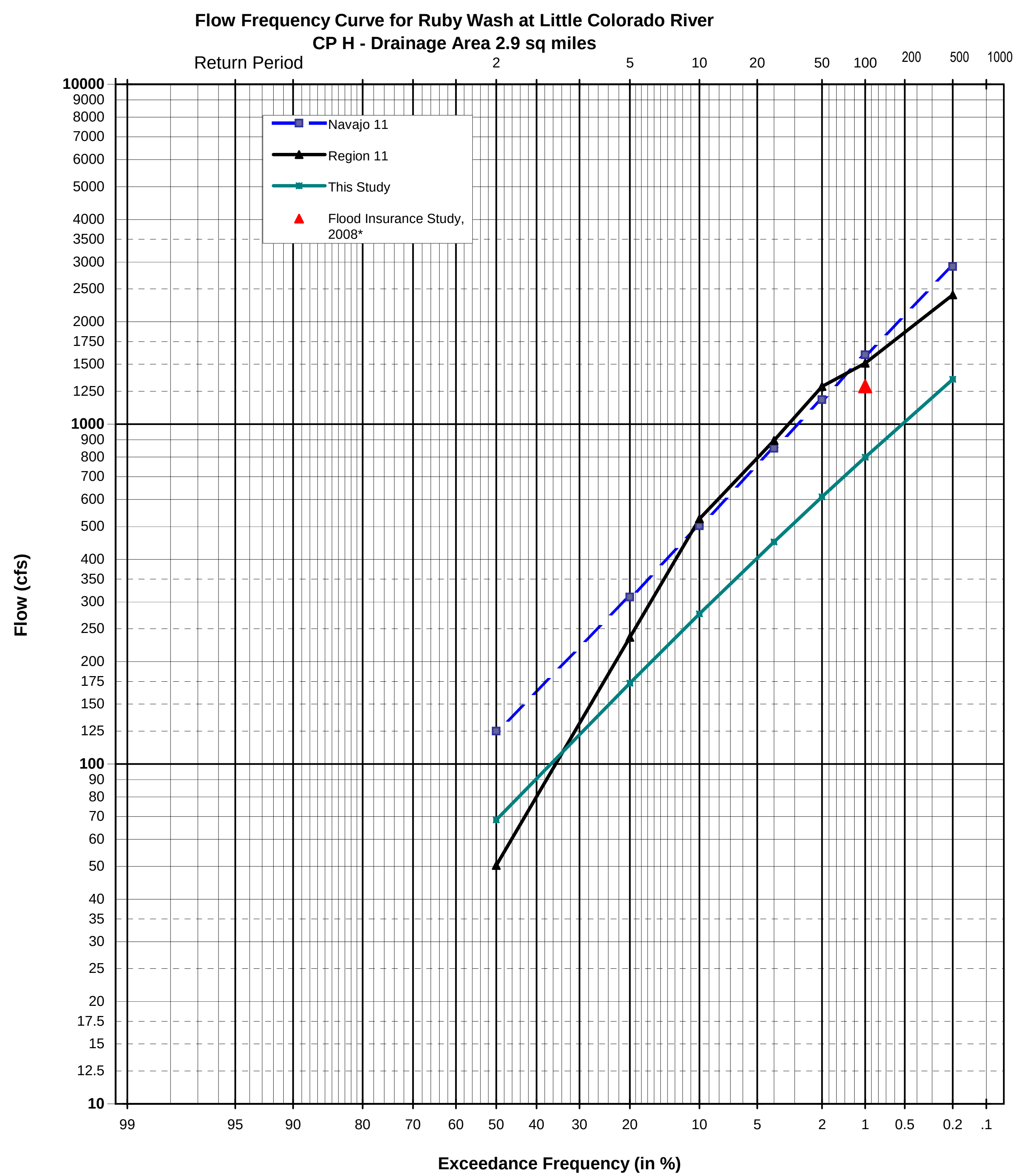
*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6e CONCENTRATION POINT E FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6f CONCENTRATION POINT F FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



*Data taken from U.S. Army Corps of Engineers, 1969	LITTLE COLORADO RIVER FEASIBILITY STUDY FIGURE 6g CONCENTRATION POINT G FLOW FREQUENCY CURVE FOR RUBY WASH US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



*Data taken from Federal Emergency Management Agency, 2008	LITTLE COLORADO RIVER FEASIBILITY STUDY
	FIGURE 6h CONCENTRATION POINT H FLOW FREQUENCY CURVE FOR RUBY WASH
	US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

Appendix A

Selected pages from USACE 1969 General Design Memorandum

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DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

IN REPLY REFER TO SPLED-DD

3 March 1969

SUBJECT: Winslow Flood Control Project, Winslow, Arizona and Vicinity - Design Memorandum No. 1 (General Design)

Division Engineer
South Pacific Division

1. Inclosed for approval in final form are 17 copies of subject report. This design memorandum is submitted in accordance with ER 1110-2-1150.

2. Work on contract plans and specifications for the Ruby Wash diversion levee has been initiated and is about 60 percent complete.

3. Expedited processing in your office and by Office, Chief of Engineers, is requested, inasmuch as initiation of construction during FY-69 is programed.

4. Inclosure 2 is in reply to SPD comments concerning draft of this report.

Norman E. Pehrson
NORMAN E. PEHRSON
Colonel, CE
District Engineer

2 Incl
1. Report (17 cys)
2. Comments

15. Local cooperation required by this report-- Local cooperation would fulfill the requirements stated in the paragraph titled "Local cooperation specified in the project document." Additionally thereto local interests would "At least annually notify interests affected that the Ice House Wash Channel improvements will not provide for complete flood protection.

16. Public hearings and views of local interests-- No public hearings have been held by the District Engineer since publication of the review report. Navajo County, which is the local agency responsible for fulfillment of local cooperation has concurred in the features of the general plan of improvement recommended in this memorandum by correspondence and conferences during the definite-project studies.

Principal officer responsible-- The name, title and address of the principal officer responsible for local cooperation follows:

Name	Title	Address
Max E. Taylor	Chairman, Navajo County Board of Supervisors	Holbrook, Arizona

LOCAL COOPERATION PROFFERED

17. Local interests compliance with requirements of local cooperation-- Compliance with the requirements of local cooperation prescribed by the authorizing legislation is expected from the Navajo County Board of Supervisors because that agency (a) Passed a resolution assuring the United States that this cooperation will be provided and (b) assumed the responsibility of representing local interests.

LOCATION OF PROJECT AND DESCRIPTION OF DRAINAGE AREA

18. Project works--The project is located approximately 200 miles northeast of Phoenix, Arizona and consists of two features: (a) The proposed diversion levee would be located about one mile south of the city of Winslow and would extend eastward to the Little Colorado River, (b) The proposed improvement of Ice House Wash would extend northward through the city to a point of discharge north of Winslow.

19. Drainage area-- That part of the Little Colorado River basin that would be drained by the proposed improvements comprises a drainage area of 26 square miles in Coconino and Navajo Counties in the vicinity of Winslow. The total drainage area at the railroad track is divided into an area of 2.2 square miles tributary to the existing Ice House Wash Channel, 12.8 square miles tributary to Ruby Wash, and an area of 10.7 square miles tributary to four unnamed washes. Ice House Wash and Ruby Wash pass through the present developed area of Winslow. Ruby Wash has its origin in the plateau area about 5 miles southwest of Winslow.

Ice House Wash, adjacent to and westerly of Ruby Wash originates 8 miles southwest of Winslow. An existing levee protecting the city airport diverts the flow from Ice House Wash to Ruby Wash. Only a small part of the original Ice House Wash drainage area now contributes to the flood problem along the wash downstream from the Santa Fe Railroad. Both Ruby Wash and Ice House Wash flow generally northward through Winslow and join the Little Colorado River about 7 miles north of Winslow. The four unnamed washes to the east of Ruby Wash which flow generally northward and join the Ruby Wash flow downstream of the railroad adding to the flood damage in the area. Surface flow in all these washes is intermittent.

20. Topography-- The Winslow region (El. 4850) is in the drainage basin of the Little Colorado River. In its upper portion, the Little Colorado is perennial but is intermittent at Winslow. The topography of the Winslow region consists essentially of a plateau which has been dissected by the Little Colorado River and its tributaries. In the vicinity of Winslow, the Little Colorado flows in a shifting channel through a broad valley several hundred feet wide Ruby Wash and Ice House Wash are the principal units in the Winslow region.

PROJECT RECOMMENDED IN THIS MEMORANDUM

21. General--The recommended plan of improvements would consist of two units (a) the Ruby Wash diversion levee and (b) the Ice House Wash Channel improvement.

22. Ruby Wash diversion Levee--The Ruby Wash diversion levee about 5.3 miles long would start from high ground about one mile south of Winslow and extend eastward to the Little Colorado River. The first 1200 feet of the proposed levee would follow the alinement of the existing levee and the suitable material of the existing embankment would be used in construction of the proposed new levee. Though the existing levee appears to be in satisfactory condition, it does not meet the present Corps of Engineers design standards. The proposed levee would include a low-flow channel with an established invert grade and variable widths. The diversion plan would include a training levee generally parallel to the diversion levee and extending upstream from the Little Colorado River a distance of about 2,400 feet to high ground. Its purpose would be to channelize flows over a proposed siphon for two irrigation ditches which cross the proposed plan of improvement.

23. Road relocations--A crossing would be provided for Arizona Highway 87 by relocating it over the top of the levee. Four 10 foot diameter CMPs would be provided for draining minor flows in the low flow channel (up to a maximum of 1650 cfs) under the highway. Greater flows would pass over the roadway. The existing Clear Creek Road which crosses the levee alinement at station 225+38 would be relocated to join Highway 87 at a point south of the levee. The section of this highway north of the levee would be abandoned. The Arizona Highway Department would design and construct both relocations since the Clear Creek Road is now a state highway. The old Clear Creek Road crossing at station 184+00 would be abandoned since it serves the same area as the new Clear Creek Road.

102. Flood frequencies-- At the time of the review report, runoff records for the washes in the vicinity of Winslow were inadequate to develop discharge-frequency relationships. The discharge- frequency curves for the area were therefore based on discharge-frequency curves developed for three streams in the general region (Show Low Creek near Show Low, Clear Creek near Winslow and Chevelon Fork near Winslow) and correlated to flood flows in Ruby and Ice House Washes. Additional flood flow data available since the date of the review report do not change the results of the frequency studies used in the review report.

103. The estimated frequencies of uncontrolled floods of various magnitudes for Ruby and Ice House Washes are given in the following table:

Estimated frequencies of uncontrolled floods of various magnitudes in Winslow, Arizona, and Vicinity

Number of times that flood would be equaled or exceeded in 100 years	Uncontrolled peak discharges: Ruby Wash at Santa Fe railroad bridge	Uncontrolled peak discharges: Ice House Wash at Santa Fe railroad bridge
	Cubic feet per second	Cubic feet per second
0.4	*16,600	*4,600
1.0	11,000	3,100
2.0	8,200	2,200
5.0	5,100	1,400
10.0	2,000	550
50.0	700	**200
95.0	**100	. . . . . .

* Standard project flood.
** Non-damaging.

104. Damage-discharge relationships-- Damages by property types for floods of various magnitudes along the overflow areas were determined for present (1968) and average future conditions of development. In the following tables are given (a) pertinent information on damages that, under present conditions, would occur to various types of property as a result of uncontrolled standard project floods occurring on Ruby and Ice House Washes, and (b) summaries of estimates of damages from future floods of various magnitudes. Damages from Ruby Wash flows would be restricted to Ruby Wash overflow area; Ice House Wash flows, however, would cause damages both along Ice House Wash and within the Ruby Wash overflow area.

TABLE 2

Subarea lags and pertinent elements, Winslow, Ariz. diversion levee, Little Colorado River, Ariz. and N. Mex., at and in the vicinity of Winslow, Arizona.

Subarea designation*	Drainage area	L	L_{ca}	S	$\frac{L.L_{ca}}{S^{\frac{1}{2}}}$	$\bar{n}$	Lag**
	Square miles	Miles	Miles	Feet per mile			Hours
A	3.2	4.4	1.7	48	1.08	0.057	1.3
B	5.3	6.3	3.1	46	2.90	.053	1.8
C	1.8	3.3	1.5	52	.69	.055	1.2
D	1.2	2.7	.91	61	.32	.057	.90
E	3.8	4.3	1.9	65	1.01	.055	1.3
F	4.8	5.6	2.7	51	2.14	.054	1.7
G	2.7	4.4	2.1	46	1.37	.052	1.5

* See pl. 1 for location of subareas.
** See pl. 6 for lag curve and explanation of terms.

TABLE 3

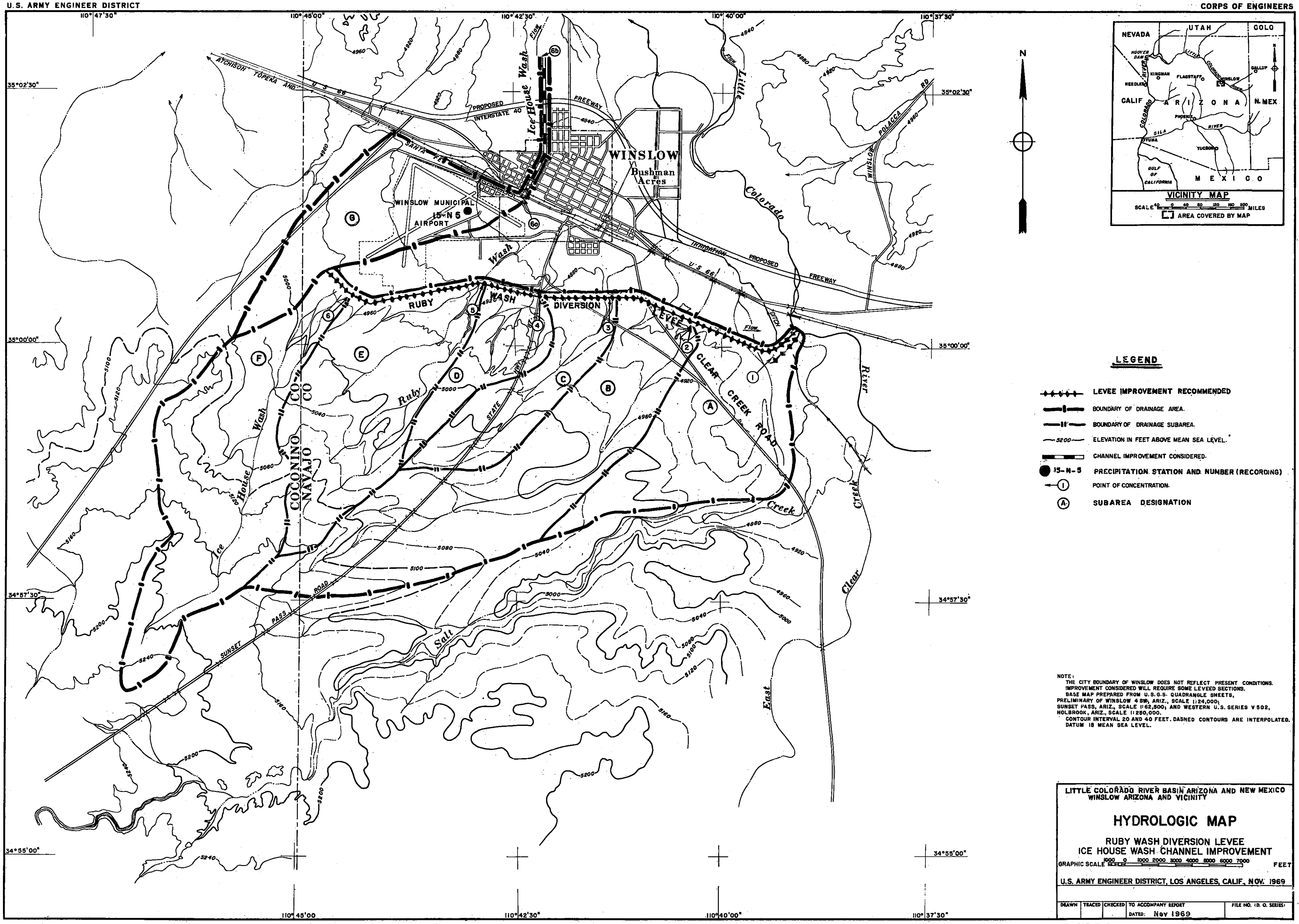
Travel time Winslow, Ariz., diversion levee, Little Colorado River, Arizona and N. Mex., at and in the vicinity of Winslow, Ariz.

