
TABLE OF CONTENTS

	Page
3.3 Water Use and Hydrology	3.3-1
3.3.1 Information Sources	3.3-1
3.3.2 Existing Water Uses	3.3-1
3.3.3 Hydrology	3.3-4
3.3.4 References	3.3-7

List of Tables

- Table 3.3-1. Minimum Instream Flow Requirements for Bypass Reaches Associated with the Kaweah Project.
- Table 3.3-2. Recent History (2002-2016) of Temporary Flow Modifications Requested by SCE and Approved by Resource Agencies.
- Table 3.3-3. Historic Water Year Types for the Kaweah River at Terminus Reservoir Based on Department of Water Resources Bulletin 120 May 1 Runoff Forecast (1994-2016).
- Table 3.3-4. Current Project Flow Gages.
- Table 3.3-5. Historic Gages in the Project Vicinity.
- Table 3.3-6. Other Flow Gages in the Kaweah River Watershed.

List of Figures

- Figure 3.3-1. East Fork Kaweah River Inflow at Kaweah No. 1 Diversion Dam in Relation to Minimum Instream Flow Requirements and Water Supply Commitments in Dry (top) and Normal (bottom) Years (May 1994-December 2014).
- Figure 3.3-2. Kaweah River Inflow at Kaweah No. 2 Diversion Dam in Relation to Minimum Instream Flow Requirements and Water Supply Commitments in Dry (top) and Normal (bottom) Years (May 1994-December 2014).
- Figure 3.3-3. Distribution of the April 1 to July 1 Forecast of Runoff in the Kaweah River at Terminus Reservoir based on the Bulletin 120 May 1 Forecast (1994-2016).
- Figure 3.3-4. Annual Inflow to the Kaweah Project (WY 1994-2014).
- Figure 3.3-5a. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the East Fork Kaweah River

Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse.

Figure 3.3-5b. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse.

Figure 3.3-5c. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) at the Kaweah No. 3 Powerhouse.

Figure 3.3-6a. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the East Fork Kaweah River Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse (WY 1994-2014).

Figure 3.3-6b. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse (WY 1994-2014).

Figure 3.3-6c. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) at the Kaweah No. 3 Powerhouse (WY 2002-2014).

Figure 3.3-7. East Fork Kaweah River and Kaweah River Inflows and Flows below the Kaweah No. 1 and 2 Diversions and Timing of Generation (2014).

List of Maps

Map 3.3-1. Current and Historic Flow Gages in the Bypass Reaches and Flowlines Associated with the Kaweah Project and Other Non-Project Flows Gages in the Kaweah Watershed.

List of Appendices

Appendix 3.3-A. Historic Water Year Types for the Kaweah River at Terminus Reservoir Based on Department of Water Resources Bulletin 120 May 1 Runoff Forecast (1938-2015).

Appendix 3.3-B. Daily Flow in Bypass Reaches and Flowlines Associated with the Kaweah Project.

Appendix 3.3-C. Tables of Monthly Summary Statistics (maximum, minimum, average discharge) and Exceedances for Gaging Stations in Bypass Reaches and Flowlines Associated with the Kaweah Project.

Appendix 3.3-D. Monthly Average Flows by Year in Bypass Reaches and Flowlines Associated with the Kaweah Project over the Available Flow Data Period of Record.

Appendix 3.3-E. Annual Maximum Instantaneous Peak Flows (cfs) for Bypass Reaches and Flowlines Associated with the Kaweah Project.

Appendix 3.3-F. Hydrology for Other River Reaches in the Watershed – Daily Flows and Annual Maximum Instantaneous Peak Flows.

List of Acronyms

ac-ft	acre-feet
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CRWQCB	California Regional Water Quality Control Board
DWR	Department of Water Resources
FERC	Federal Energy Regulatory Commission
MIF	minimum instream flow
NPS	National Park Service
POR	period of record
Project	Kaweah Project
SCE	Southern California Edison Company
SNP	Sequoia National Park
SUP	Special Use Permit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Watershed	Kaweah River Watershed

3.3 WATER USE AND HYDROLOGY

This section describes water use and hydrology associated with Southern California Edison Company's (SCE) Kaweah Project (Project). The Federal Energy Regulatory Commission's (FERC or Commission) content requirements for this section are specified in Title 18 of the Code of Federal Regulations (CFR) Chapter I § 5.6(d)(3)(iii). The FERC regulations require information on water resources, including water use (quantity) and water quality of waters affected by the Project. This section specifically addresses the water use and hydrology components of the FERC regulations. Information on water quality is addressed in Section 3.4 Water Quality.

Information on (1) upstream and downstream requirements by other parties that may constrain operations of the Project; and (2) existing water rights and water rights applications that could potentially affect or be affected by the Project is also provided in Section 2.0 Project Description and Section 3.2 Description of the Kaweah River Basin.

3.3.1 Information Sources

Existing information regarding water use and hydrology associated with the Project was collected, compiled, and reviewed. Relevant information used to prepare this section was obtained from the following sources:

- Department of Water Resources (DWR) Bulletin 120 (DWR 2015);
- Environmental Assessment, Kaweah Project FERC Project No. 298-000 (FERC 1991);
- Errata notice to notice dated 12/17/03 Amending License re Kaweah River Power Authority under P-3947 (FERC 2003b);
- Kaweah River Investigation, California, Final Feasibility Report (USACE 1996);
- Order amending license re Kaweah River Power Authority's Terminus Dam Project under P-3947 (FERC 2003a);
- Order Amending Minimum Flow Release Requirements for Southern California Edison's Project No. 298 (FERC 1994);
- Order Issuing New License (Major) for Southern California Edison's Project No. 298 (FERC 1992);
- Special Use Permit (SUP) for Southern California Edison (NPS 2012);
- United States Geological Survey (USGS) Surface-Water Data for the Nation (USGS 2015); and
- Water Quality Control Plan for the Tulare Lake Basin (CRWQCB 2004).

3.3.2 Existing Water Uses

This section describes existing water uses associated with the Project and other water uses upstream and downstream of the Project.

3.3.2.1 Existing Project Water Uses

Existing and potential beneficial uses that apply to the surface waters within the Kaweah River Watershed (Watershed) are identified in the *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan) (CRWQCB 2004). Beneficial uses identified in the Basin Plan that pertain to the Kaweah River above Lake Kaweah include: (1) municipal and domestic water supply; (2) hydropower generation; (3) water contact and non-contact water recreation; (4) warm freshwater fisheries; (5) cold freshwater fisheries; (6) wildlife habitat; (7) rare, threatened, and endangered species; (8) spawning, reproduction, and/or early development for fisheries; and (9) freshwater replenishment.

SCE operates the Project for hydroelectric generation and consumptive use. Consumptive water is delivered to local water users from the Kaweah No. 1 and Kaweah No. 2 flowlines, consistent with SCE's contractual obligations, and to the Hammond Fire Station near Hammond consistent with SCE's water rights and agreements.

The Project has three powerhouses: Kaweah No. 1 Powerhouse, Kaweah No. 2 Powerhouse, and Kaweah No. 3 Powerhouse. Water is diverted from the East Fork Kaweah River at the Kaweah No. 1 Diversion Dam and conveyed to the Kaweah No. 1 Powerhouse via the Kaweah No. 1 Flowline. Water is diverted from the Kaweah River at the Kaweah No. 2 Diversion Dam and conveyed to the Kaweah No. 2 Powerhouse via the Kaweah No. 2 Flowline. Water conveyed to Kaweah Powerhouse No. 3 is diverted at the Middle Fork and Marble Fork diversions (non-FERC facilities). A summary of the last five years of generation and the Project's dependable capacity is provided in Section 2.0 Project Description.

The Project has two conflicting obligations (demands) associated with operation of the Project. These obligations include providing: (1) domestic water to local users through the Project flowlines based on contractual entitlements; and (2) minimum instream flow (MIF) releases consistent with the flow schedule in License Article 405 of the existing FERC license (Table 3.3-1). SCE must release a maximum of 1 cubic foot per second (cfs) from the Kaweah No. 1 Diversion and 3 cfs from the Kaweah No. 2 Diversion to meet SCE's contractual obligations to local water users consistent with their pre-1914 water rights. During low-runoff periods, consumptive water is diverted and delivered to local water users, but no water is diverted for generation purposes. Figures 3.3-1 and 3.3-2 illustrate actual inflow compared to MIF release requirements and water supply obligations at the Kaweah No. 1 Diversion and Kaweah No. 2 Diversion, respectively.

Historically, SCE has requested and obtained approval from resource agencies (California Department of Fish and Wildlife [CDFW] and U.S. Fish and Wildlife Service [USFWS]) to temporarily modify (reduce) MIF releases below the Kaweah No. 1 and Kaweah No. 2 diversions when projected inflows were approaching the combined flow necessary to meet both water supply and MIF release requirements. These temporary flow modifications from the resource agencies were necessary to ensure that SCE could comply with the license conditions based on uncertainty in actual runoff (magnitude and/or timing). SCE obtained agency approval for temporary modifications of MIFs below the Kaweah No. 1 Diversion in four Dry years and below Kaweah No. 2 Diversion in eight

years (four Dry years and four Normal years) (Table 3.3-2).¹ The recent history of temporary flow modifications is discussed in more detail in Section 2.0 Project Description.

Although, SCE obtained agency approval for temporary modifications of MIFs when inflows were projected to not meet both the MIF requirements and the water supply commitments, the approved reductions in MIF were only implemented at the Kaweah No. 2 Diversion in 2002, 2012, 2015, and 2016 (Table 3.3-2). In 2002, SCE implemented the flow modifications, reducing the MIF release by 1.5 cfs on average for 13 days. In 2012, SCE reduced the MIF release by 1 cfs on average for three days. In 2015, SCE reduced the MIF release by 0.35 cfs on average for four days. In 2016, since runoff in the Kaweah Watershed was projected to remain low due to drought conditions in the region, SCE obtained approval from FERC for a temporary variance of the minimum flow requirement below the Kaweah No. 2 Diversion Dam. This temporary variance was implemented in late-August and expires December 31, 2016. In the East Fork Kaweah River, stream flows were sufficient to meet both the MIF requirements and the water supply commitments in all years despite requests for flow modifications based on projected inflow.

3.3.2.2 Other Projects Upstream and Downstream of the Kaweah Project

Flows upstream of the Project are influenced by several SCE operated non-FERC Project facilities located in the Sequoia National Park (SNP). All non-FERC Project facilities are currently operated under a special use permit (SUP) issued to SCE by the SNP. In the upper East Fork Kaweah River Watershed, SCE stores water in four small non-FERC Project reservoirs (Eagle Lake, Lady Franklin Lake, Crystal Lake, and Upper Monarch Lake). The reservoirs (collectively referred to as Mineral King Lakes) were originally constructed between 1903 and 1905 and have a combined storage capacity of approximately 1,152 acre-feet (ac-ft). SCE releases water from these reservoirs in the late summer and fall months to augment flows in the East Fork Kaweah River.

On the Middle and Marble forks of the Kaweah River, SCE operates two non-FERC Project diversions (Middle Fork Diversion and Marble Fork Diversion) and flowlines. The Middle Fork and Marble Fork diversions and associated flowlines were constructed in 1907 and 1913, respectively. Both diversions are operated in a run-of-river mode and have limited storage capacity (less than one ac-ft total combined storage). Flows from the Middle and Marble forks of the Kaweah River are diverted and conveyed through the Kaweah No. 3 Flowline to the Kaweah No. 3 Powerhouse. All but the last 2,580 feet of the flowline is located in the SNP and is not part of the FERC License. The portion of the flowline outside the SNP and the Kaweah No. 3 Powerhouse are FERC Project facilities.

Approximately ten miles downstream of the Project, the Kaweah River is impounded by the United States Army Corps of Engineers' (USACE) Terminus Dam that forms Lake

¹ See Table 3.3-1 for a definition of water year designations.

Kaweah. The Terminus Dam was constructed in 1962 for flood control and irrigation purposes. During the spring runoff season, the reservoir stores up to 185,000 ac-ft of water. Downstream of Terminus Dam, the Kaweah River flows are diverted for irrigation of adjacent farmlands. Water releases serve multiple local water districts, including the Tulare Irrigation District and the Kaweah Delta Water Conservation District, and urban areas, including the cities of Tulare and Visalia. The Terminus Power Plant (FERC Project No. 3947), completed in 1992 by the Kaweah River Power Authority, generates hydroelectricity at the dam. The power plant is jointly managed by Tulare Irrigation District and the Kaweah Delta Water Conservation District. The power plant has a capacity of 20.09 megawatts (FERC 2003a, 2003b).

3.3.3 Hydrology

This section describes existing FERC license flow requirements, flow gages, hydrology, and reservoir storage associated with operations of the Project.

3.3.3.1 Existing FERC License Flow Requirements

The MIF requirements, as specified in License Article 405 of the existing FERC License, for the bypass reaches² associated with the Project are presented in Table 3.3-1. MIF release requirements at the Project diversions are based on water year type. In the existing FERC license, water year types for the Project are defined as either “Normal” or “Dry” based on the April 1 through July 1 forecast of runoff in the Kaweah River at Terminus Reservoir as published by the DWR in its May 1 forecast. A Dry Year is defined as a year when the forecast is equal to or less than 172,000 ac-ft of runoff. A Normal Year is defined as a year when the forecast is greater than 172,000 ac-ft of runoff. The MIF release schedules take effect on May 10 following the May 1 forecast and extend through May 9 of the following calendar year (FERC 1994).

A summary of water year types from 1994-2016, based on the definition of Normal and Dry in the existing FERC license are provided in Table 3.3-3 (DWR 2015). This time period (1994-2015) is representative of recent runoff patterns and climate conditions in the Watershed since issuance of the existing FERC license. Water year types over a longer time period (1938 through 2015) are provided in Appendix 3.3-A for reference. Between 1994 and 2015, 68% of the years were classified as Normal and 32% were classified as “Dry”. The distribution of DWR runoff forecasts in the Kaweah River at Terminus Reservoir from 1994-2015 and associated water year types is shown in Figure 3.3-3.

In addition to MIF requirements, License Article 404 specifies that the “Licensee shall operate the Project such that flows below diversion dams and Powerhouses Nos. 1 and 2 are not altered at a rate greater than 30 percent of the existing streamflow per hour” (i.e., ramping rates).

² A bypass reach is a segment of a river downstream of a diversion facility where Project operations result in the diversion of a portion of the water from the river.

3.3.3.2 Existing Flow Gages

SCE currently maintains a network of flow gaging stations to monitor and record flows associated with operation of the Project. This network consists of eight stations that currently measure flow in bypass reaches, Project flowlines, and Project powerhouses (Table 3.3-4). Additional gages have historically recorded flows in the bypass reaches and flowlines associated with the Project and these are identified on Table 3.3-5. Additional Watershed gages are listed in Table 3.3-6. The location of current and historic flow gages in the bypass reaches and flowlines associated with the Kaweah Project, and other non-Project flow gages in the Kaweah Watershed are shown on Map 3.3-1.

3.3.3.3 Hydrology Associated with Project Operations

Flow data from existing and historic Project gages and other gages in the Watershed were collected and compiled into an Excel database (Tables 3.3-3 through 3.3-6). Data were reviewed to identify gages with data gaps or questionable data and those that only recorded low flows. Records with poor data were not included in the hydrology summaries.

The period of record (POR) used to characterize recent historical flows in the Kaweah River and East Fork Kaweah River extends from water year 1994 through 2014 (October 1, 1994 through September 30, 2014)^{3,4}. As discussed above, this time period best represents Project operations since issuance of the FERC license and recent climatic conditions.

Hydrology

The Project is operated in a run-of-river mode. The Project diverts water from the East Fork Kaweah River at the Kaweah No. 1 Diversion and from the Kaweah River at the Kaweah No. 2 Diversion for power generation and to meet contractual obligations with pre-1914 water users. These diversions alter the volume of water in the rivers downstream of Project diversions (bypass reaches), with minimal to no change in the annual seasonal flow pattern. The bypass reaches associated with the Project include:

- East Fork Kaweah River, from the Kaweah No. 1 Diversion to the confluence with the Kaweah River (4.7 miles); and
- Kaweah River, from the Kaweah No. 2 Diversion to the confluence of the Kaweah No. 2 Powerhouse Tailrace and the Kaweah River (4.1 miles).

³ A water year is defined as the period between October 1 of one year and September 30 of the following year. The water year is designated by the calendar year in which it ends, so that the 2013 water year started on October 1, 2012 and ended on September 30, 2013.

⁴ In a few summaries, 2015 data are also included to illustrate the extremely dry water year conditions. However, these were not included in summaries of the water year. Flow data at the powerhouses are available for 2002-2014.

The amount and timing of flow diverted is a function of inflow (runoff), FERC License requirements for MIF and ramping rates (Section 2.0 Project Description), flowline capacities, and the minimum flow required to maintain sufficient head in the flowline to meet water delivery contractual obligations. Total annual inflow into the Project (combined inflow at the Kaweah No. 1 and No. 2 diversions) in water years 1994-2014 ranged from approximately 87,000 ac-ft (2014) to more than 605,000 ac-ft (1998). The median total annual inflow was approximately 235,000 ac-ft during this period (Figure 3.3-4).

The Kaweah No. 1 Flowline (East Fork Kaweah River) can divert up to 24 cfs, and the Kaweah No. 2 Flowline (Kaweah River) can divert up to 87 cfs. To maintain sufficient head pressure to meet water delivery contractual obligations along the flowlines, SCE must release a maximum of 1 cfs in the Kaweah No. 1 Flowline and 3 cfs in the Kaweah No. 2 Flowline. Water diverted into the flowlines at Project diversions passes through Project powerhouses generating electricity prior to returning to the Kaweah River downstream of the Project tailraces (with the exception of water diverted for consumptive purposes). Additional information on consumptive water use, including water user diversion points, is provided in Section 2.0 Project Description.

Figures 3.3-5 and 3.3-6 show monthly flow exceedances and monthly average flows in the bypass reaches (below the diversions), Project flowlines, and flow into the powerhouses for example water years that are representative of different runoff conditions into the Project diversions. The following example water years were selected to be representative of different water year types:

- Normal Water Year – 2006;
- “Drier” Normal Year – 2009; and
- Dry – 2014.

SCE typically diverts water throughout the year in wetter years, peaking in the winter and early summer months (Figures 3.3-5 and 3.3-6). In drier years, low summer and winter flows (e.g., August to November) typically preclude diversion for generation. Diversions for generation in dry years typically only occur in spring (including Normal years with low runoff and Dry years) (Figures 3.3-5, 3.3-6, and 3.3-7). In “Drier” Normal years, inflows can be extremely low in the late summer/fall resulting in reductions in flow diversions (e.g., Figure 3.3-5, 2009).

A detailed summary of the hydrology associated with the Project (river reaches, flowlines, and powerhouses) and at selected gages upstream and downstream of the Project is provided in the following appendices:

- Appendix 3.3-B – This appendix includes daily flow graphs in the bypass reaches and flowlines associated with the Project by location.
- Appendix 3.3-C – This appendix includes tables of monthly summary statistics (maximum, minimum, and average discharge) and exceedances (10%, 20%, 50%, 80%, and 90%) for the bypass reaches and flowlines associated with the Project.