Flood discharge travel: From concentration point number*	Flood discharge travel: To concentration point number*	Travel time
		Minutes
6	5	13
5	4	9
4	3	10
3	2	12
2	1	16

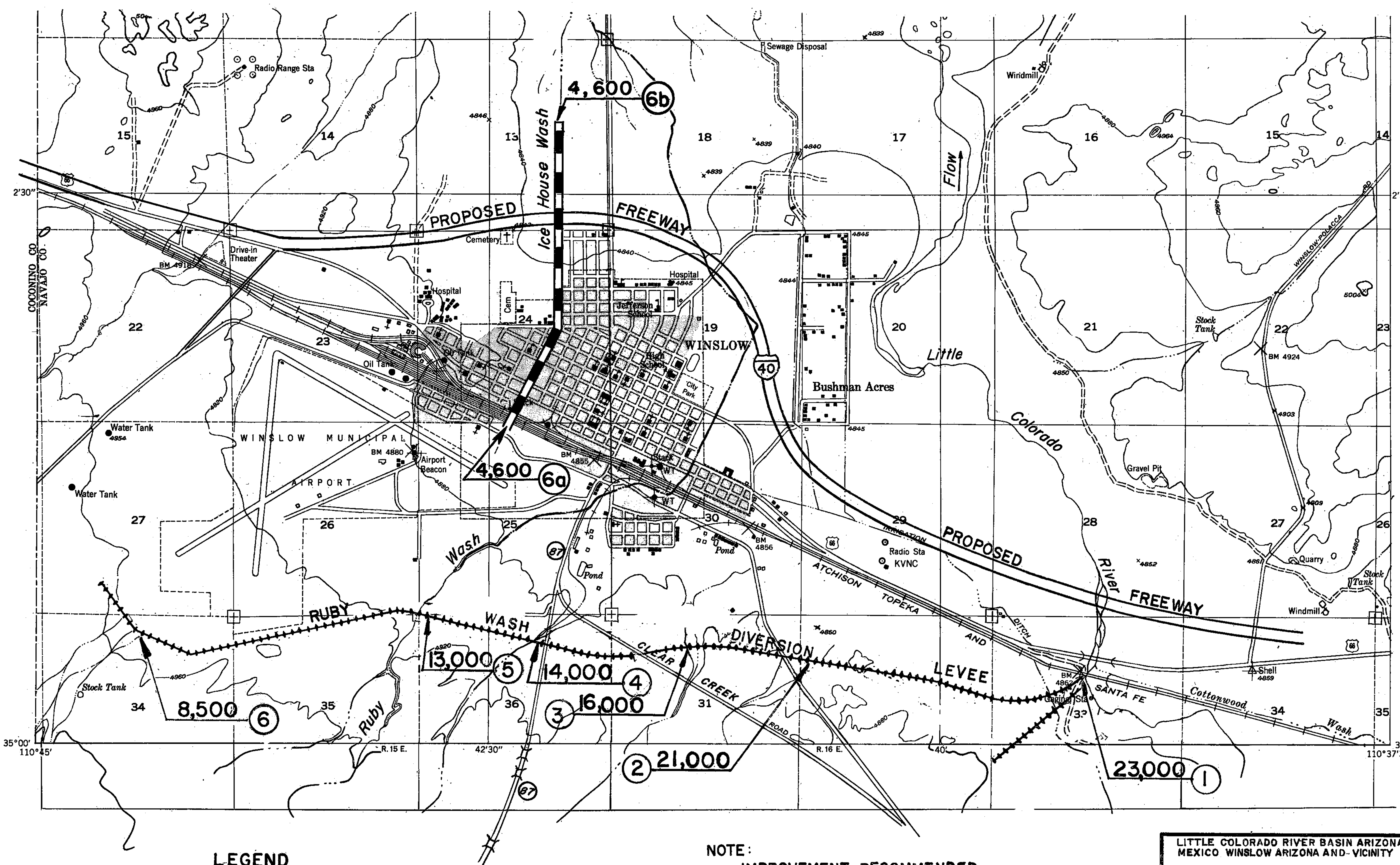
* See pl. 1 for location of concentration points.

U.S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS



APPENDIX 2 PLATE 1



LEGEND

LEVEE IMPROVEMENT RECOMMENDED.
CHANNEL IMPROVEMENT RECOMMENDED

② 21,000 — CONCENTRATION POINT AND STANDARD PROJECT FLOOD PEAK DISCHARGE IN CUBIC FEET PER SECOND

NOTE:
IMPROVEMENT RECOMMENDED REQUIRE SOME LEVEED SECTIONS.

1 3/4 1/2 1/4 0 1

SCALE IN MILES

LITTLE COLORADO RIVER BASIN ARIZONA AND NEW MEXICO WINSLOW ARIZONA AND VICINITY

STANDARD PROJECT FLOOD PEAK DISCHARGES
RUBY WASH DIVERSION LEVEE
ICE HOUSE WASH CHANNEL IMPROVEMENT

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
DATED: NOV. 1969

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Little Colorado River at Winslow Feasibility Study
Climate Change Evaluation

August 2015

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List of Figures

Definitions of Acronyms

AOGCM --- Atmosphere Ocean General Circulation Model
AMO --- Atlantic Multidecadal Oscillation
CMIP3 --- Coupled Model Intercomparison Project 3
CMIP5 --- Coupled Model Intercomparison Project 5
DQC --- District Quality Control
ECB --- Engineering Construction Bulletin
˚F --- Fahrenheit
GCM --- Global Circulation Models
IPCC --- Intergovernmental Panel on Climate Change
LCR --- Little Colorado River
NOAA --- National Oceanic and Atmospheric Administration
NCAR --- National Center for Atmospheric Research Atlantic
PDO --- Pacific Decadal Oscillation
RCP --- Relative Concentration Pathways SRES --- Special Report on Emissions Scenarios
SSTs --- Pacific sea surface temperatures
TSP --- Tentatively Selected Plan
U.S. --- United States
USGS --- United States Geological Survey
USACE --- United States Army Corps of Engineers
USGCRP --- U.S. Global Change Research Program

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1.1 Introduction

The Little Colorado River at Winslow Feasibility Study area encompasses the floodplain of the Little Colorado River (LCR) from the Clear Creek confluence downstream (northwest) to the northern end of the existing Winslow Levee. The purpose of this Feasibility Study is to develop and evaluate potential non-structural and engineered solutions to reduce damages caused by flooding in the City of Winslow and the surrounding community. A related purpose is to reduce the risks to life, safety, and health caused by this flooding.

The Little Colorado River watershed has major tributaries, including Chevelon Creek, Ruby Wash, Clear Creek, Cottonwood Wash, Salt Creek, and Jacks Canyon (Figure 1 of the Hydrology Appendix). The LCR originates in the White Mountains, south of Springerville, Arizona. It flows in a north/northwesterly direction in a well-defined canyon until reaching the City of Holbrook, Arizona (Arizona Department of Water Resources, 1980). From there, it continues westerly and flows another 30 miles on a broad, open floodplain before it reaches the City of Winslow, Arizona. From there, the LCR continues northwesterly towards Grand Falls, Arizona, where the river creates a waterfall of around 190 ft in height. The total drainage area of the LCR varies from 11,462 square miles at Holbrook, to 16,192 square miles at Winslow, to 21,068 square miles at Grand Falls, Arizona.

USACE recognizes that there is a need to begin incorporating climate change science into The LCR at Winslow Feasibility Hydrological Study.

Climate change is a global-scale concern, but can be particularly important in the southwestern United States where potential impacts on water resources can be significant to the peak flow rates used to design flood risk management structures.

1.2 USACE Climate Change Guidance

Future global climate change has the potential to change regional precipitation trends which would have a potential corresponding effect on flood control hydrology and basis for flood control improvements. The US Army Corps of Engineers has published ECB 2014-10 *Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects*. The guidance document's recommended procedure is a qualitative approach to evaluate the general direction of climate change relevant to elements of the hydrology study. The approach will not produce binding numerical outputs; however the information should be used to help identify opportunities to reduce potential vulnerabilities and increase resilience as part of the project's authorized operations. In some cases, it may be possible to calculate an order of magnitude range of the relevant climate threats and impacts that can be considered in the context of project goals or design vulnerabilities and impacts. This, in turn, can be used to describe future without project conditions or inform decisions during the alternative formulation and selection phase, when one project alternative can be judged to reduce vulnerabilities or enhance resilience more than the others. The qualitative analysis is the only approach currently required for hydrologic studies for inland watersheds. The analysis is required for studies that did not complete the TSP Milestone at the time the ECB was issued. Since a TSP was not selected by the issue date of the ECB 2014-10, 2 May 2014, climate change will need to be addressed for the TSP.

Under the *USACE Climate Change Adaptation Policy Statement,* signed by Assistant Secretary of the Army Ms. Jo-Ellen Darcy on 3 June 2011, USACE is required to mainstream climate change adaptation in all activities as a means of enhancing the resilience of USACE's built and natural water-resource infrastructure and reducing its potential vulnerabilities to the effects of climate change and variability. USACE is charged with adaptation planning using the best available and actionable science to consider the impacts of climate change when planning for the future.

ECB 2014-10 outlines a two-step process for qualitative evaluation of climate change impacts to projects, studies and designs. The first step, Phase I, involves an initial screening-level qualitative analysis to assess whether climate change is relevant to the project goals or design. The second step, Phase II, provides a qualitative assessment of the hydrologic impacts of climate change in the project area. The qualitative approach includes evaluating the general effect of climate change on the important hydrologic variables and the underlying physical processes such as changes in processes governing rainfall runoff or snowmelt.

1.3 Phase I Assessment: Relevance of Climate Change

The purpose of the current Little Colorado River at Winslow Feasibility Study is to formulate and evaluate cost effective, environmentally-sensitive, and technically feasible flood risk management (FRM) alternatives to address flood related damages and life-safety risk to the City of Winslow and vicinity. If climate change were to increase the magnitude or frequency of flood flows, this would impact the project goals and design. Regional climate change is anticipated to significantly increase the temperatures throughout the watershed year round, which could affect the watershed's response to runoff due to the changed antecedent conditions and possible decrease in vegetation which could lead to additional sediment loading in the rivers. The elevation above mean sea level at Winslow Arizona is 4,800 feet; therefore, this project will not be affected by sea level rise. Any future conditions which increase the magnitude or frequency of flood flows would impact the project. An increase in average temperatures could affect the amount of vegetation available to intercept raindrops and help hold the soil together with their root systems which could lead to increased erosion and sediment yield to the rivers. In addition, an increase in average temperatures could increase evapotranspiration from vegetation requiring the plants to pull more moisture from the soil and it could also draw down the ground water to lower than historic levels and dry out the soils even more thus increasing the amount of potential runoff that could infiltrate into the ground reducing the amount of runoff. Therefore climate change is a consideration for this project.

1.4 Phase II Assessment: Qualitative Assessment of Climate Change Impacts

Because climate change has the potential to impact the project goals and designs, a qualitative assessment of these impacts was undertaken, supplemented by an assessment of current trends in precipitation and temperature across the region and annual peak stream flow data.

1.4.1 Methods

Most of the information included in this climate change evaluation was obtained through a literature review. In addition, observed temperature and precipitation trends for Eastern Central Arizona were investigated to better understand current rates of climate change in the study area. Monthly temperature and precipitation values were obtained from the NOAA and Western Regional Climate Center at Desert Research Institute. The period of record for the temperature data was from 1920 to 2014, the average annual precipitation data was from 1893 to 2014. The Eastern Central Arizona dataset was chosen because there was no specific data for Winslow Arizona and a majority of the Little Colorado River watershed above Winslow Arizona is in Eastern Central Arizona. In addition, annual peak stream flow data was investigated to determine if there were any specific trends in the annual peak flow data. Annual peak stream flow data were obtained from the USGS website under National Water Information System for gages: 09397000, 09397300, 09401000, 09397500, 09398000, 09398500 and 09399000.

1.4.2 Background

The Little Colorado River originates in the White Mountains, south of Springerville, Arizona. The following are summarized overall basin characteristics (Delph Engineering, 2009). The Little Colorado River watershed is a portion of the Colorado Plateau which is characterized by various rock formations and broad valleys with extensive flat, mesa-like highlands. The vegetation cover ranges from barren desert to mountain forest, including juniper, sagebrush, and grass. The elevation above mean sea level ranges from 11,500 feet in the upper watershed, to 4,800 feet at Winslow, to 4,650 feet at Grand Falls. The LCR basin is generally cool in the winter and warm in the summer. Temperatures extremes range from summertime highs of 110˚ F in the lower part of the basin to wintertime lows of -35˚ F in the upper part of the basin. Two rainy seasons are observed. One extends from July to November and the other extends from December to April. Typically, late spring and June are dry throughout the basin. Mean annual precipitation ranges from 7 inches near Winslow to around 40 inches in the upper portion of the basin. Average stream flows in the LCR and its tributaries are minimal, and periods of no flow have been observed.

1.4.3 Current Winslow Climate

Winslow can be classified as arid, with average annual precipitation totaling 7 inches. Daily high temperatures in January average 46˚ F with minimum overnight temperatures averaging 26˚ F.

By contrast, daytime highs in July typically average 89˚ F, with minimum overnight temperatures averaging 69˚ F. According to the data collected from Winslow MUNICIPAL AP Station, Arizona (029439), from January 1893 to January 2015, the average total annual precipitation is 7.63 inches. The average rainfall between July and November is 0.77 inches. The average rainfall between December and April is 0.48 inches. The lowest monthly average is 0.27 inches in June and 0.30 inches in May (Western Regional Climate Center).

Mountain climates like that in the upper watershed of the Little Colorado River are complex and vary over short distances due to aspect and relief, which influence temperature and precipitation via cold air drainage, down and up-canyon winds, variation in the duration of direct vs. indirect insolation, vegetation cover, duration of snow cover, and other factors (Barry, 2008; Beniston, 2006). Changes at individual stations may differ from regional climate trends (Pepin et al., 2005) in ways that are strongly influenced by landscape position, topography and elevation (Lundquist and Cayan, 2007). Valley floors may lag regional warming, particularly in winter months, due to the increasing frequency and severity of temperature inversions under more stable, anticyclonic conditions (Daly et al., 2010), as are anticipated to become more common in the southwestern United States (Seth et al., 2011).

1.4.4 Temperatures: Current Trends and Modeled Future Values

1.4.4.1 Literature Review

Global warming is not uniform within all the continental U.S. Arizona is one of the top 10 states that have warmed more and faster than other states. Between 1921 and 2011, meteorologists and climatologists have found that the five fastest warming states, including Arizona, warmed 0.273˚ F per decade which is twice the U.S. average rate of 0.127˚ F per decade for this approximate 100-year period. The global warming has not been stopped and has even accelerated since 1970. The study shows the temperature, in Arizona, has increased over 0.639˚ F per decade between 1970 and 2011 (Tebaldi et al., 2012).

1.4.4.2 Observed Temperature Trends for the Period 1920-2014

Temperatures within the LCR watershed above Winslow, Arizona range from summer highs near Winslow of 110˚ F to winter lows in the White Mountains of -35˚ F. NOAA has a database of temperature records for Eastern Central Arizona that was analyzed for this climate change evaluation. Average monthly temperatures between 1920 and 2014 were plotted to see if any trends in the temperature could be seen. These plots can be seen in Figures 1 through 12. Linear trend lines were fit to the data between the periods of 1920 and 2014 and 1970 and 2014. For all months, January through December, both of the trend lines suggest that temperatures are increasing and that they are increasing at a faster rate since 1970. In addition, the average monthly temperatures, for the 1920-2014 dataset can be seen on Figure 13 to show how much the temperature flocculates throughout the year. The average monthly temperature in ˚F and the average decade increase in temperature from 1920-2014 and 1970-2014 can be seen in Table 1.

The average increase in temperature per decade between 1920 and 2014 is 0.249˚ F and the average increase in temperature per decade between 1970 and 2014 is 0.663˚ F.

1.4.4.3 Comparison of Temperature Trends between Literature and Observations

The observed temperatures in Eastern Central Arizona are steadily increasing since 1920. Also, the rate of that temperature increase is increasing in recent years. The rate of temperature rise per decade is 0.249˚ F between 1920 and 2014, and 0.663˚ F per decade between 1970 and 2014. (See Table 1 and Figures 1 through 12.) This correlates well with Tebaldi's (et al., 2012) observations where the rate of temperature rise is 0.273˚ F per decade between 1921 and 2011, and 0.639˚ F per decade between 1970 and 2011.