- Appendix 3.3-D – This appendix includes tables summarizing monthly average flows in the bypass reaches and flowlines associated with the Project.
- Appendix 3.3-E – This appendix includes a table summarizing instantaneous peak annual flows for the bypass reaches and flowlines associated with the Project.
- Appendix 3.3-F – This appendix includes flows at selected gages upstream and downstream of the Project.

3.3.3.4 Reservoir Storage

The Project facilities have minimal water storage (approximately 13 ac-ft combined) in one forebay tank and two small forebays located at the terminus of the flowlines, above the powerhouses (Kaweah No. 1 Forebay Tank – 0.18 ac-ft; Kaweah No. 2 Forebay – 0.75 ac-ft; and Kaweah No. 3 Forebay – 11 ac-ft). Water levels in the forebays remain constant (full) during Project operations. The forebays may be drained during the Project's annual maintenance outage. The Project also includes diversion pools behind Kaweah No. 1 Diversion Dam and Kaweah No. 2 Diversion Dam (<0.03 ac-ft and 1 ac-ft of storage, respectively). Elevations of the diversion pools remain constant (full) year-round. The locations of these Project facilities are shown on Map 3.3-1.

Water stored in four small reservoirs (with combined storage capacity of 1,152 ac-ft) located on tributaries to the East Fork Kaweah River, upstream of the Kaweah No. 1 Diversion Dam within the SNP are also utilized by the Project. These reservoirs are operated under a SUP with the SNP and are, therefore, not under FERC jurisdiction. However, the water rights associated with these reservoirs influence the operation of the Kaweah No. 1 Powerhouse, which is under FERC jurisdiction.

3.3.4 References

- California Regional Water Quality Control Board (CRWQCB) Central Valley Region. 2004. Water Quality Control Plan for the Tulare Lake Basin Second Edition. Revised January 2004. Available at: http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlbp.pdf.
- Department of Water Resources (DWR). 2015. Department of Water Resources Bulletin 120. Available at: <http://cdec.water.ca.gov/snow/bulletin120/>.
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United States Department of the Interior, National Park Service – Sequoia and Kings Canyon National Parks (NPS). 2012. Special Use Permit for Southern California Edison. Permit No. PWR-SEKI-2012-007.

United States Geological Survey (USGS). 2015. USGS Surface-Water Data for the Nation. Available at: <http://waterdata.usgs.gov/nwis/sw>.

TABLES

Table 3.3-1. Minimum Instream Flow Requirements for Bypass Reaches Associated with the Kaweah Project.^{1, 2}

Month	Kaweah No. 1 Diversion		Kaweah No. 2 Diversion	
	Normal Year (cfs)	Dry Year (cfs)	Normal Year (cfs)	Dry Year (cfs)
October	5	5	11	5
November	5	5	11	5
December	5	5	11	5
January	5	5	20	10
February	5	5	20	10
March	10	10	30	20
April	10	10	30	30
May	10	10	30	30
June	10	10	30	30
July	10	10	20	10
August	5	5	20	10
September	5	5	11	5

Source: FERC License Article 405, as amended on April 20, 1994.

¹ Runoff of Kaweah River at Terminus Reservoir for April 1 through July 31, for the current year, as estimated by the California Department of Water Resources (DWR) on or about May 1 of each such calendar year shall be used to distinguish between a normal water year and a dry water year for the purpose of this article. A "Normal Year" is defined as a forecasted runoff of 172,000 acre-feet or more. A "Dry Year" is defined as a forecasted runoff is equal to or less than 172,000 acre-feet. The determination of either a normal water year or a dry water year shall then be used in maintaining the appropriate minimum flow release for the period May 10 of each calendar year through May 9 of the succeeding calendar year.

² This flow schedule may be temporarily modified if required by operating emergencies beyond the control of the licensee or for short periods on mutual agreement between the licensee, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Table 3.3-2. Recent History (2002-2016) of Temporary Flow Modifications Requested by SCE and Approved by Resource Agencies.

SCE Modification Request	Resource Agency Approval	Water Year Type	Modification Implemented (Yes/No)	Amount/Duration of Offset Water (cfs/Days)
Kaweah No. 1 Diversion				
June 29, 2015	CDFW: July 16, 2015 USFWS: August 26, 2015	Dry	No	N/A
August 8, 2014	CDFW: August 28, 2014 USFWS: September 2, 2014	Dry	No	N/A
September 5, 2013	CDFW: September 16, 2013 USFWS: September 11, 2013	Dry	No	N/A
September 10, 2007	CDFW: Approved USFWS: October 19, 2007	Dry	No	N/A
Kaweah No. 2 Diversion				
August 11, 2016	CDFW: August 17, 2016 USFWS: August 18, 2016	Normal	Yes	In Progress
June 29, 2015	CDFW: July 16, 2015 USFWS: August 26, 2015	Dry	Yes	Average 0.35 cfs/4 days
August 25, 2014	CDFW: August 28, 2014 USFWS: September 2, 2014	Dry	No	N/A
August 16, 19, 21, and 22, 2013	CDFW: August 27, 2013 USFWS: August 23, 2013	Dry	No	N/A
August 3, 2012	CDFW: August 8, 2012 USFWS: August 9, 2012	Normal	Yes	Average 1 cfs/3 days
September 25, 2009	CDFW & USFWS Approved	Normal	No	N/A
September 10, 2007	CDFW: Approved USFWS: October 19, 2007	Dry	No	N/A
August 16, 2002	CDFW: August 16, 2002 USFWS: August 16, 2002	Normal	Yes	Average 1.5 cfs/13 days

Table 3.3-3. Historic Water Year Types for the Kaweah River at Terminus Reservoir Based on Department of Water Resources Bulletin 120 May 1 Runoff Forecast (1994-2016).¹

Year	Apr-Jul Runoff Forecast (TAF)	Water Year Type Classification
1994	135	Dry
1995	500	Normal
1996	320	Normal
1997	320	Normal
1998	540	Normal
1999	160	Dry
2000	240	Normal
2001	190	Normal
2002	195	Normal
2003	225	Normal
2004	160	Dry
2005	380	Normal
2006	480	Normal
2007	95	Dry
2008	230	Normal
2009	195	Normal
2010	380	Normal
2011	490	Normal
2012	175	Normal
2013	83	Dry
2014	72	Dry
2015	38	Dry
2016	210	Normal

¹Data obtained from: DWR Bulletin 120. Available at: <http://cdec.water.ca.gov/snow/bulletin120/>. Water Year Types for Apr 1 - Jul 1 Forecast of Runoff in the Kaweah River at Terminus Reservoir based on Bulletin 120 May 1 Forecast.

TAF = thousand acre-feet

Table 3.3-4. Current Project Flow Gages.

Gage Name	SCE Gage Number	USGS Station Number	Period of Record	Lat, Long	Notes
East Fork Kaweah River					
East Fork Kaweah River near Three Rivers, CA	201	USGS 11208730	6/1/52-present	36°27'05", 118°47'15"	Traditional stage-discharge stream gage located on the south-west bank of the East Fork Kaweah River. Gage measures streamflow between the intake dam and the gage pool weir. Data gaps: 10/1/1955 - 9/30/1957; 10/1/1978 - 9/30/1993
	201a		10/1/95-present	36°27'05", 118°47'15"	Operational AVM on a release pipe that comes out of the sandbox used by SCE to measure minimum instream flow releases.
East Fork Kaweah River Conduit 1 near Three Rivers, CA	202		10/1/02-present	36°27'05", 118°47'19"	Operational AVM just downstream from the flowline intake that measures flow in the flowline.
East Fork Kaweah River Conduit 1 at Power Plant near Hammond, CA	200a	USGS 11208800	10/1/02-present	36°27'55", 118°51'43"	AVM located on the penstock to the Kaweah No. 1 Powerhouse that measures flow into the powerhouse.
Kaweah River					
Kaweah River below Conduit No. 2 near Hammond, CA	203	USGS 11208600	10/1/93-present	36°29'04", 118°50'06"	Traditional stage-discharge stream gage located on the west bank of the Kaweah River that measures stream flow approximately 500 feet downstream of the Kaweah No. 2 Diversion Dam.
Kaweah River Conduit No. 2 near Hammond, CA	204a		12/8/05-present	36°29'10", 118°50'09"	Operational Acoustic Doppler Current Profiler (ADCP) located on the Kaweah No. 2 Flowline that measures flow from the Kaweah No. 2 Intake into the flowline.
Kaweah River Conduit No. 2 at Powerhouse near Hammond, CA	205a	USGS 11208818	10/1/02-present	36°27'42", 118°52'46"	This gage is an AVM located on the penstock to the Kaweah No. 2 Powerhouse that measures flow into the powerhouse.

Table 3.3-4. Current Project Flow Gages (continued).

Gage Name	SCE Gage Number	USGS Station Number	Period of Record	Lat, Long	Notes
Kaweah River (continued)					
Middle Fork Kaweah River Conduit No. 3 A Power Plant near Hammond, CA	206a	USGS 11208565	10/1/02-present	36°29'10", 118°50'08"	This gage is an AVM located on the penstock to the Kaweah No. 3 Powerhouse that measures flow into the powerhouse. This gage measures the combination of flows measured at SCE gage nos. 208 and 210.

Table 3.3-5. Historic Gages in the Project Vicinity.

Gage Name	SCE Gage Number	USGS Station Number	Period of Record	Lat, Long	Notes
East Fork Kaweah River					
Combined Flow East Fork Kaweah River near Three Rivers CA	--	USGS 11208731	6/1/52-9/30/02	36°27'05", 118°47'15"	Historic Calculated Flow Gage. Combined flow of USGS gage 11208730 and USGS gage 11208720. Data gaps: 10/1/1955 - 9/30/1957; 10/1/1978 - 9/30/1993
East Fork Kaweah River Conduit 1 near Three Rivers, CA	202	USGS 11208720	10/1/74 – 9/30/02	36°27'05", 118°47'19"	Historic Flow Gage. Measured flow in the Kaweah No. 1 Flowline. Data gaps: 10/1/1978 - 9/30/1993; 9/1/2005 - 9/9/2005; 8/26/2009 - 9/30/2009
Kaweah River					
Combined Flow of 11208570+ 11208600 CA	--	USGS 11208601	10/1/93-9/30/02	36°29'10", 118°50'09"	Historic Calculated Flow Gage. Combined flow of USGS gage 11208570 and USGS gage 11208600.
Kaweah River Conduit No. 2 near Hammond, CA	204	USGS 11208570	10/1/93-12/8/05	36°29'10", 118°50'09"	Traditional stage-discharge stream gage historically used by SCE to monitor flows in the flowline (replaced with SCE gage 204a).

Table 3.3-6. Other Flow Gages in the Kaweah River Watershed.

Gage Name	Gaging Station Number	Period of Record	Lat, Long	Notes
Kaweah River - downstream of Project				
Kaweah River at Three Rivers CA	USGS 11209900	10/1/58-9/30/90	36°26'38", 118°54'09"	Historic Flow Gage. Located 2.6 miles downstream from the East Fork Kaweah River and Kaweah River confluence.
Kaweah River at Three Rivers	USACE	2007-2015	36° 26' 37.9998, 118° 54' 15.997	Real-time Stage Gage. Located 2.6 miles downstream from the North Fork Kaweah River and Kaweah River confluence.
Middle Fork Kaweah River - upstream of Project				
Middle Fork Kaweah River No 3 Conduit near Potwisha Camp CA	USGS 11206000	10/1/75-9/30/02	36°30'41", 118°47'48"	Historic Flow Gage. Measured flow in the flowline near the point of diversion. Flow is currently measured at this location for operational purposes by SCE at gage no. 210.
Middle Fork Kaweah River near Potwisha Camp (river flow only) CA	USGS 11206500	7/12/49-9/30/14	36°30'47", 118°47'27"	Measured flow downstream of the diversion. Beginning October 2003, no records computed above 38 ft ³ /s. Incomplete data used in calculations made between 2003-2015.
Middle Fork Kaweah River near Potwisha Camp (total flow) CA	USGS 11206501	7/1/49-9/30/02	36°30'48", 118°47'27"	Historic Calculated Flow Gage. Computed combined flow USGS gage 11206000 and USGS gage 11206500.
Marble Fork Kaweah River - upstream of Project				
Marble Fork Kaweah River No 3 Conduit at Potwisha CA	USGS 11207500	10/1/75-9/30/02	36°31'10", 118°48'00"	Historic Flow Gage. Measured flow in the flowline near the point of diversion. Flow is currently measured at this location for operational purposes by SCE at gage no. 208.
Marble Fork Kaweah River (R only) at Potwisha Camp CA	USGS 11208000	4/1/50-9/30/14	36°31'19", 118°47'54"	Measures flow downstream of the diversion. Beginning October of 2003, no records recorded above 8 ft ³ /s. Incomplete data used in calculations.

Table 3.3-6. Other Flow Gages in the Kaweah River Watershed (continued).

Gage Name	Gaging Station Number	Period of Record	Lat, Long	Notes
Marble Fork Kaweah River - upstream of Project (continued)				
Marble Fork Kaweah River (total flow) at Potwisha Camp CA	USGS 11208001	10/1/50-9/30/02	36°31'08", 118°48'03"	Historic Calculated Flow Gage. Computed combined flow USGS Gage 11207500 and 11208000.
Marble Fork Kaweah River above Horse Creek near Lodgepole CA	USGS 11206820	10/01/13-4/22/15	36°27'05", 118°37'04"	Located 11.0 of miles upstream of the Marble Fork Diversion Dam. Measures flow in the Marble Fork Kaweah River.
East Fork Kaweah River - upstream of Project				
East Fork Kaweah River below Mosquito Creek near Hammond CA	USGS 11208620	9/1/68-10/11/73	36°27'05", 118°37'04"	Historic Flow Gage. Located 11.1 miles upstream of the Kaweah No. 1 Diversion Dam. Measures flow in the East Fork Kaweah River.
East Fork Kaweah River at Sequoia National Park Boundary near Hammond CA	USGS 11208625	8/1/68-10/19/71	36°27'30", 118°39'11"	Historic Flow Gage. Located 9.5 miles upstream of the Kaweah No. 1 Diversion Dam. Measures flow in the East Fork Kaweah River.
Tributary to Kaweah River				
Middle Fork Kaweah Tributary near Hammond CA	USGS 11208500	6/1/67-9/30/73	36°29'35", 118°49'30"	Historic Flow Gage. Located on an unnamed tributary that flows into the Kaweah River approximately 1 mile upstream of the Kaweah No. 2 Diversion.
North Fork Kaweah River (above Confluence with Kaweah River)				
North Fork Kaweah River at Kaweah CA	USGS 11209500	10/1/1910-9/30/81	36°29'25", 118°55'12"	Historic Flow Gage. Located 3.5 miles upstream of the confluence with the Kaweah River. Measures flow in the North Fork Kaweah River.

FIGURES

Figure 3.3-1. East Fork Kaweah River Inflow at Kaweah No. 1 Diversion Dam in Relation to Minimum Instream Flow Requirements and Water Supply Commitments in Dry (top) and Normal (bottom) Years (May 1994-December 2014).

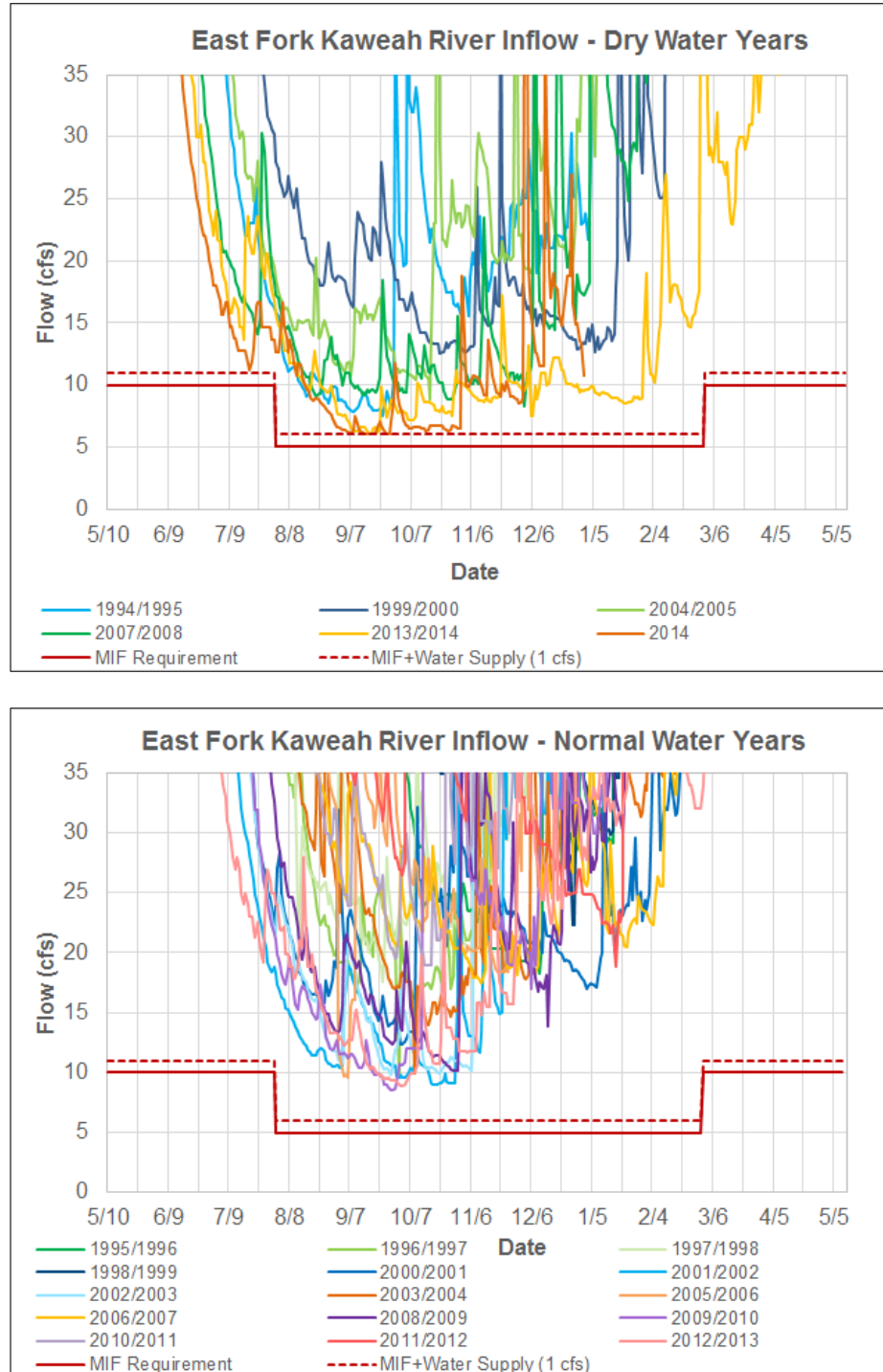


Figure 3.3-2. Kaweah River Inflow at Kaweah No. 2 Diversion Dam in Relation to Minimum Instream Flow Requirements and Water Supply Commitments in Dry (top) and Normal (bottom) Years (May 1994-December 2014).