1.4.4.4 Model Projections of Temperature under a Changing Climate

Climate model projections of temperature and precipitation consist of three components:

- Coarse-resolution global models of atmospheric and ocean circulation (atmosphere-ocean general circulation models or AOGCMs).
- Estimates of future concentrations of greenhouse gases in the atmosphere, typically provided by IPCC Special Report on Emissions Scenarios (SRES) models of different combinations of economic, demographic, and technological development, as well as estimates of future globalization, primarily consisting of the A2 (high emissions), A1B (moderate emissions) and B1 (low emissions) scenarios (IPCC 2000). These scenarios were used in the CMIP3 models. Studies since 2013 increasingly use CMIP5 models, which are identified by their RCPs, which range from a low-emissions scenario known as RCP 2.6 to a high emissions scenario known as RCP 8.5. The current greenhouse gas emissions trends are exceed the emissions trends used for either the A2 or the RCP 8.5 scenarios. If emissions trends continue at this rate temperature and precipitation changes may mirror the projections of the models where these scenarios were used as inputs, and models based on the A1B and B1 scenarios, or models using RCPs less than 8.5, may underestimate the rate of future climate change.
- Statistical or dynamical downscaling of the AOGCM model outputs are used to rescale climate projections to the finer-grained regional scale. These are the kinds of outputs cited in the sections below describing climate model projections for the study area. In addition, these are the information used as inputs to models that investigate the hydrologic impacts of climate change in the region.

General Projections of Southwestern Temperatures

Model projections indicate that surface temperatures in the Southwest will warm substantially over the 21st Century (highly likely), and warming is likely to be higher in summer and fall than in winter and spring (Cayan et al., 2013). For the Southwest as a whole, compared to the period 1971-2000, models used in the most recent national climate assessment project (Cayan et al., 2013; USGCRP 2014):

- For the 2021-2050 period, warming in models assuming the B1 (low future emissions) scenario will be between 1-3° F while under the higher future emissions model scenario (known as A2) warming is likely to be between 2-4° F.
- For the period 2041-2070, warming in models assuming the B1 scenario is likely to range from 1-4° F and under the A2 scenario from 2-6° F.
- For the period 2070-2099, warming in models assuming the B1 scenario is likely to range from 2-6° F while under the A2 scenario, the projections are 5-9° F.
- Warming is likely to be higher inland and to increase from south to north.

Seasonal differences in warming are likely, although the high variation among models reduces confidence in specific results (Cayan et al., 2013). Increases in summer temperatures are likely to be greater than for other seasons, with mean increases across modeled scenarios around 3.5° F in 2021-2050, 5.5° F in 2041-2070, and 9° F 2070-2099. The least amount of warming is anticipated for the winter months, with an average increase of 2.5° F in 2021-2050 increasing to almost 7° F in 2070-2099.

1.4.4.5 Observed Temperature Trends Compared to Model Projections

If the observed 1970-2014 warming trend of approximately 0.66° F per decade (average of January –December) were to continue across the 21st century, net warming will amount to approximately 6.6° F by 2100. This net warming is very much in agreement with the model projections of net warming noted in the literature review. An increase in average temperatures could eventually affect the amount and type of vegetation able to survive in the warmer climate. If less vegetation is available to intercept and slow down raindrops impact erosion could increase. Vegetation helps to hold top soil together with their root systems and with less vegetation, there could be increased erosion and increased sediment yield to the rivers. In addition, an increase in average temperatures could draw down the ground water level and dry out the soil to lower than historic levels thus increasing the amount of potential runoff that could infiltrate into the ground, potentially reducing the volume of runoff.

1.4.5 Precipitation: Current Trends and Modeled Future Values

1.4.5.1 Literature Review

Warming-driven changes to global atmospheric circulation will affect when, where, and by how much precipitation will change. These changes will be superimposed on already highly-variable precipitation patterns resulting from the interplay of long- and short-term climate cycles. Long-term wet and dry cycles in the Southwest are controlled primarily by SSTs, particularly the multi-decadal PDO. Atlantic Ocean SSTs are also important. The driest phases in the Southwest are associated with cool Pacific SSTs (negative PDO) and warm Atlantic SSTs (positive AMO) (Norwine et al., 2007). Interannual (time scales of 1 to less than 10 years) variation in winter precipitation is controlled by the ENSO cycle, with either El Niño or La Niña amplified depending on the state of the PDO. Because of the high variability in precipitation in the Southwest at multiple scales, detecting changes in precipitation has been more challenging than detecting changes in temperature. Gutzler has also stated there is too little evidence for the initiation of a long-term change in the precipitation record (Gutzler, 2013) compared to the temperature record.

Changes in PDO and AMO correspond to the major dry and wet periods (McCabe et al., 2004). From 1944 through 1963, combination of a negative PDO and positive AMO were major contributors to Southwestern drought. From 1964-1976, negative PDO and negative AMO contributed to average precipitation conditions, and from 1977 through 1994, the combination of positive PDO and negative AMO contributed to wetter-than-average precipitation. Since 2000, PDO has been primarily negative (Mantua, 2013) and AMO has been strongly positive (NCAR 2012), contributing to the reemergence of drought across the Southwest. The decade 2001-2010 has had the second-largest area affected by drought (after the period 1951-1960) and the most severe average drought conditions of any decade since 1901 (Hoerling et al., 2013).

Despite recent drought years, no trends have been observed in annual water year precipitation from 1895/96 through 2010/11 for the six-state Southwest (NOAA, 2013b) that includes Colorado and New Mexico. Seasonal time series show no trends for winter, spring and summer; fall shows a slight upward, but not statistically-significant, trend. Precipitation on the Southern Great Plains, including Texas, shows no significant trend in any season (NOAA, 2013a).

In addition, there has been no overall trend in the frequency of extreme precipitation events across the Southwest (NOAA, 2011). Throughout the 20th century and into the early 21st century, the number of 1-day-duration and 5-year return interval precipitation events fluctuated, but remained within the range of early 20th century values.

1.4.5.2 Observed Precipitation Trends for the Period 1920-2014

Average annual precipitation of the LCR watershed above Winslow, Arizona ranges from 7 inches near Winslow to around 40 inches in the White Mountains. The National Oceanic and Atmospheric Administration (NOAA) has a database of precipitation records for Eastern Central Arizona that was analyzed for this climate change evaluation. The average precipitation for the dataset between 1920 and 2014 is 19.92 inches of precipitation. The annual precipitation between 1920 and 2014 was plotted to see if any trends in the amount of precipitation could be determined. The evaluation of these data can be seen on Figure 14. Between 1920 and 2014, there is a lot of variability in the annual precipitation and no obvious trend. However, fitting a linear trend line to the data shows a general trend of decreasing precipitation between 1920 and 2014. In addition to the scatter plot of the annual precipitation data (Figure 14), a precipitation mass curve was plotted for the data set. (Figure 15) This plot shows a cumulative precipitation over 95 years of data, which is fairly constant. Trend lines were added to the mass curve from 1920-2014 and from 2001-2014. The trend line from 2001-2014 has a slightly flatter slope which correlates with the current drought in the south west.

1.4.5.3 Comparison of Precipitation Trends between Literature and Observations

The lack of an obvious trend in precipitation in the observed 1920-2014 period is consistent with the observations of Gutzler that there is too little evidence for the initiation of a long-term change in the precipitation record (Gutzler, 2013), and consistent with other studies on long-term precipitation trends in the Southwest. However “unusually dry” best describes Southwest moisture conditions during 2001 – 2010 (Hoerling, 2013). This correlates with the flatter slopped mass curve between 2001 and 2014. The analysis of the data set is somewhat consistent with Hoerling’s observations since the average annual precipitation between 2001 and 2014 is 17.35 inches as compared to the average from 1920 to 2014 of 19.92 inches.

1.4.5.4 Model Projections of Precipitation under a Changing Climate

Southwest Precipitation Projections

In general, warming is anticipated to intensify existing precipitation patterns: wet areas, such as the northeastern U.S., may get wetter and dry areas, such as northern Mexico and southern Arizona, are likely to get drier (USGCRP, 2009). Most climate models project that the Southwest will become drier. Modelers are highly confident of this result (USGCRP, 2009). “Highly confident” means that most models agree that drying will occur, even though there is disagreement about the amount of change in precipitation.

Drying will be driven by increased evaporation due to warmer temperatures, and by changes in precipitation due to changes in global scale atmospheric circulation, such as poleward expansion of the subtropical dry zone (Lu et al., 2007).

Researchers at USGCRP project a 10 to 30% decline in precipitation by 2080-2090 primarily in the winter and spring, which projected on B1 and A2 scenarios resulting from the northward (poleward) shift of midlatitude winter storm tracks bringing the Southwest into the subtropics year-round (Melillo et al., 2014). Land and ocean warming may bring more moisture into the Southwest during the summer months, providing stronger monsoons, but this is only projected by some models. Modeling by (Dominguez et al. 2010) suggests that the distribution of drying may be uneven across the Southwest: the southern part of the Southwest may become drier, and the northern part slightly wetter, but the modeled trends were not significant. Across the fifteen CMIP3 Model projections show that precipitation will continue to be characterized by wet and dry cycles including both increases and decreases in precipitation (Cayan et al., 2013). Overall, model simulations used in the most recent National Climate Assessment show changes in precipitation that range from -13% to +10% across all model runs (Cayan et al., 2013). Confidence in model projections is medium-low, reflecting the variation in the magnitude and direction of projected changes.

1.4.6 Peak Annual Stream Flow Analysis

There are 7 stream gages that were used in the Peak-Flow-Frequency Analysis as part of the LCR at Winslow Feasibility Study Baseline and Future Without-Project-Conditions Hydrology.

The LCR at Holbrook, USGS gage no. 09397000, has 31 years of record for the years of 1905, 1923, 1950-1972, and 2004-2008. The LCR near Joseph City, USGS gage no. 09397300, has 36 continuous years of record between 1970 and 2008. The LCR at Grand Falls, USGS gage no. 09401000, has 43 years of record for the years of 1923-1959, 1970, 1971, and 1990-1994. The Chevelon Creek below Wildcat Canyon, near Winslow, USGS gage no. 9397500, has 48 years of record for the years of 1948-1970, 1978, and 1982-2007. The Chevelon Creek near Winslow, USGS gage no. 09398000, has 50 years of record for the years of 1916-1919, 1929-1978, and 2006. The Clear Creek below Willow Creek near Winslow, USGS gage no. 09398500, has 45 continuous years of record between 1948 and 1993. The Clear Creek near Winslow, USGS gage no. 09399000, has 54 years of record for the years of 1929-1982 and 2005-2006. Although all of these gages do not have continuous years of record or complete data sets for each decade, a qualitative analysis was done on a decade by decade basis for each gage. Decades with less than four years of recorded peak flow data were excluded from the analysis. The average of the annual peak flow rates and the highest annual peak flow rate measured within specific decades were plotted for each gage to see if there were any trends in the data. The results of these analyses can be seen in Table 2 and on Figures 16 and 17. Qualitative trends in the decades are indicated in Table 2. High average peak flows occurred in the 1920s and in the 1970s. Moderately low average peak flows occurred in the 1940s and the 1980s. Extremely low average peak flows occurred in the 2000s and the 2010s.

The LCR at Holbrook gage saw a steady increase in average annual peak flows from the 1950s through the 1970s however the flows in the 2000s were considerably lower than those in the 1950s through the 1970s. The high annual peak flow rates for the LCR at Holbrook gage fluctuated with the lowest high decade peak in the 1940s and the highest high decade peak in the 1950s.

The LCR near Joseph City gage saw a parabolic decrease in average annual peak flows between the 1970s and the 2000s. The high annual peak flow rates for the LCR near Joseph City flocculate a little but in general decrease between the 1970s and the 2000s.

The LCR at Grand Falls gage saw a drastic decrease in average annual peak flows from the 1920s to the 1930s and then a more gradual decrease between the 1930s and the 1950s with the lowest average annual peak flows in the 1990s. The high annual peak flow rates for the LCR at Grand Falls gage also saw a drastic decrease in high decade peak flow rate between 1920 and 1930. After that time, the high annual peak flow rates fluctuated with the with the lowest high decade peak in the 1990s.

The Chevelon Creek below Wildcat Canyon near Winslow gage saw a steady decrease in average annual peak flows from the 1950s through the 1980s however the average annual peak flows when up in the 1990s and then back down in the 2000s. The high annual peak flow rates for the Chevelon Creek near Winslow gage had a similar distribution to those of the average annual peak flows.

The Chevelon Creek near Winslow gage saw a steady decrease in average annual peak flows from the 1910s through the 1940s however the average annual peak flows when up in the 1950s and then stayed fairly constant through the 1960s. The high annual peak flow rates for the

Chevelon Creek near Winslow gage stayed steady in the 1910s and the 1930s but then went down in the 1940s, up in the 1950s and then back down again in the 1960s.

The Clear Creek below Willow Creek near Winslow gage average annual peak flows fluctuated quite a bit between the 1950s and the 1980s. The high annual peak flow rates for the Clear Creek below Willow Creek near Winslow gage had a similar but more drastic distribution to those of the average annual peak flows.

The Clear Creek near Winslow gage average annual peak flows fluctuated quite a bit between the 1930s and the 1970s with the lowest average annual peak flow in the 1940s and the highest average annual peak flow in the 1970s. The high annual peak flow rates for the Clear Creek near Winslow gage had a similar but more drastic distribution to those of the average annual peak flows with the highs and lows of the high annual peak flow rates being in the same decades as the average annual peak flows.

In addition to analyzing the annual peak flow data on a decade by decade basis, all of the annual peak flow data, for each gage, were plotted and a best fit linear curve was fit to the entire data set to see if there were consistent trends between the stream gages. These plots can be seen on Figures 18 through 24. Five of the best fit linear curves (Figures 18, 19, 20, 21 & 24) had a negative slope indicating a decrease in annual peak flow rates while the other two best fit linear curves (Figures 22 & 23) had a positive slope indicating an increase in annual peak flow rates. However the two best fit linear curves that have a positive slope do not have the recent two drought ridden decade's data that would bring the trend lines down similar in the other gage's best fit linear curves.

1.4.7 Potential Impacts to Flood Risk Management Project

Precipitation extremes are expected to become more frequent and intense even if net precipitation stays the same or decreases (Gershunov et al., 2013). This may occur because the amount of water the atmosphere can hold scales with temperature: a warmer atmosphere is able to hold more water, and, therefore, greater heat and moisture are available to fuel larger storms. By mid-century, models project an increase of 13-14% in the intensity of wintertime extremes with 20- and 50- year return periods under the high emissions scenario (Dominguez et al., 2010).

Precipitation under the North American Monsoon is not well modeled by GCMs, and there is little model consensus on its evolution (Gershunov et al., 2013). A recent study suggests that precipitation in the North American Monsoon region will be reduced by 20% in winter, spring, and summer by the last 20 years of this century under the A2 (high emissions) scenario (Cavazos,2012). Other studies suggest that precipitation during the late summer/early fall monsoon season will remain the same, but much of this rainfall may shift to September and October (Cook and Seager, 2013).

Low confidence also surrounds model projections of extreme precipitation events during the monsoon season (Gershunov et al., 2013). Changes to flood risk during the monsoon cannot be evaluated at this time.

1.5 Conclusion

Climate change is anticipated to impact the study area primarily through temperature increases, which are projected to rise by as much as 3.5°F to as much as 8.5°F by 2100. Temperature increases are likely to drive evaporation increases. Changes in precipitation are less certain, although winter precipitation is likely to decrease. Summer precipitation may increase in intensity, resulting in stronger, wetter storms interspersed with longer dry periods. CMIP3 models predict precipitation decreases of 2% in 2035, 4% by 2055, and about 5% by 2085 in average southwest United States. Historic precipitation and peak flow data do not show a consistent trend through time; however, fitting best-fit curves to the data show that both precipitation and peak flows have been decreasing over the period of record. Because of the low confidence in the future model projections and the lack of a consistent trend in historic data, no quantitative adjustments to the discharge-frequency and/or volume-frequency are recommended.

In addition, The Little Colorado River has an extremely large watershed upstream of Winslow, AZ (16,192 square miles). Due to the large size of the watershed, and attenuation of flows in the river itself, even if there are more intense periods of precipitation during the summer monsoons, which was a possibility indicated by some of the future model projections, they will most likely not cover the entire watershed and be isolated to specific sub basins. This is because of the nature of monsoon storms. Because of this, it is unlikely there will be a significant effect on the peak flows at Winslow due to climate change. Therefore, for the Little Colorado River at Winslow Feasibility Study, no quantitative adjustments to the discharge-frequency and/or volume-frequency are recommended with respect to future climate change.

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Tables

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Table 1: Monthly Temperature for Eastern Central Arizona

Month	Average Temperature 1920-2014	Decade Rate of Increase 1920-2014	Decade Rate of Increase 1970-2014
	(deg F)	(deg F)	(deg F)
January	41.28	0.459	0.865
February	44.50	0.241	0.288
March	48.93	0.395	1.049
April	55.74	0.285	1.006
May	64.35	0.19	0.83
June	73.65	0.27	0.533
July	78.55	0.162	0.249
August	76.28	0.227	0.461
September	71.34	0.166	0.614
October	60.93	0.161	0.714
November	49.29	0.296	0.997
December	41.98	0.139	0.346
Average	58.90	0.249	0.663

Table 2: Decade Peak Flow Highs and Averages

	LCR at Holbrook-09397000		LCR near Joseph City-09397300		LCR at Grand Falls- 09401000		Chevelon Creek Below Wildcat Canyon near Winslow-09397500		Chevelon Creek near Winslow-09398000		Clear Creek Below Willow Creek near Winslow-09398500		Clear Creek near Winslow-09399000		Qualitative Trends
Decades	**High**	**Average**	**High**	**Average**	**High**	**Average**	**High**	**Average**	**High**	**Average**	**High**	**Average**	**High**	**Average**	
	cfs	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	**cfs**	
1900s															
1910s									9,500	4,528					
1920s					120,000	45,848									**High**
1930s					38,000	14,291			9,400	2,545			26,200	5,253	
1940s					20,100	10,603			2,620	1,425			3,300	1,893	Low
1950s	21,800	8,670			26,100	7,876	19,800	5,434	25,300	5,400	16,400	4,532	22,500	5,239	
1960s	24,200	12,854					9,920	4,374	13,300	5,003	13,100	4,376	18,500	5,211	
1970s	20,300	17,050	25,400	13,037							19,700	6,724	36,300	8,686	**High**
1980s			12,600	8,322			6,440	2,700			8,140	2,803			Low
1990s			12,400	6,092	16,600	5,663	24,700	5,277							
2000s	9,590	6,060	9,860	5,497			9,050	1,695							**Low**
2010s	7,890	6,310	6,050	4,918			3,410	1,240							**Low**

Figures

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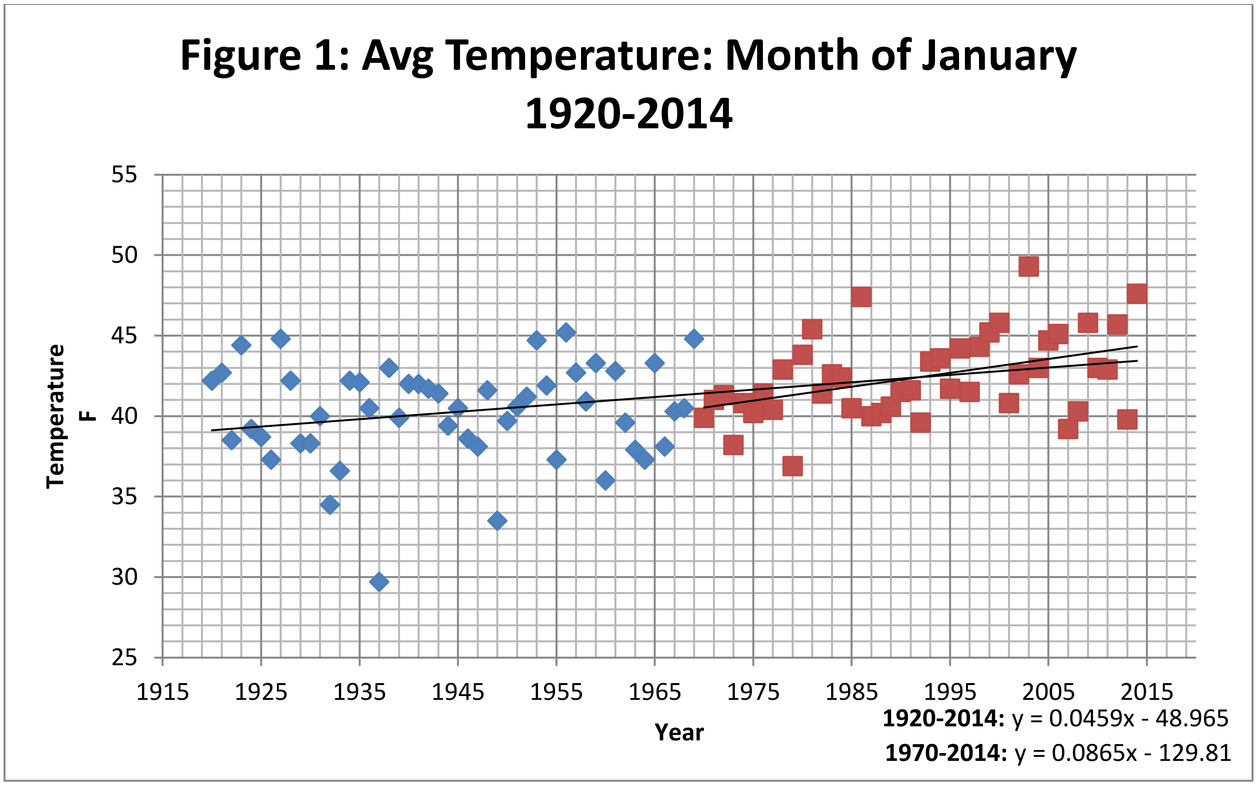


Figure 1: Avg Temperature: Month of January 1920-2014
Temperature F
Year
55
50
45
40
35
30
25
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
1920-2014: y = 0.0459x - 48.965
1970-2014: y = 0.0865x - 129.81

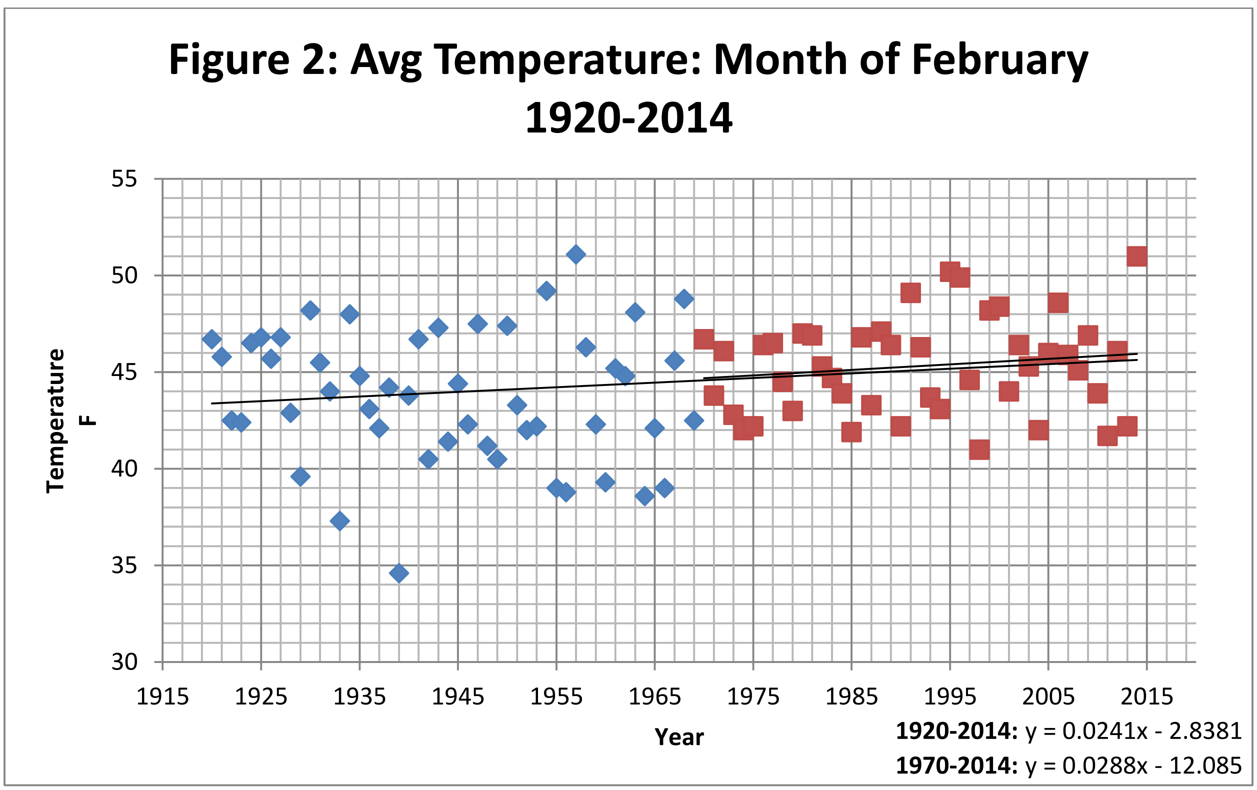


Figure 2: Avg Temperature: Month of February 1920-2014
Temperature F
Year
55
50
45
40
35
30
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
1920-2014: y = 0.0241x - 2.8381
1970-2014: y = 0.0288x - 12.085

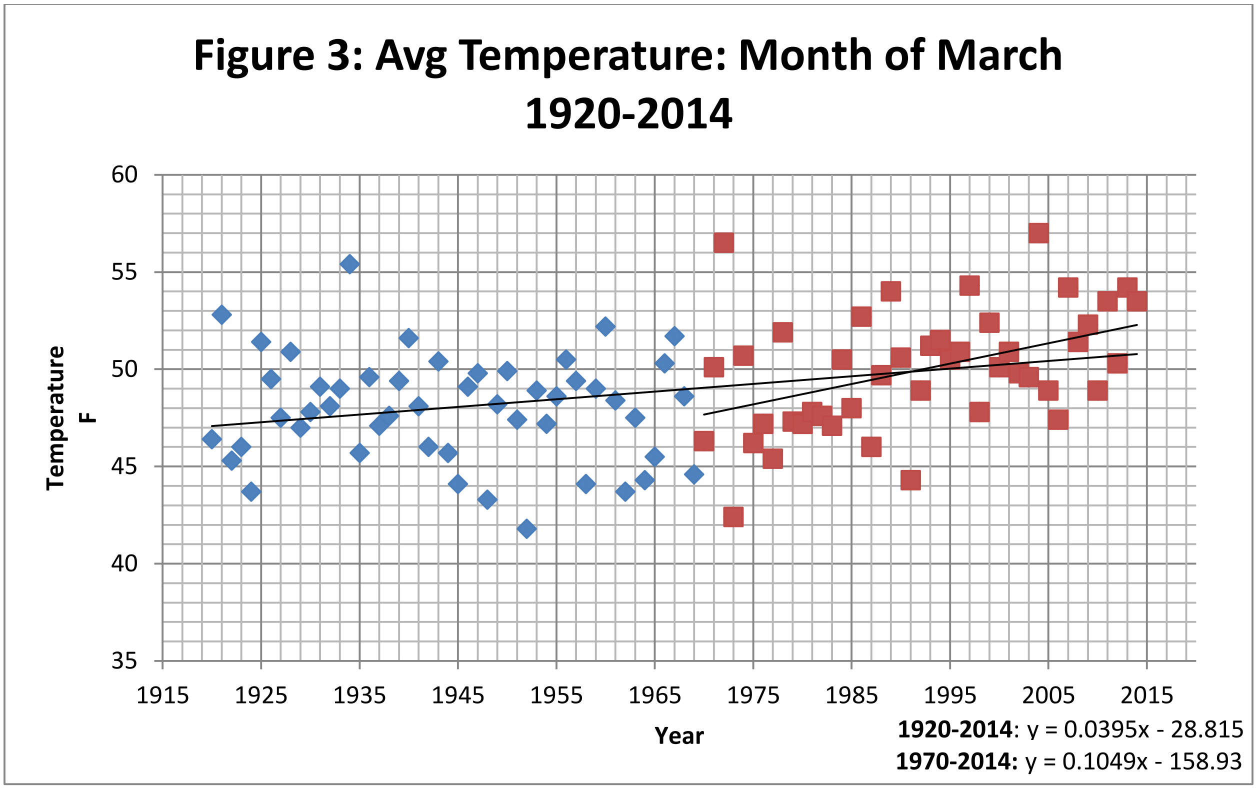


Figure 3: Avg Temperature: Month of March 1920-2014
60
55
50
45
40
35
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0395x - 28.815
1970-2014: y = 0.1049x - 158.93

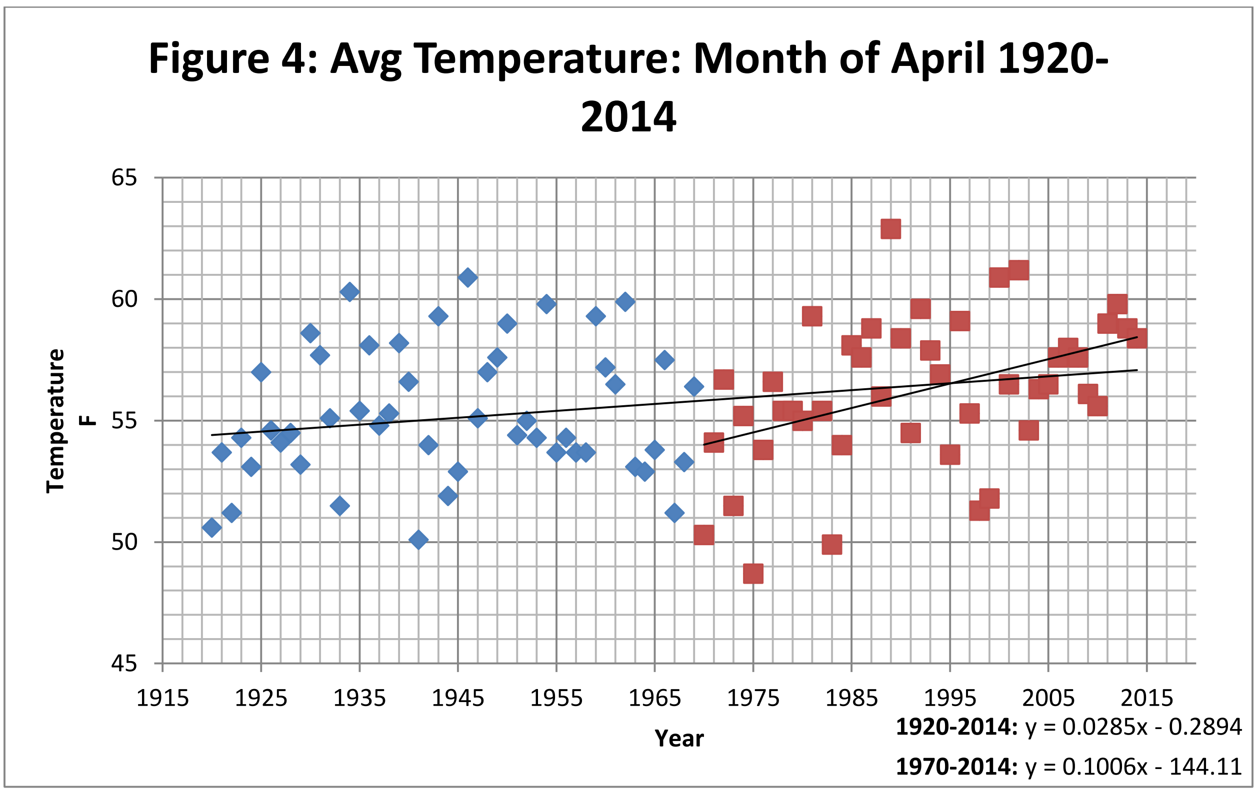


Figure 4: Avg Temperature: Month of April 1920-2014
65
60
55
50
45
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0285x - 0.2894
1970-2014: y = 0.1006x - 144.11