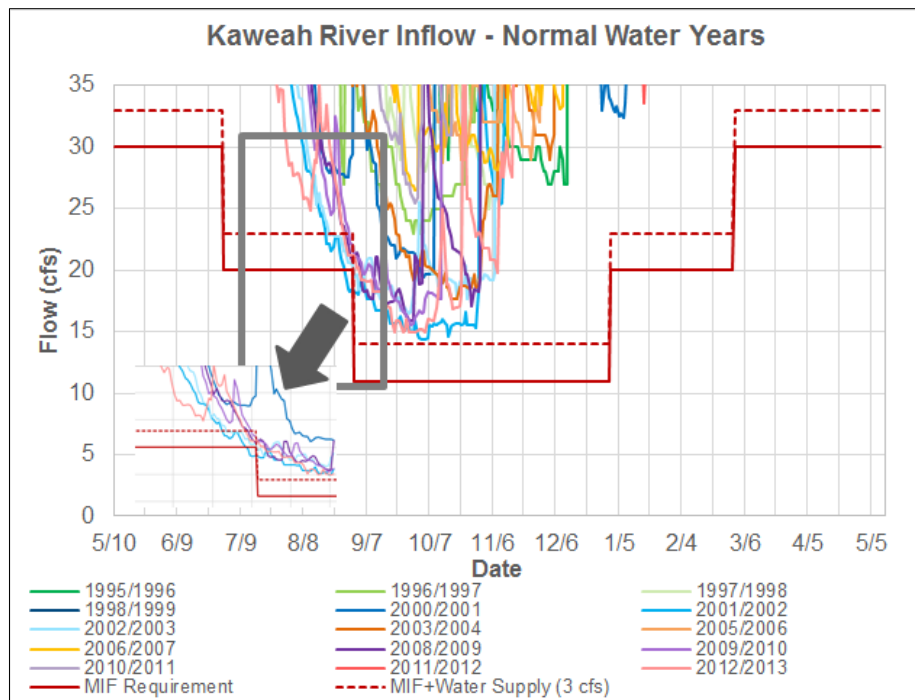
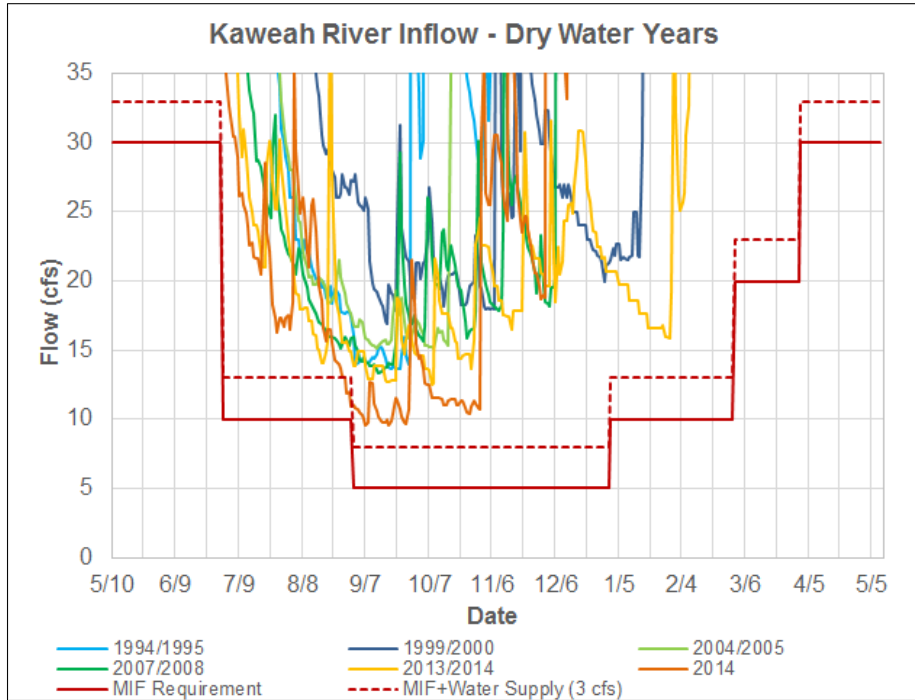


Figure 3.3-3. Distribution of the April 1 to July 1 Forecast of Runoff in the Kaweah River at Terminus Reservoir based on the Bulletin 120 May 1 Forecast (1994-2016).

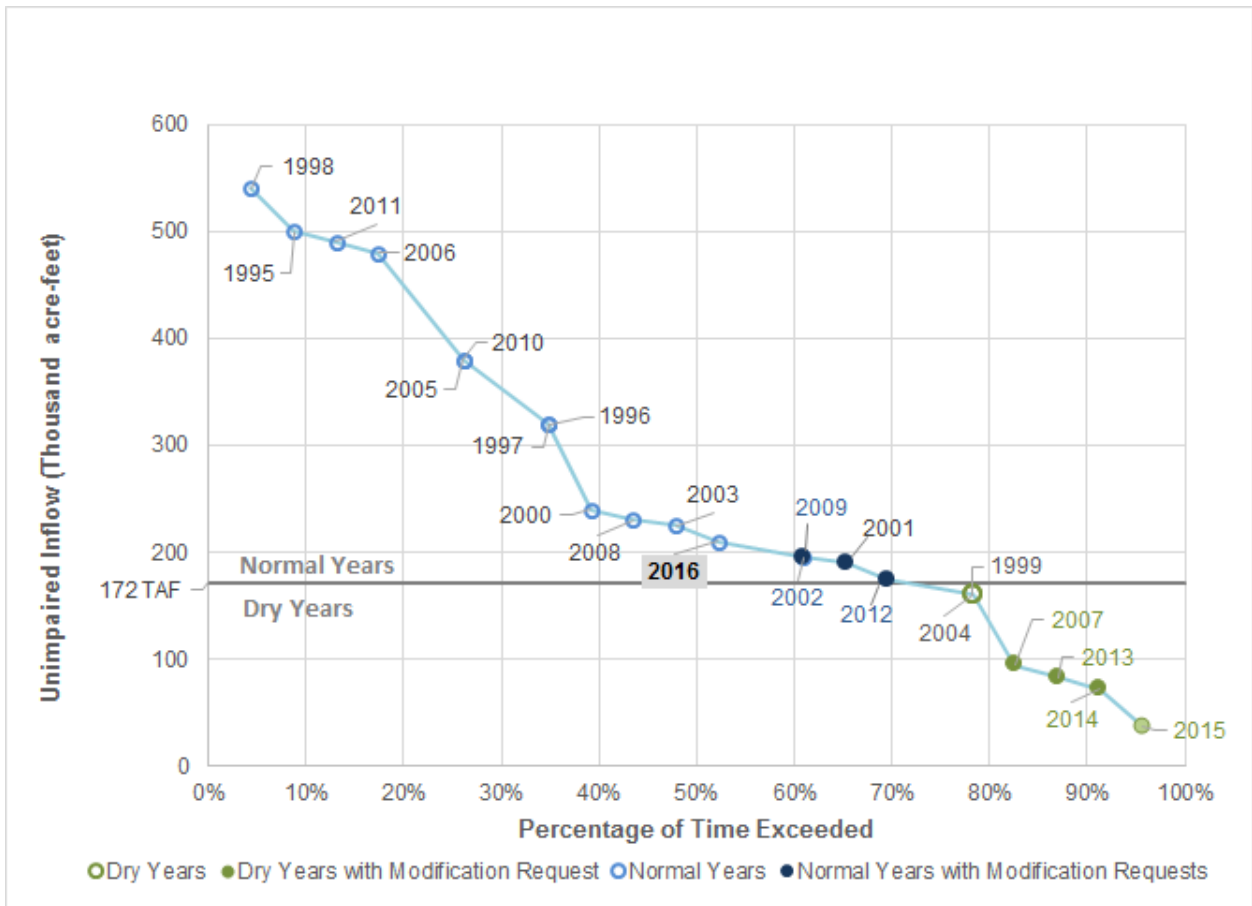
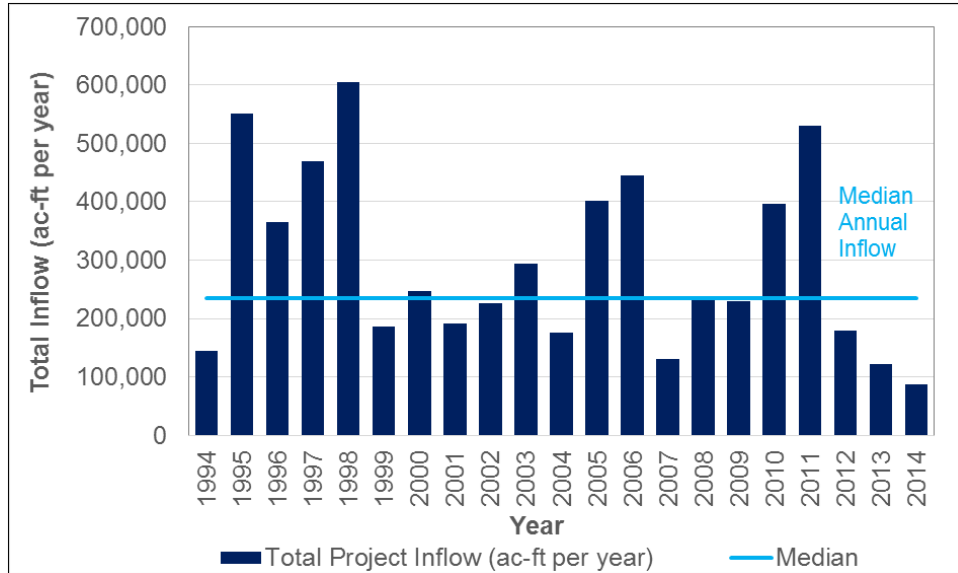


Figure 3.3-4. Annual Inflow to the Kaweah Project (WY 1994-2014).