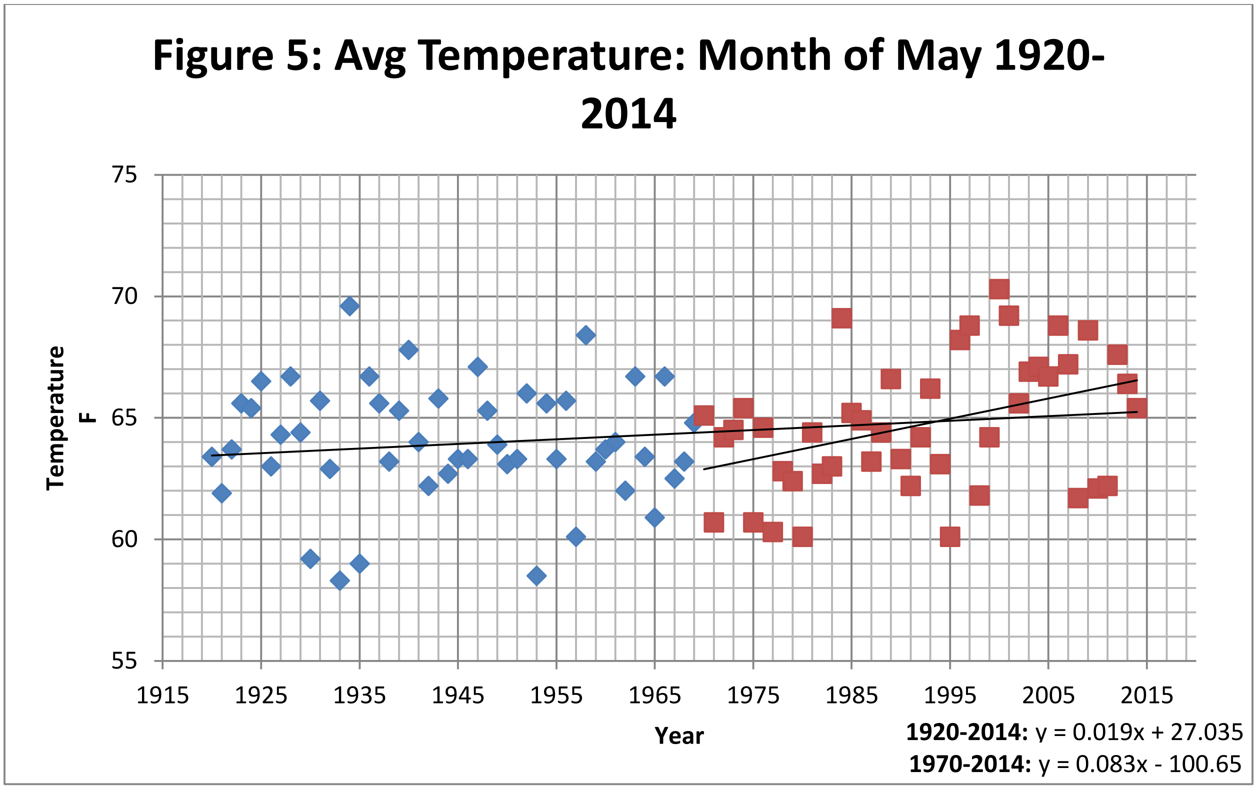


Figure 5: Avg Temperature: Month of May 1920-2014
75
70
65
60
55
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.019x + 27.035
1970-2014: y = 0.083x - 100.65

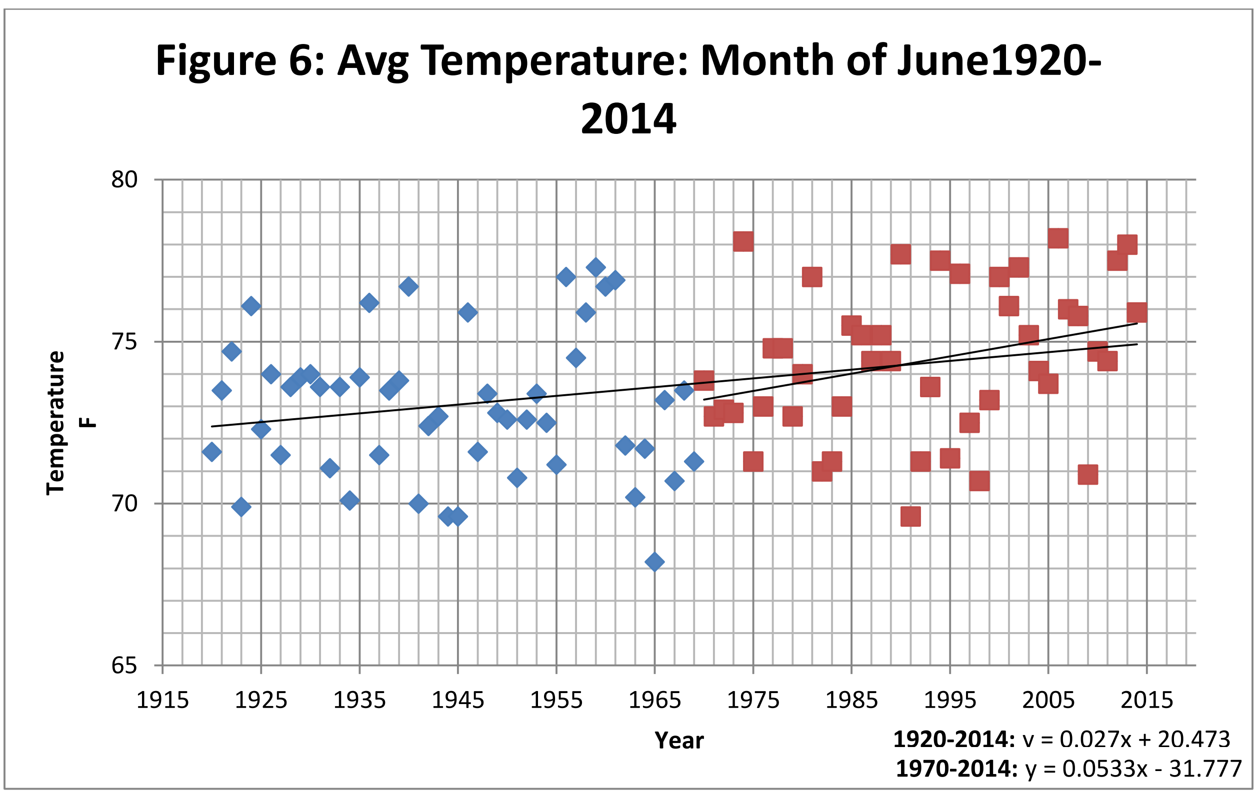


Figure 6: Avg Temperature: Month of June1920-2014
80
75
70
65
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.027x + 20.473
1970-2014: y = 0.0533x - 31.777

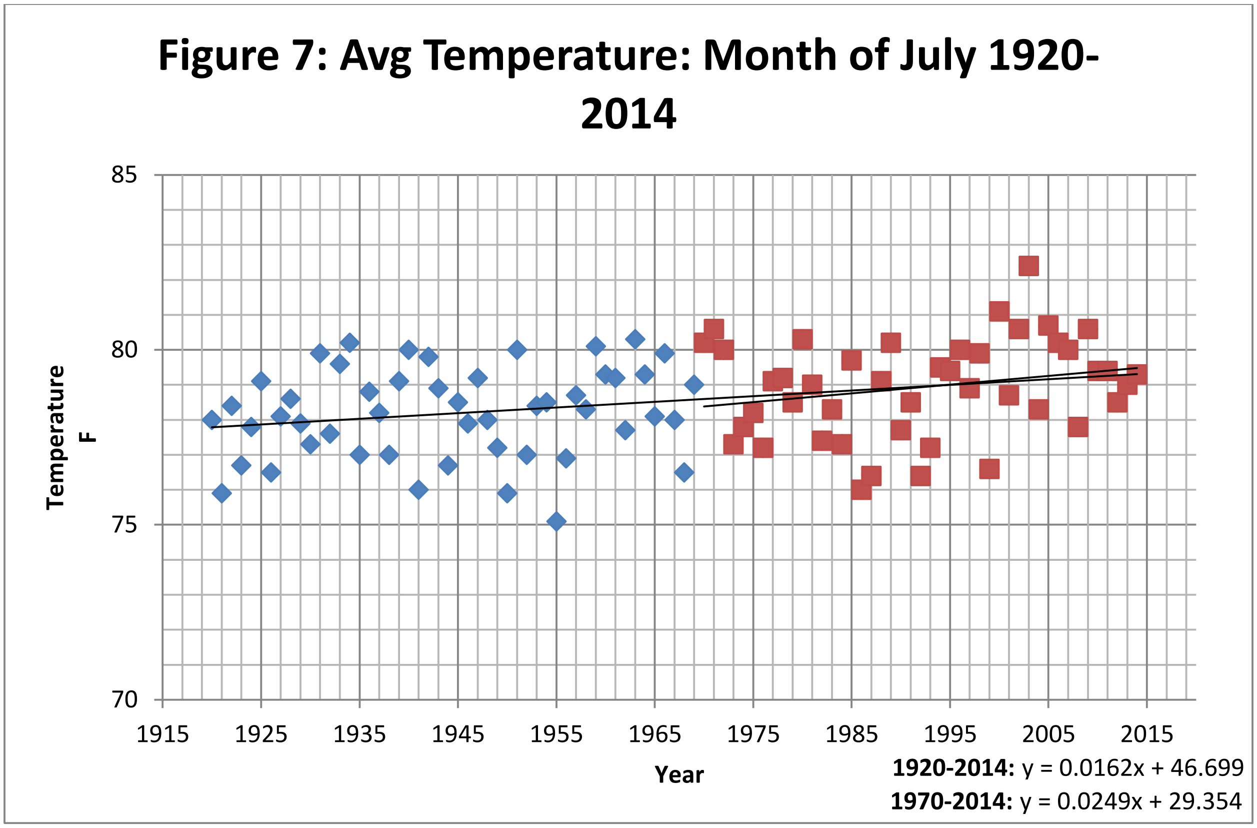


Figure 7: Avg Temperature: Month of July 1920-2014
85
80
75
70
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0162x + 46.699
1970-2014: y = 0.0249x + 29.354

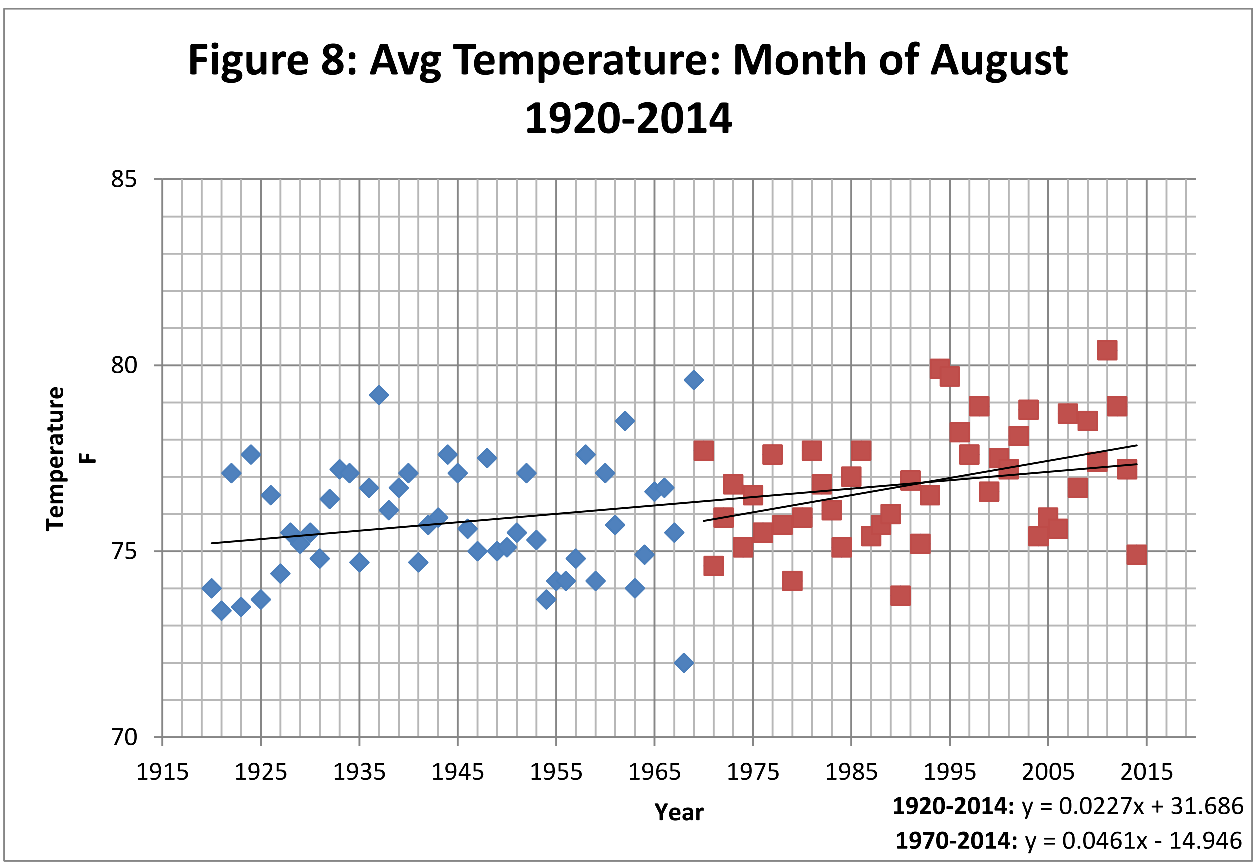


Figure 8: Avg Temperature: Month of August 1920-2014
85
80
75
70
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0227x + 31.686
1970-2014: y = 0.0461x - 14.946

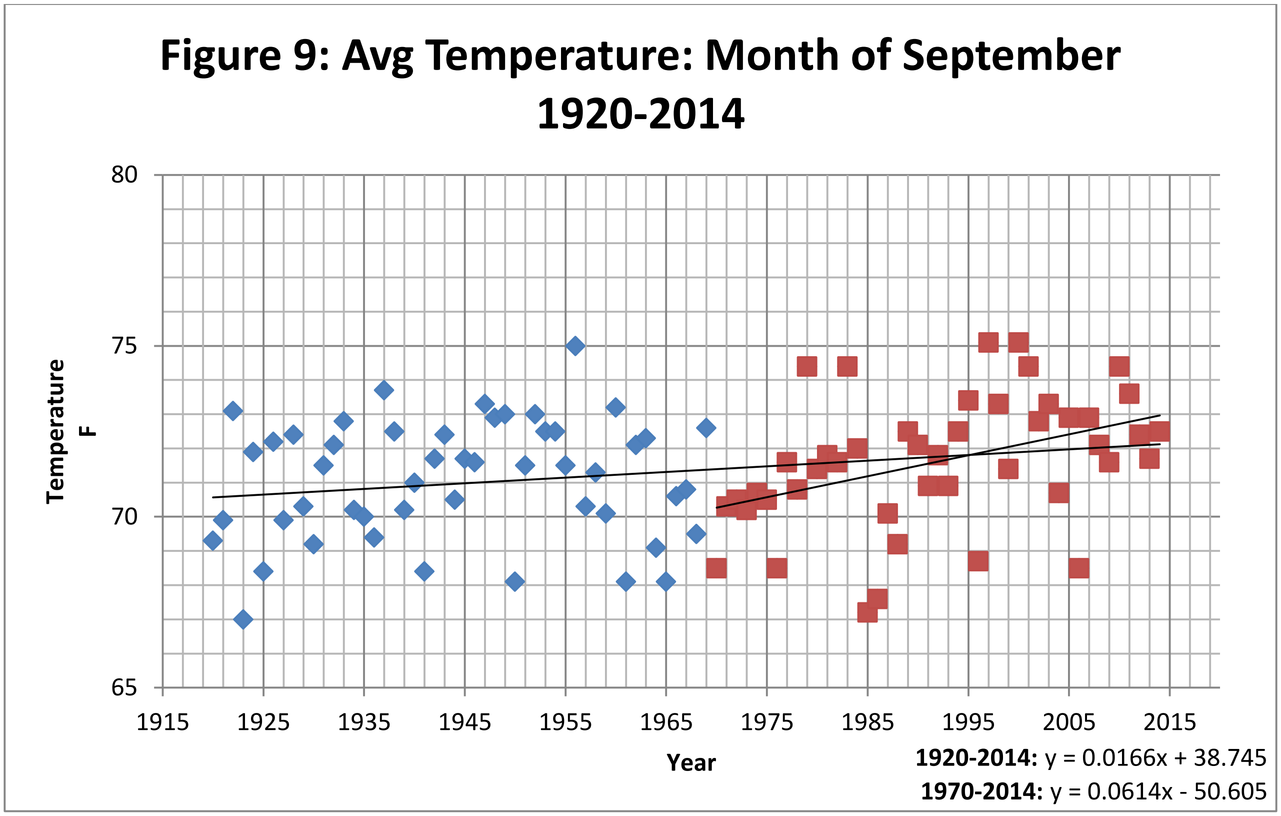


Figure 9: Avg Temperature: Month of September
1920-2014
80
75
70
65
Temperature
F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0166x + 38.745
1970-2014: y = 0.0614x - 50.605