¹ The period of record (POR) used to characterize recent historical flows in the Kaweah River and East Fork Kaweah River extends from water year 1994 through 2014. This time period best represents Project operations since issuance of the FERC license and recent climatic conditions.

Figure 3.3-5a. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the East Fork Kaweah River Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse.

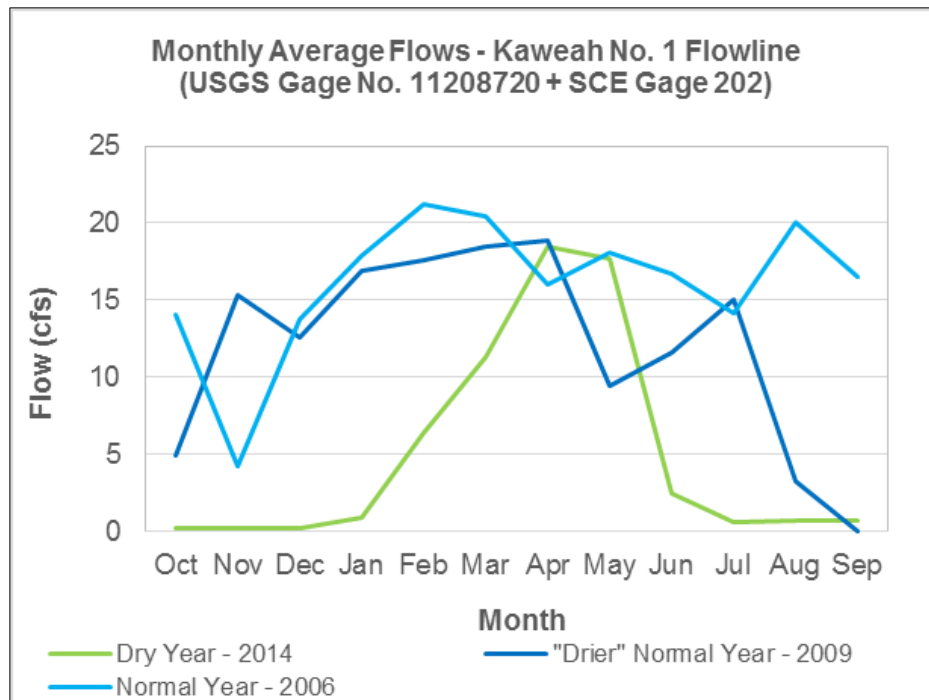
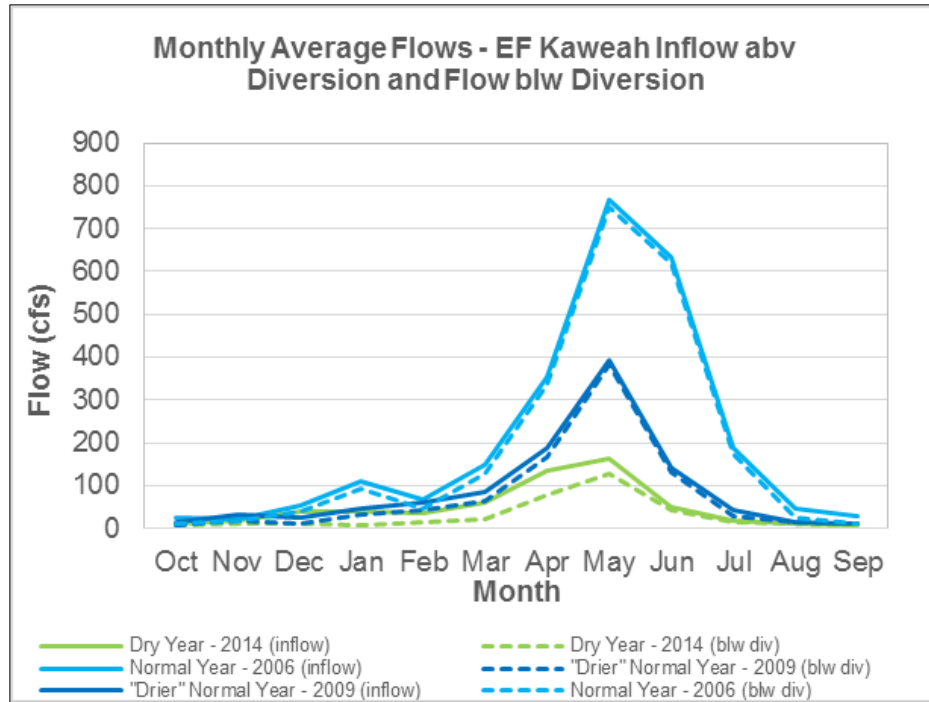


Figure 3.3-5a. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the East Fork Kaweah River Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse (continued).

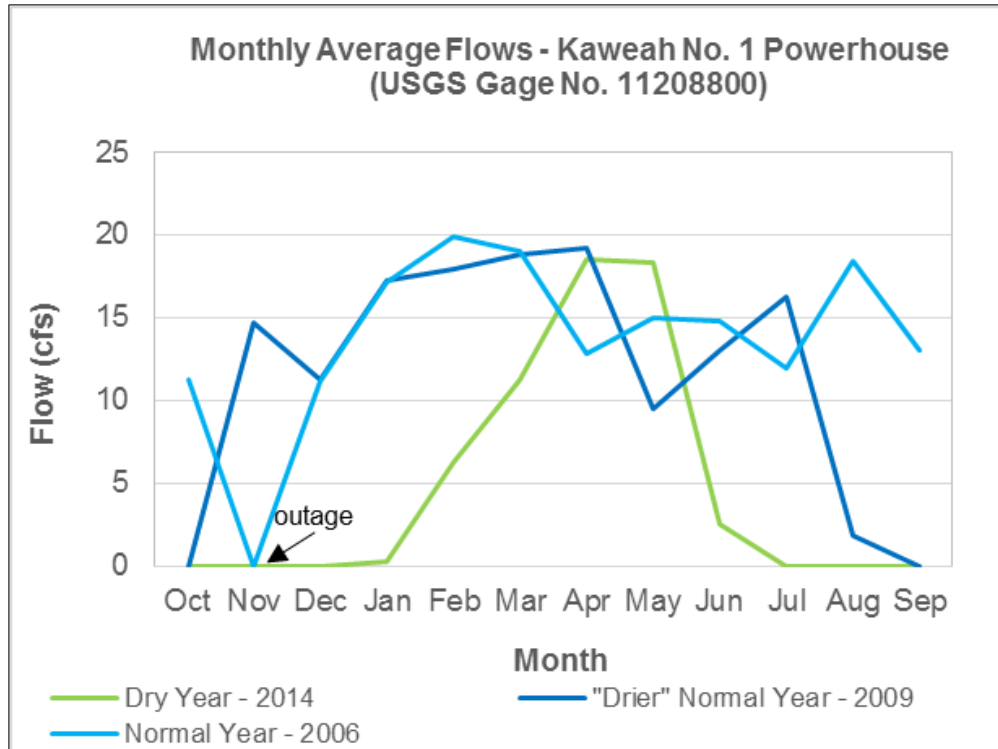


Figure 3.3-5b. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse.

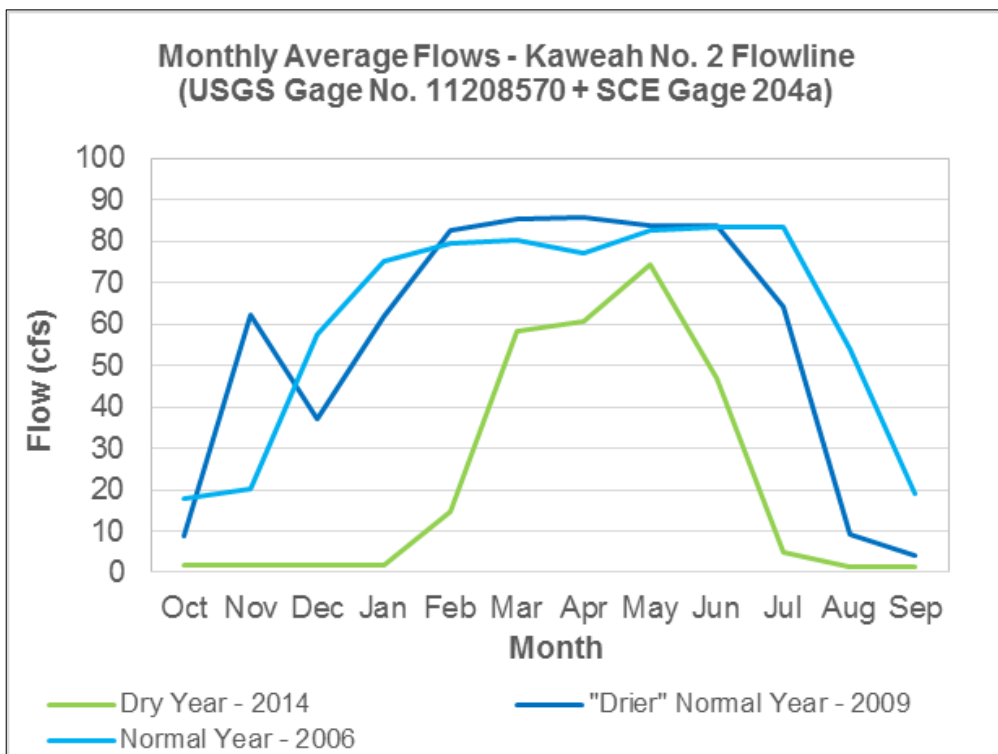
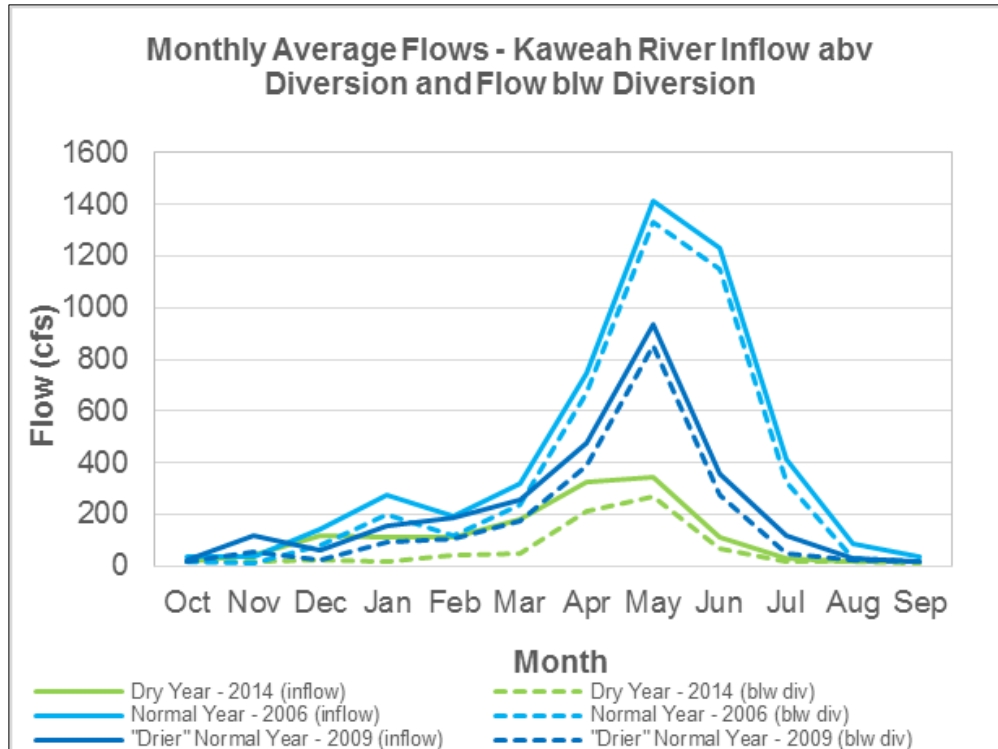


Figure 3.3-5b. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse (continued).

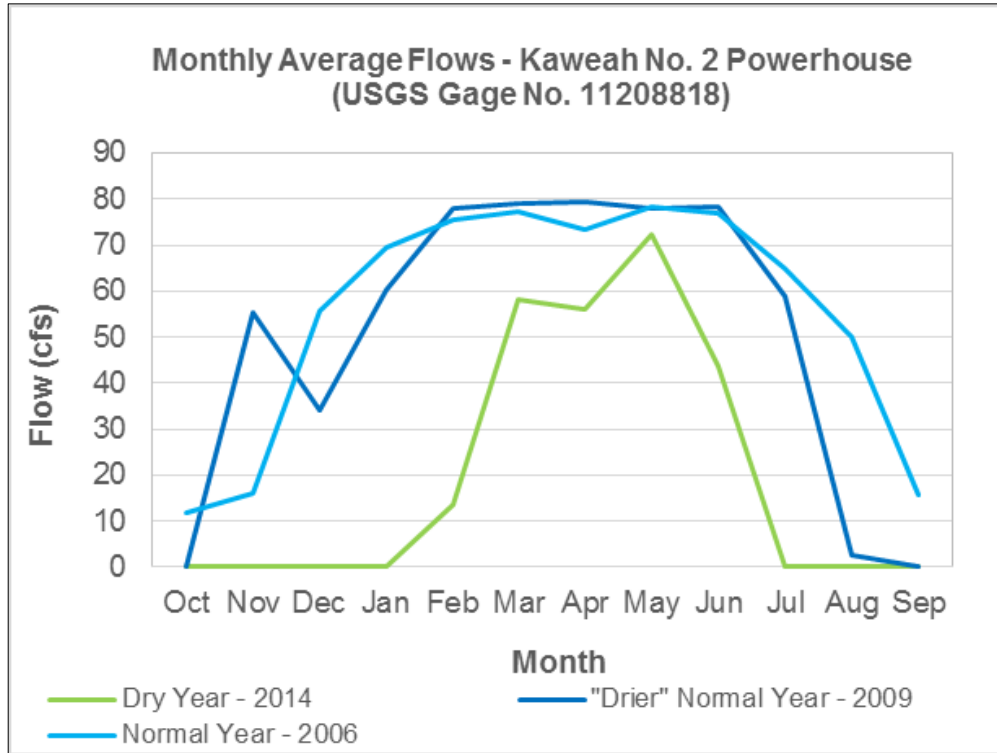


Figure 3.3-5c. Monthly Average Flows in a Representative Dry Year (2014), Normal Year (2006), and “Drier” Normal Year (2009) at the Kaweah No. 3 Powerhouse.

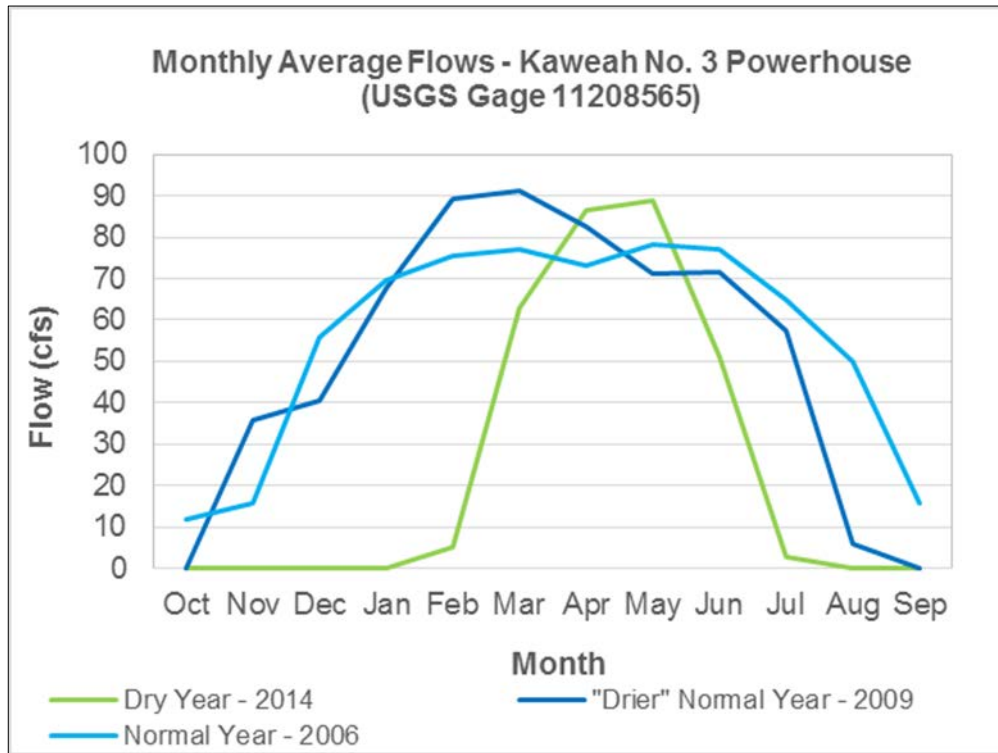


Figure 3.3-6a. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the East Fork Kaweah River Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse (WY 1994-2014).¹