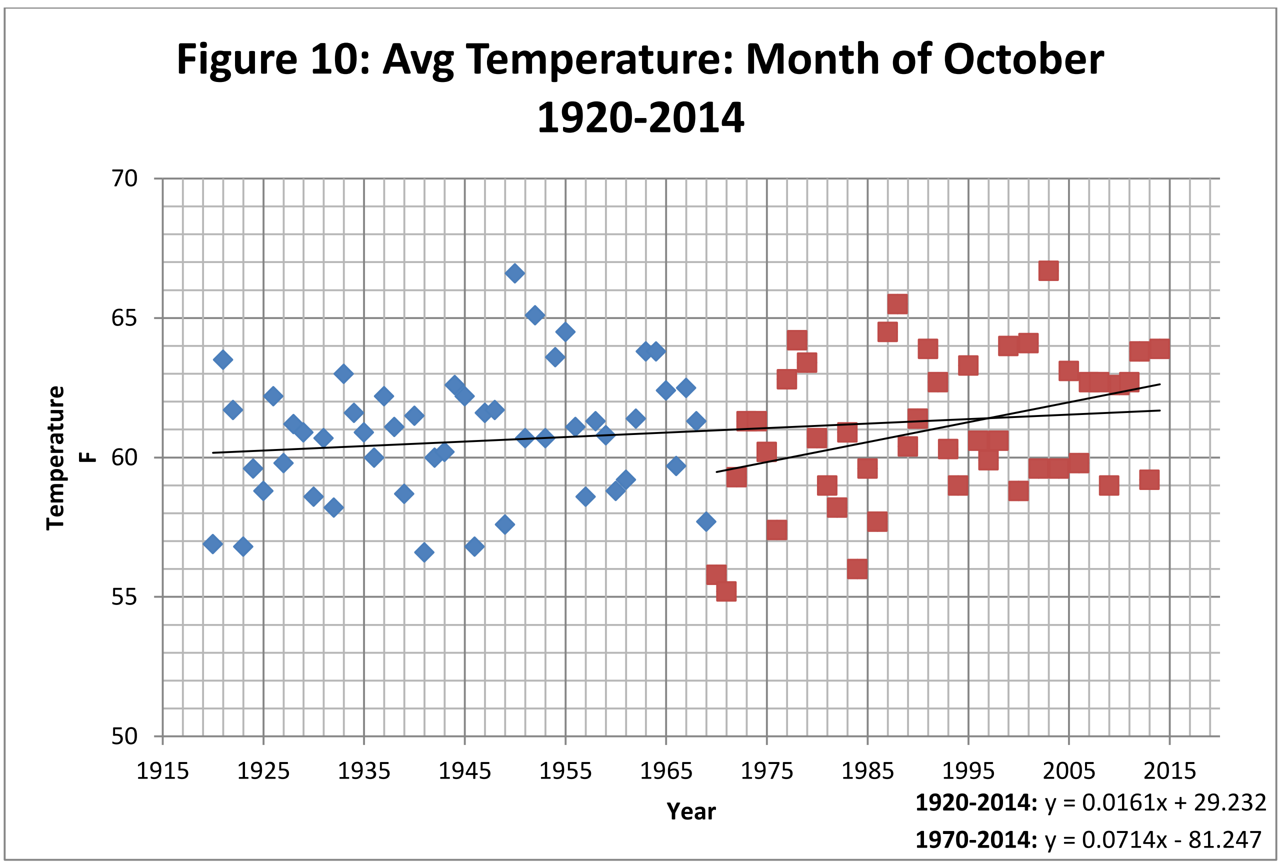


Figure 10: Avg Temperature: Month of October
1920-2014
70
65
60
55
50
Temperature
F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0161x + 29.232
1970-2014: y = 0.0714x - 81.247

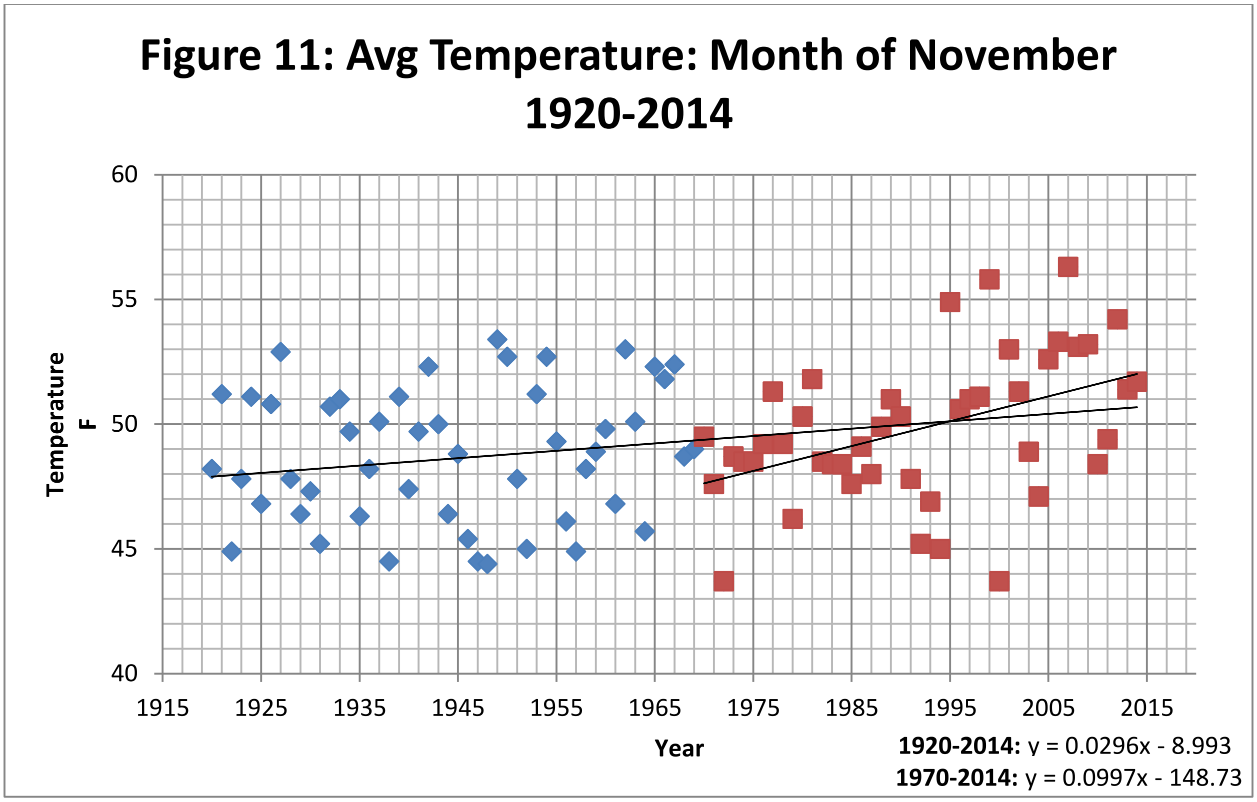


Figure 11: Avg Temperature: Month of November 1920-2014
60
55
50
45
40
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0296x - 8.993
1970-2014: y = 0.0997x - 148.73

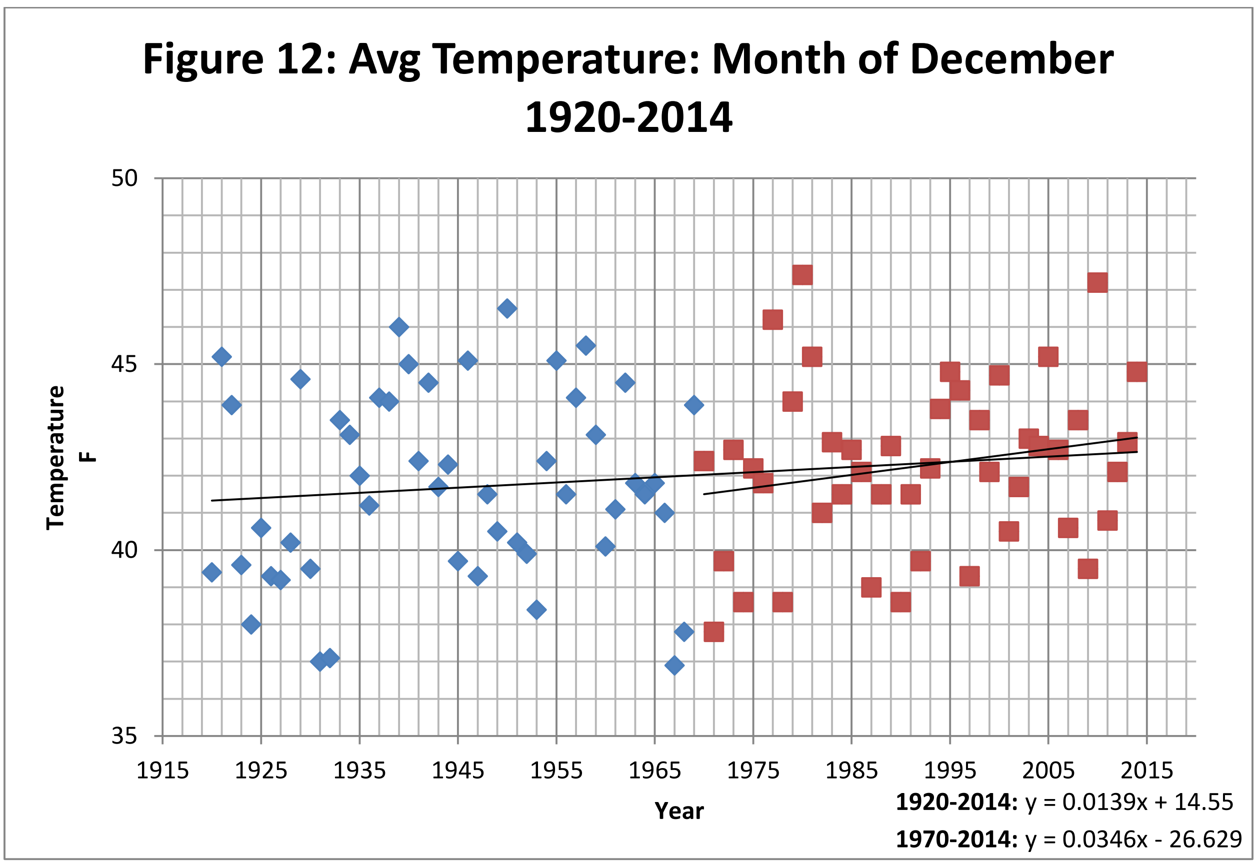


Figure 12: Avg Temperature: Month of December 1920-2014
50
45
40
35
Temperature F
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
Year
1920-2014: y = 0.0139x + 14.55
1970-2014: y = 0.0346x - 26.629

Figure 13: Average Montly Temperature for Eastern Central Arizona

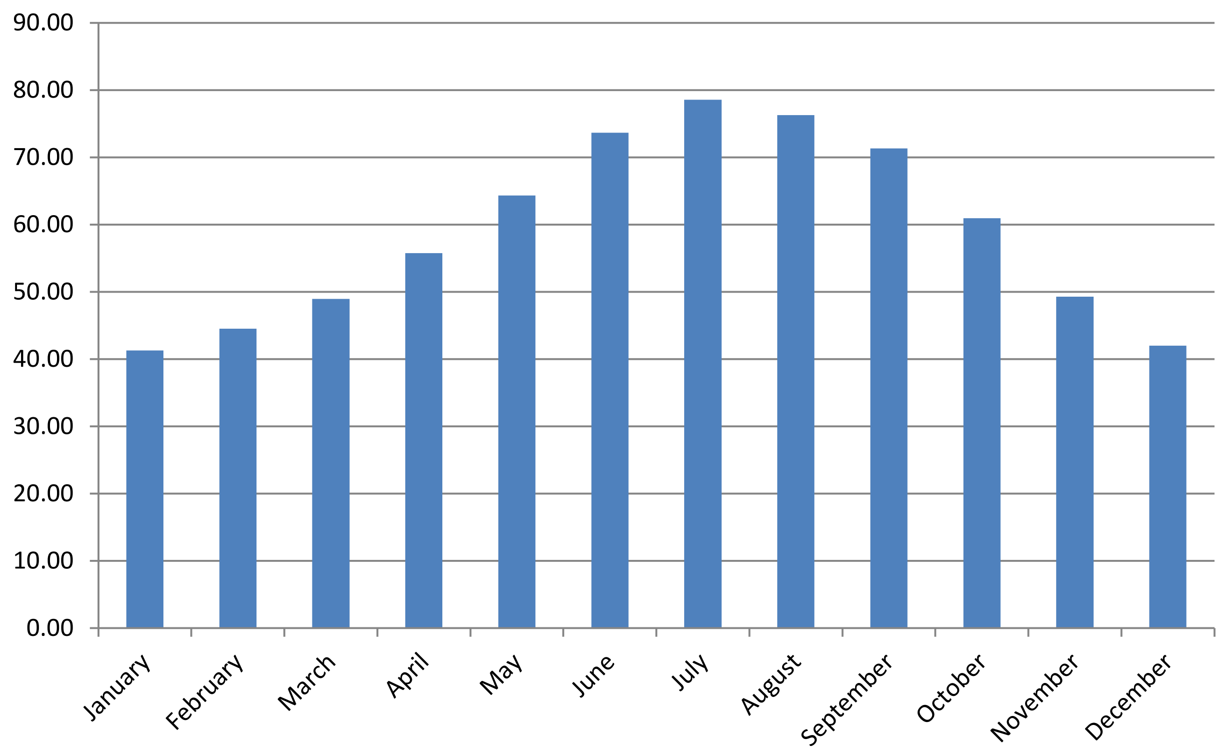
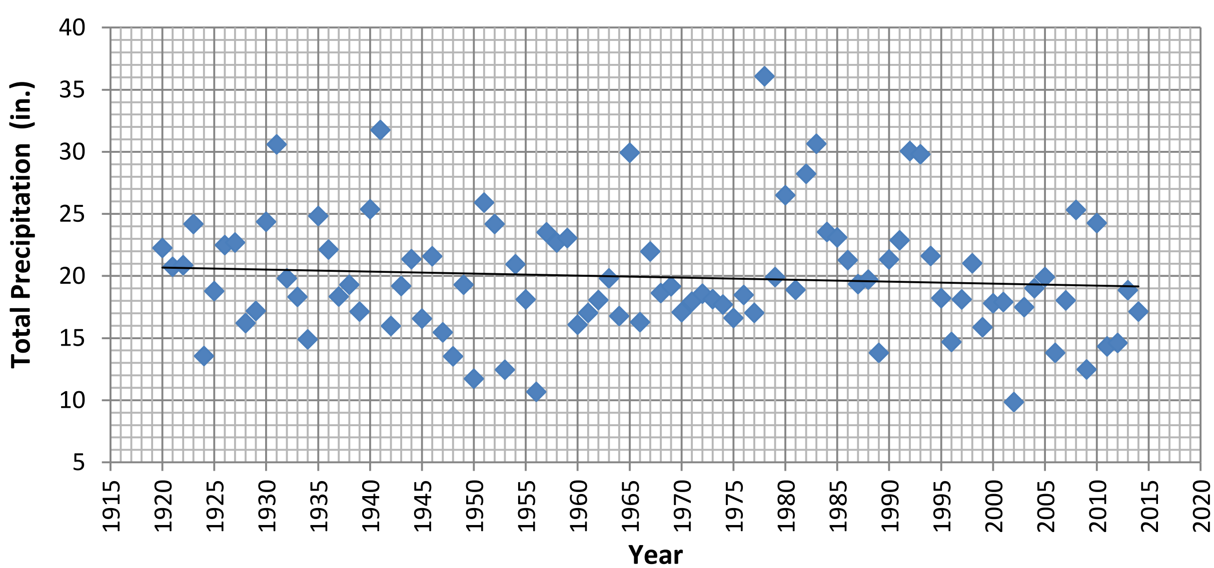


Figure 14: Annual Precipitation for Central Eastern Arizona



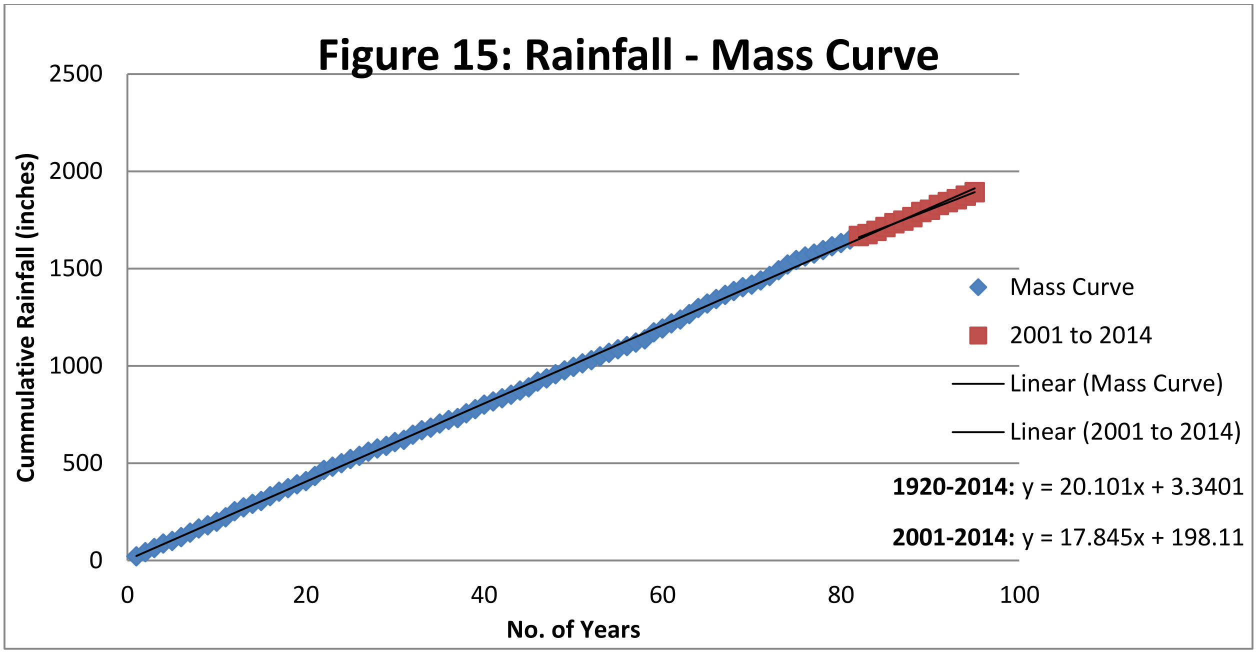


Figure 15: Rainfall - Mass Curve
Cummulative Rainfall (inches)
No. of Years
Mass Curve
2001 to 2014
Linear (Mass Curve)
Linear (2001 to 2014)
1920-2014: y = 20.101x + 3.3401
2001-2014: y = 17.845x + 198.11

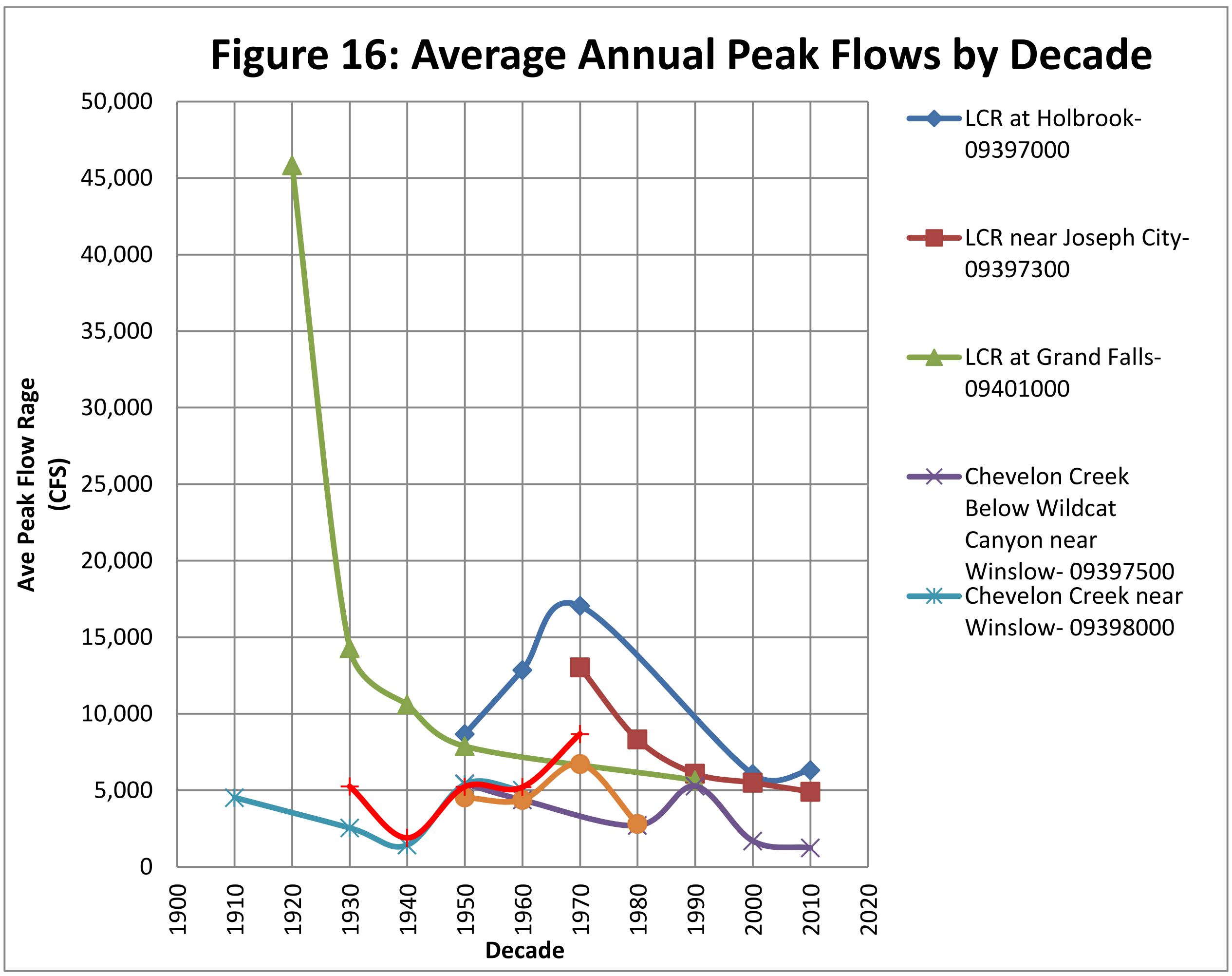


Figure 16: Average Annual Peak Flows by Decade
Ave Peak Flow Rage (CFS)
Decade
LCR at Holbrook- 09397000
LCR near Joseph City- 09397300
LCR at Grand Falls- 09401000
Chevelon Creek Below Wildcat Canyon near Winslow- 09397500
Chevelon Creek near Winslow- 09398000

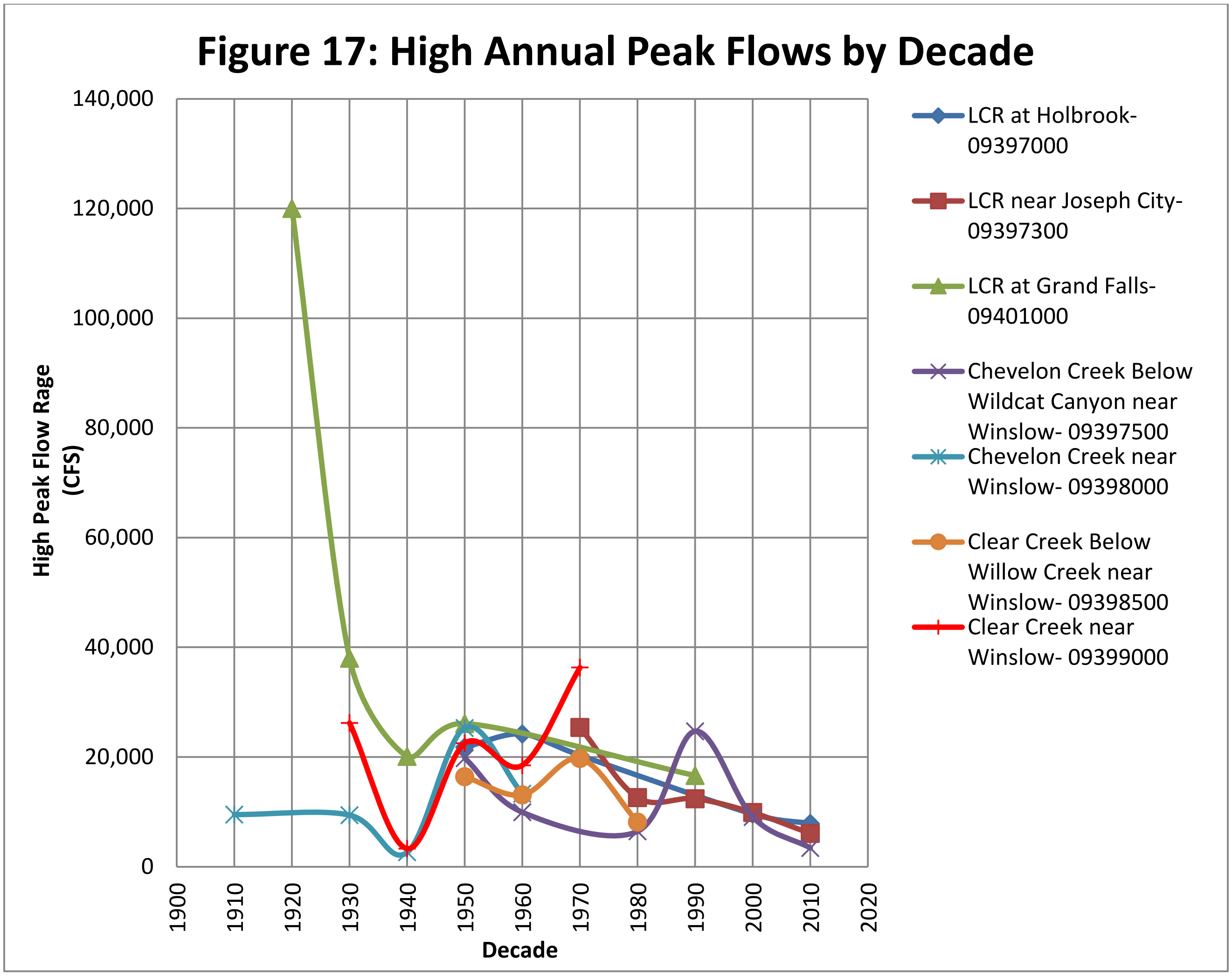


Figure 17: High Annual Peak Flows by Decade
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
High Peak Flow Rage (CFS)
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Decade
LCR at Holbrook-09397000
LCR near Joseph City-09397300
LCR at Grand Falls-09401000
Chevelon Creek Below Wildcat Canyon near Winslow- 09397500
Chevelon Creek near Winslow- 09398000
Clear Creek Below Willow Creek near Winslow- 09398500
Clear Creek near Winslow- 09399000

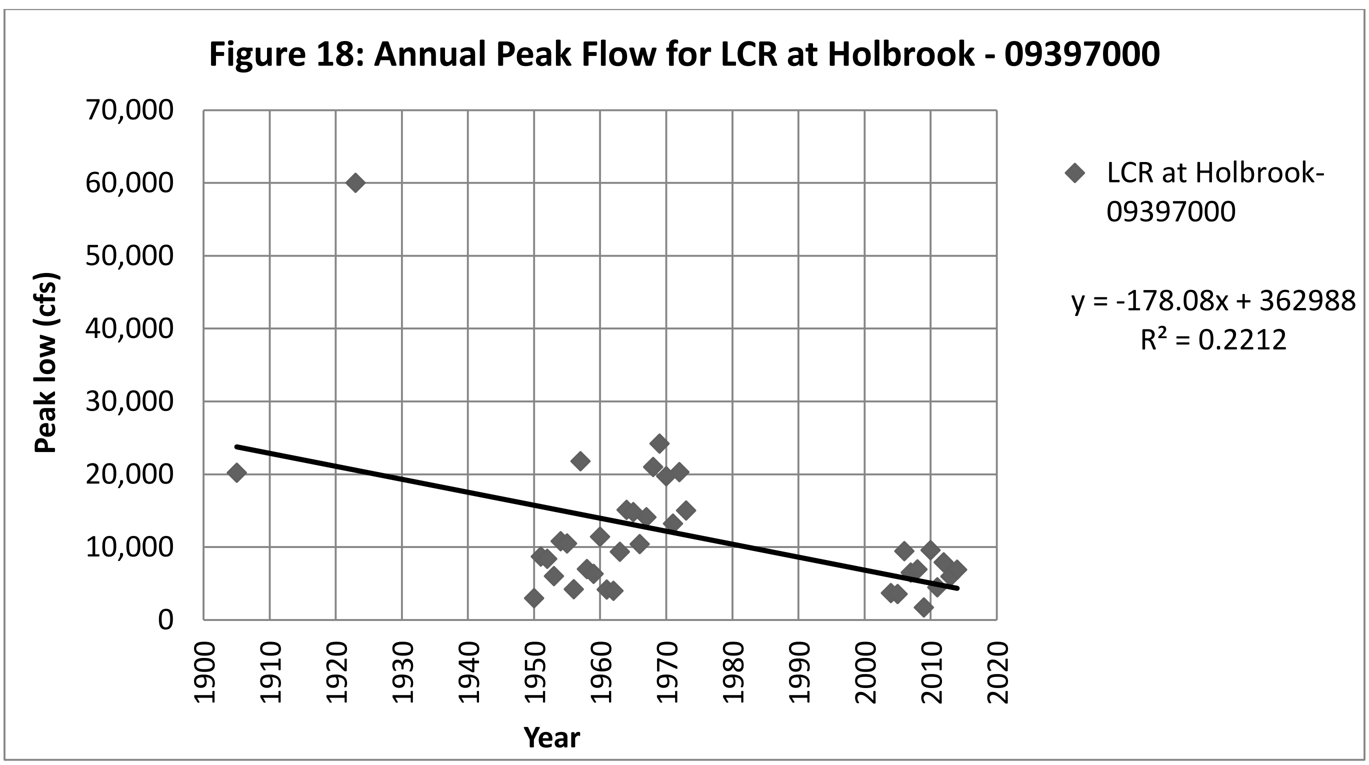


Figure 18: Annual Peak Flow for LCR at Holbrook - 09397000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Peak low (cfs)
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Year
LCR at Holbrook-09397000
y = -178.08x + 362988
R² = 0.2212

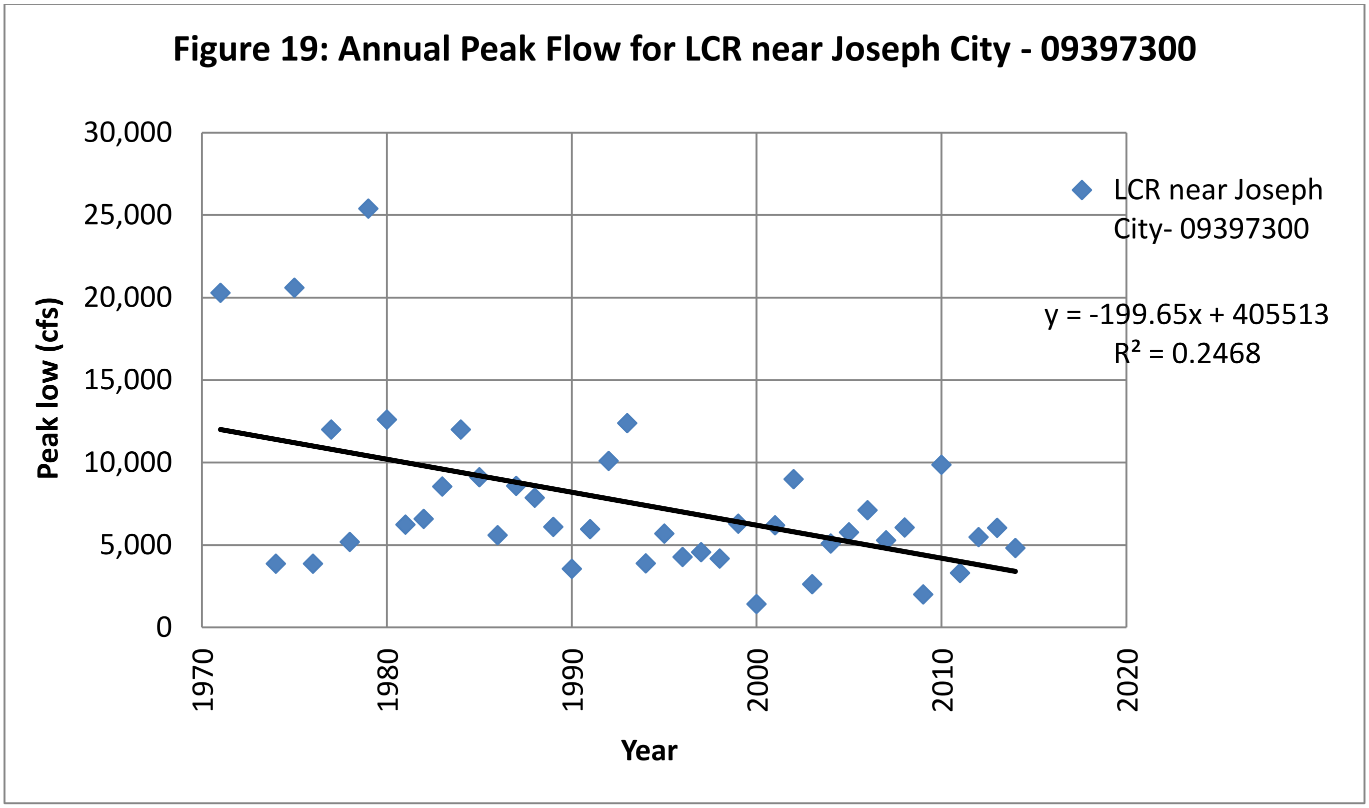


Figure 19: Annual Peak Flow for LCR near Joseph City - 09397300
30,000
25,000
20,000
15,000
10,000
5,000
0
Peak low (cfs)
1970
1980
1990
2000
2010
2020
Year
LCR near Joseph City- 09397300
y = -199.65x + 405513
R² = 0.2468

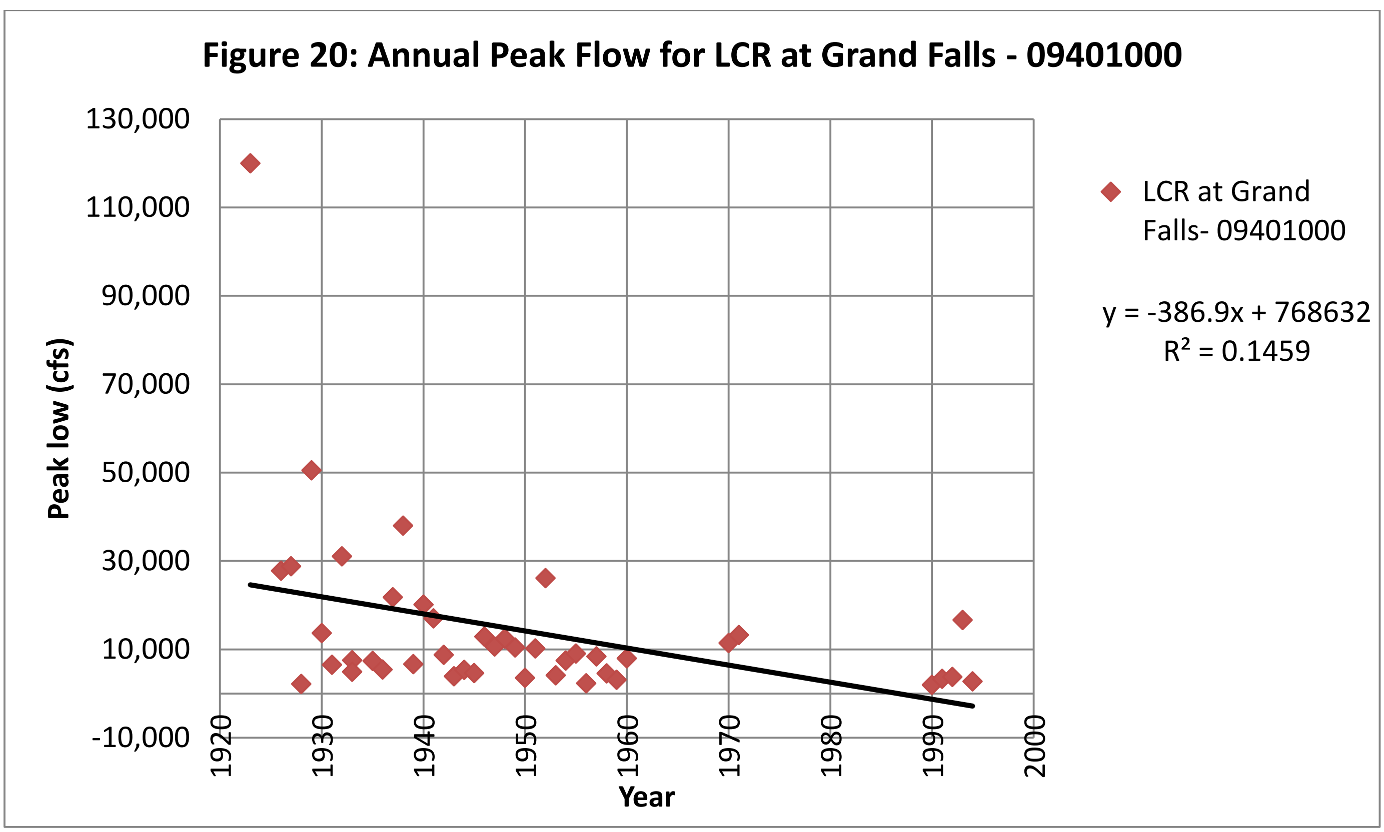


Figure 20: Annual Peak Flow for LCR at Grand Falls - 09401000
130,000
110,000
90,000
70,000
50,000
30,000
10,000
-10,000
Peak low (cfs)
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year
LCR at Grand Falls- 09401000
y = -386.9x + 768632
R² = 0.1459

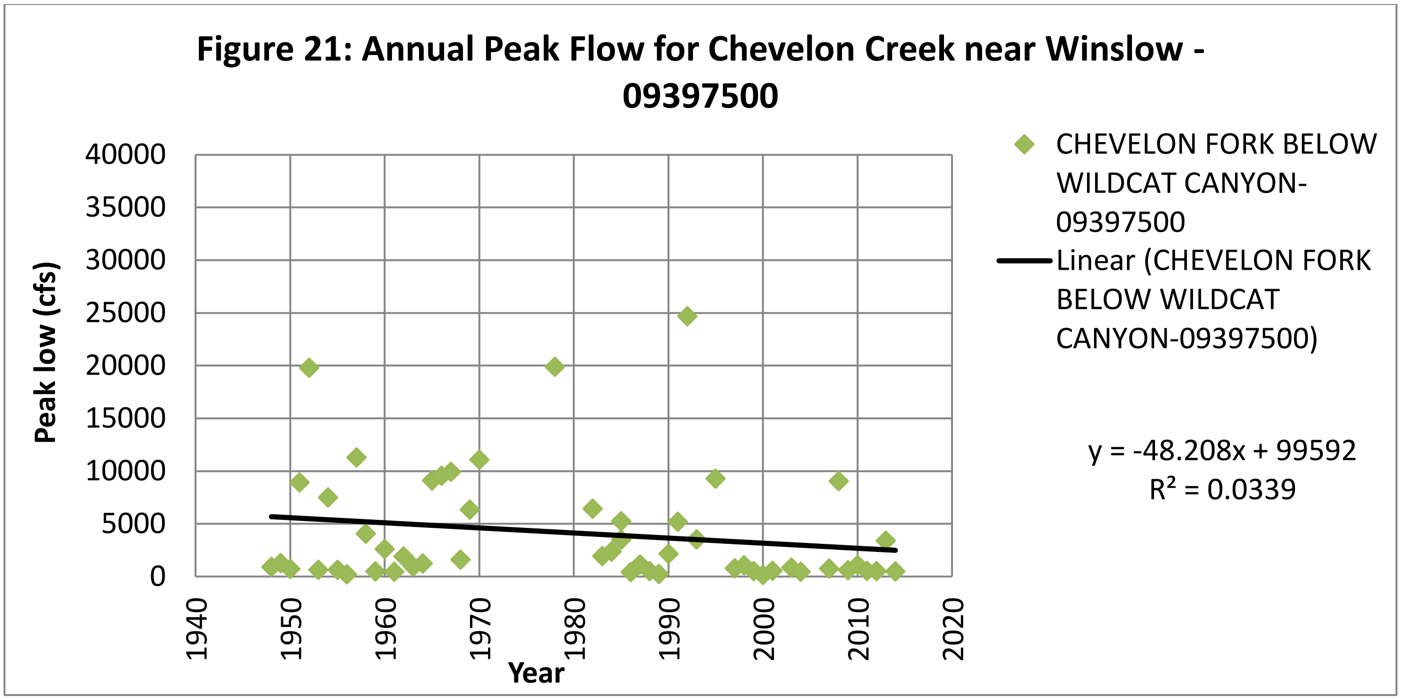


Figure 21: Annual Peak Flow for Chevelon Creek near Winslow - 09397500
CHEVELON FORK BELOW WILDCAT CANYON-09397500
Linear (CHEVELON FORK BELOW WILDCAT CANYON-09397500)
y = -48.208x + 99592
R² = 0.0339
Peak low (cfs)
Year
40000
35000
30000
25000
20000
15000
10000
5000
0
1940
1950
1960
1970
1980
1990
2000
2010
2020

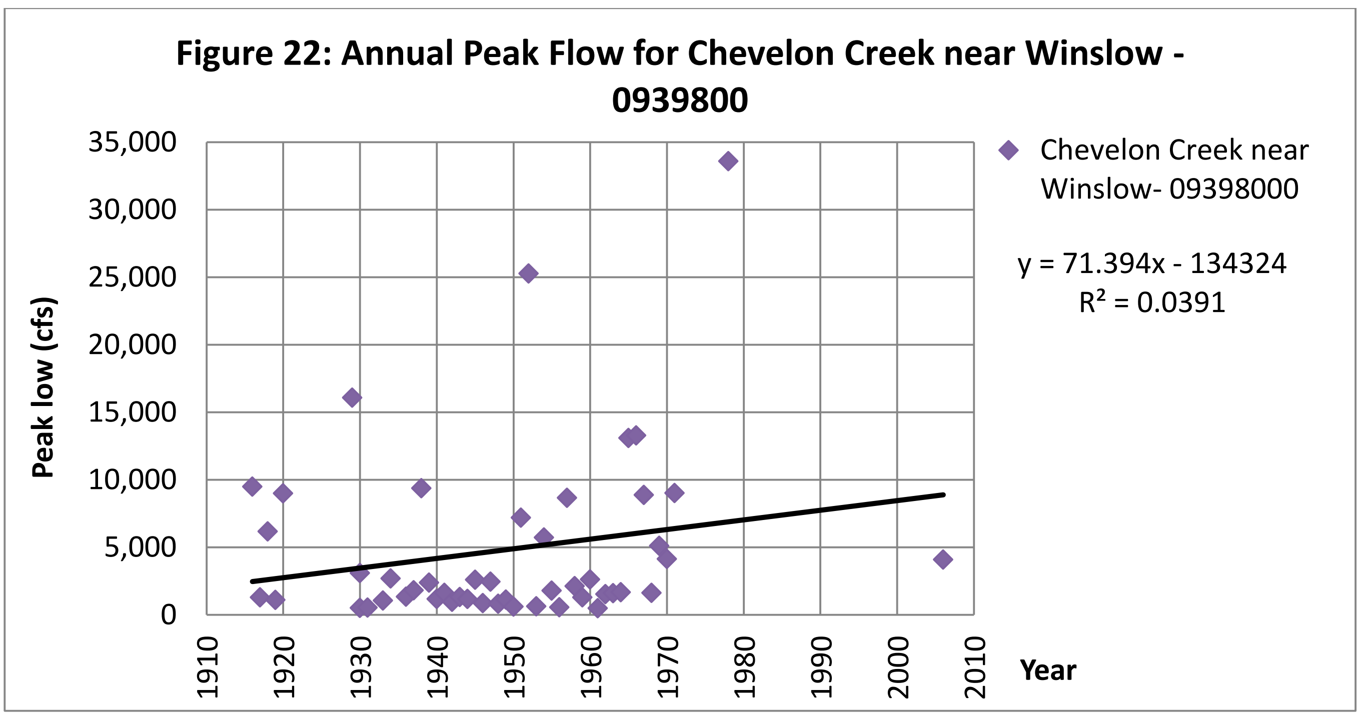


Figure 22: Annual Peak Flow for Chevelon Creek near Winslow - 0939800
Chevelon Creek near Winslow- 09398000
y = 71.394x - 134324
R² = 0.0391
Peak low (cfs)
Year
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

Figure 23: Annual Peak Flow for Clear Creek near Winslow - 09398500

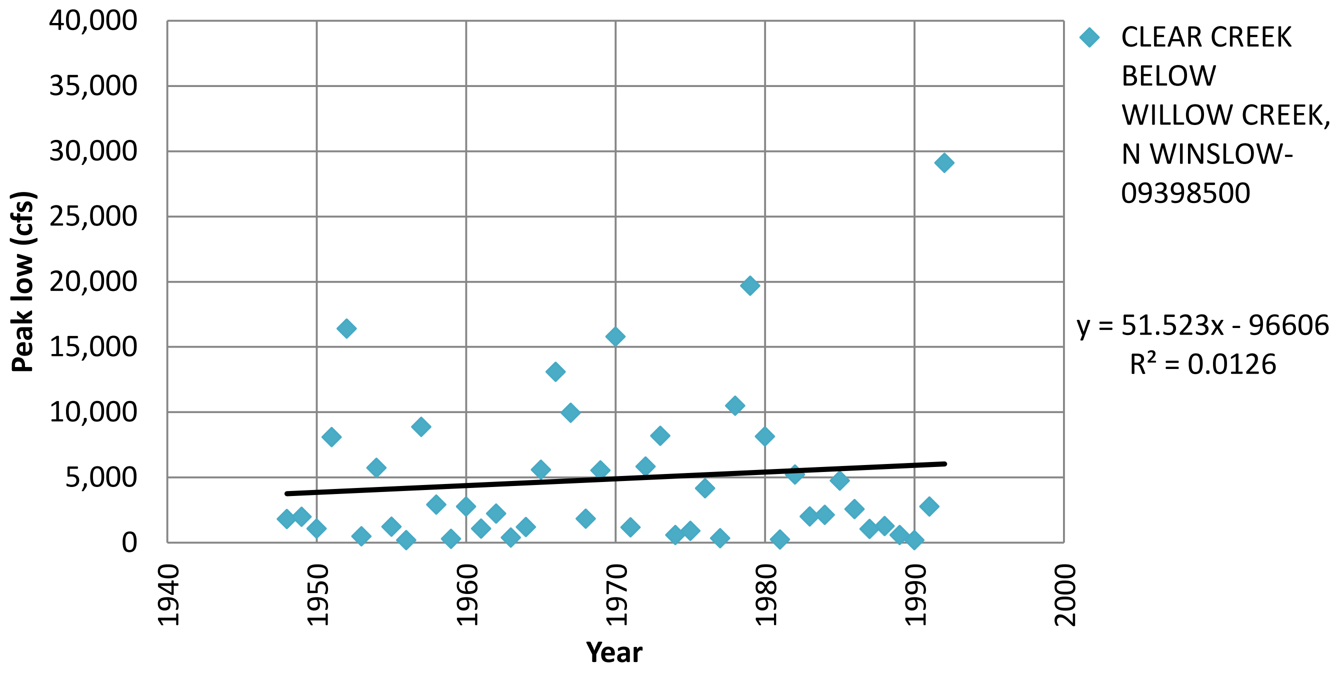


Figure 24: Annual Peak Flow for Clear Creek near Winslow - 09399000