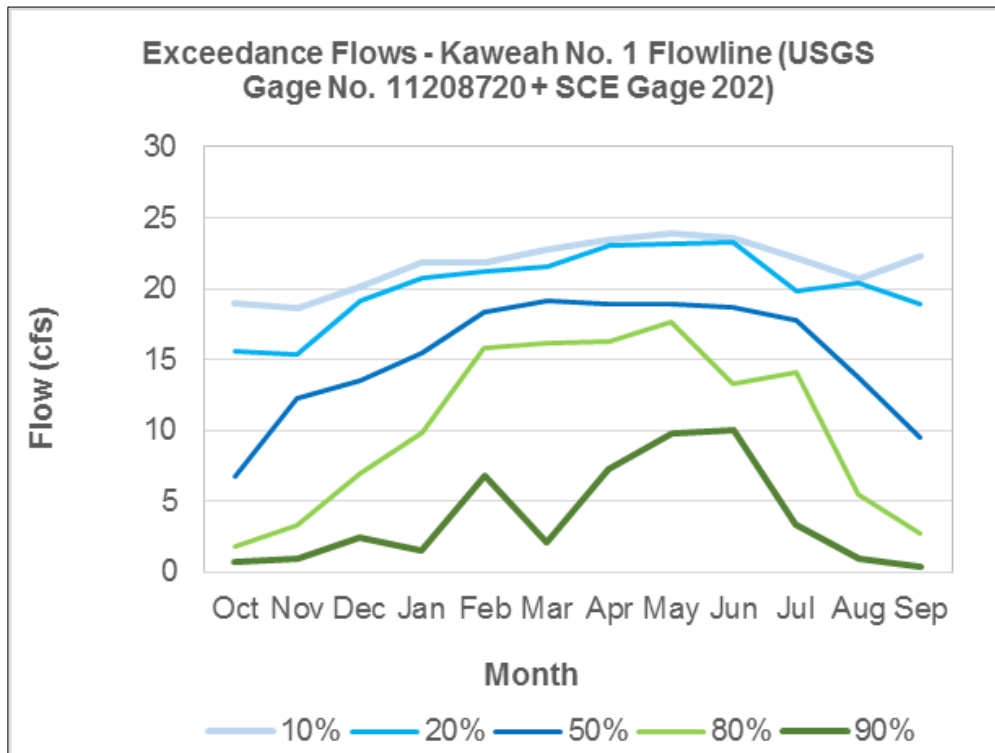
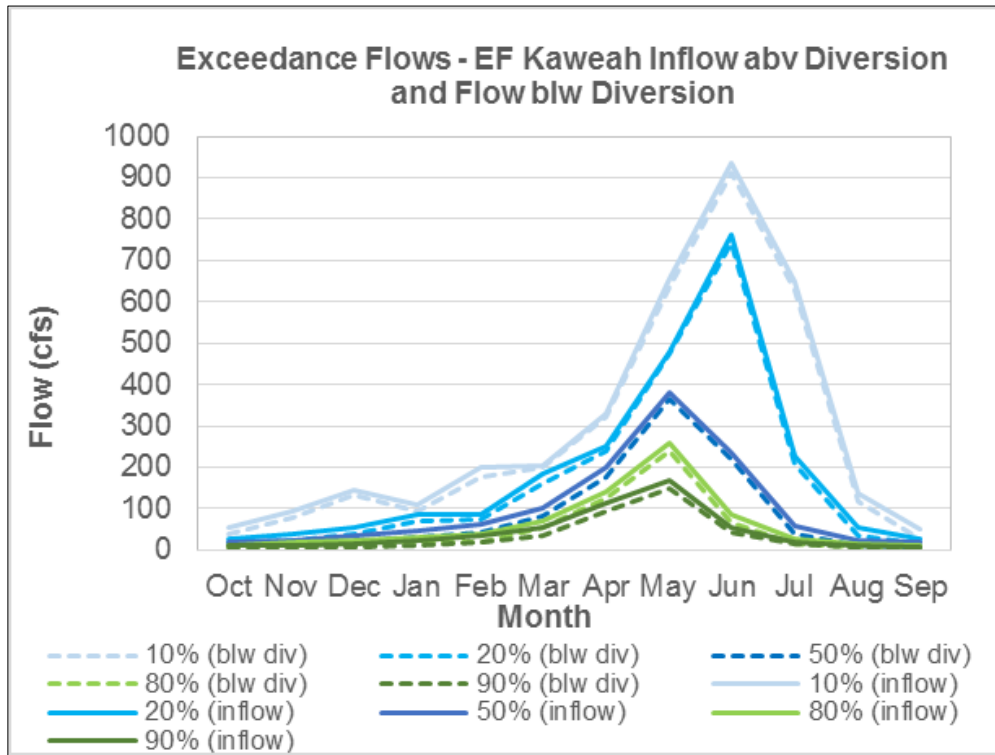
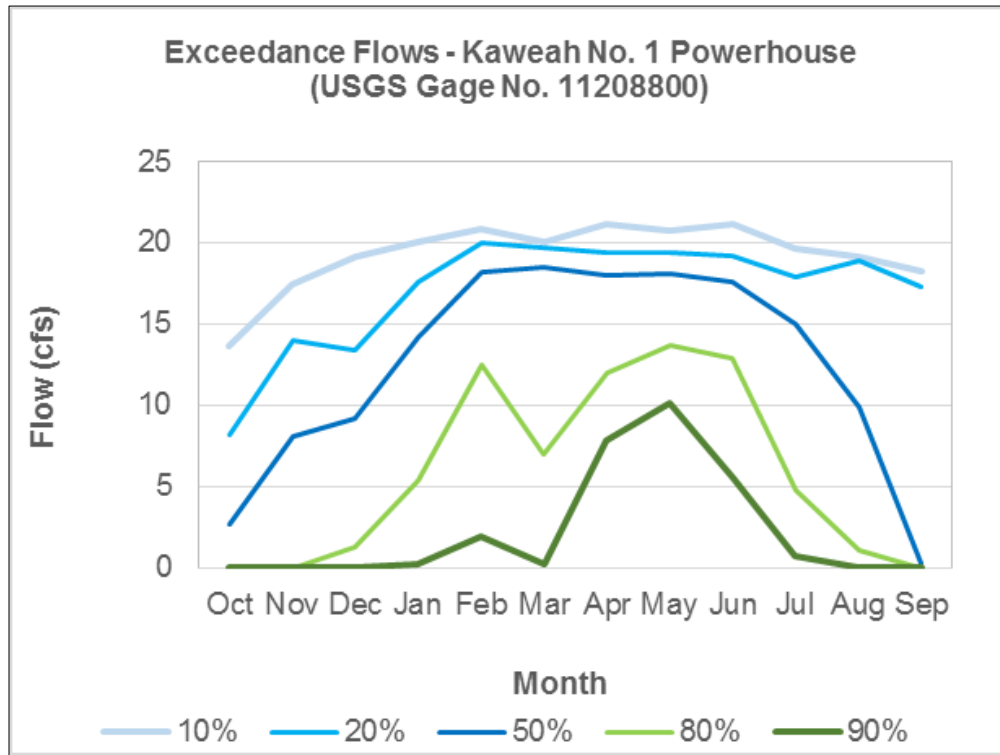


Figure 3.3-6a. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the East Fork Kaweah River Bypass Reach and Kaweah No. 1 Flowline, and at the Kaweah No. 1 Powerhouse (WY 1994-2014) (continued).¹



¹ Kaweah No. 1 Powerhouse period of record is from 2002-2014.

Figure 3.3-6b. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse (WY 1994-2014).¹

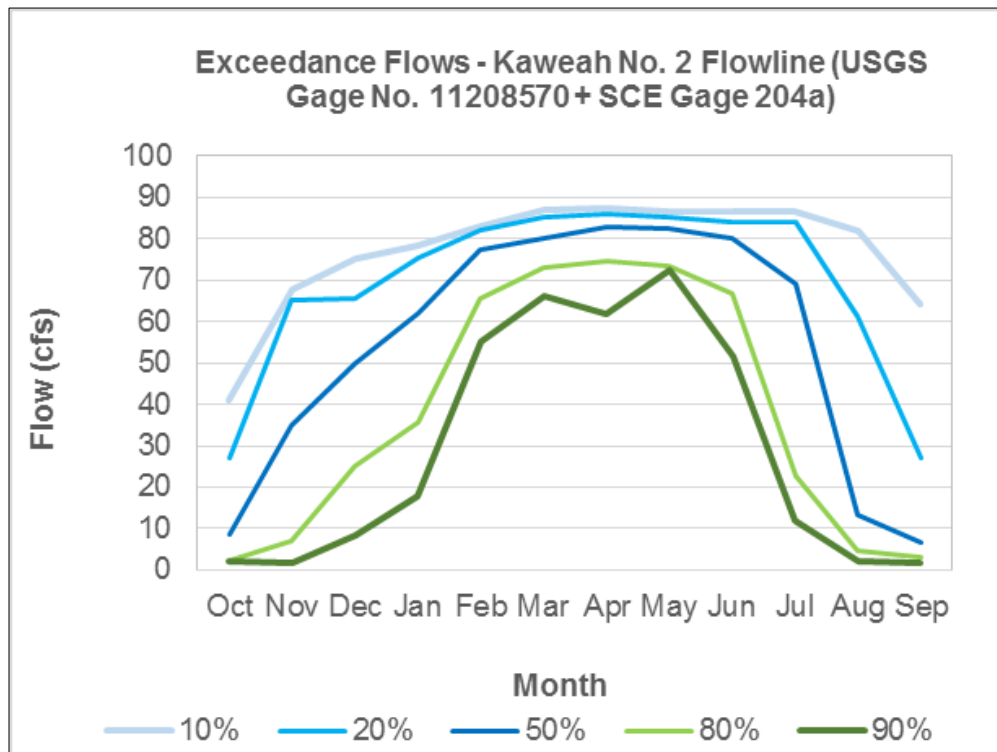
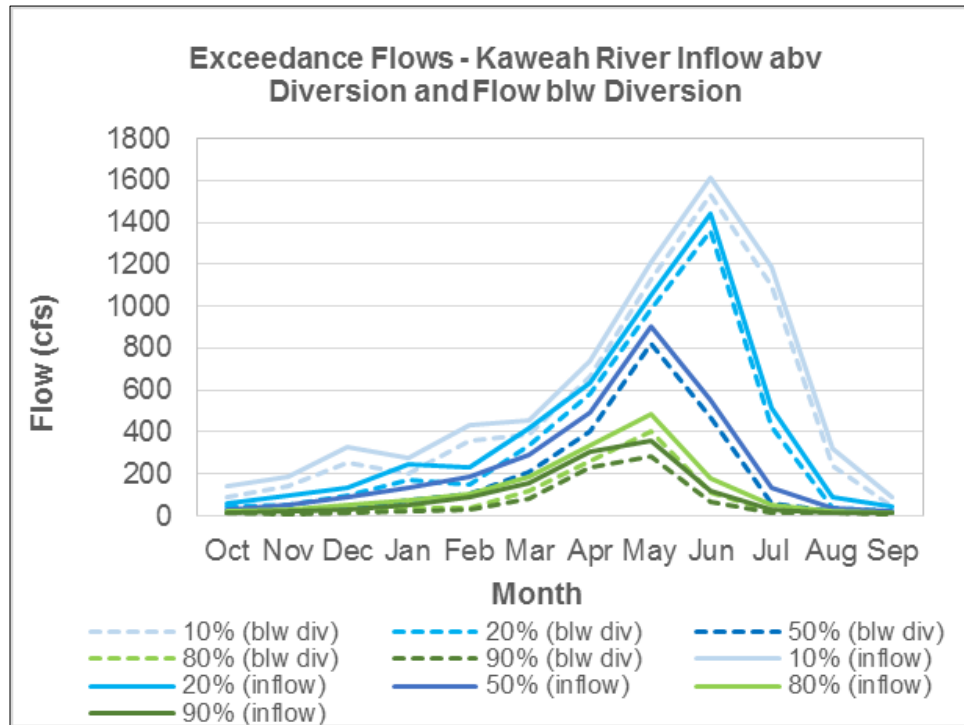
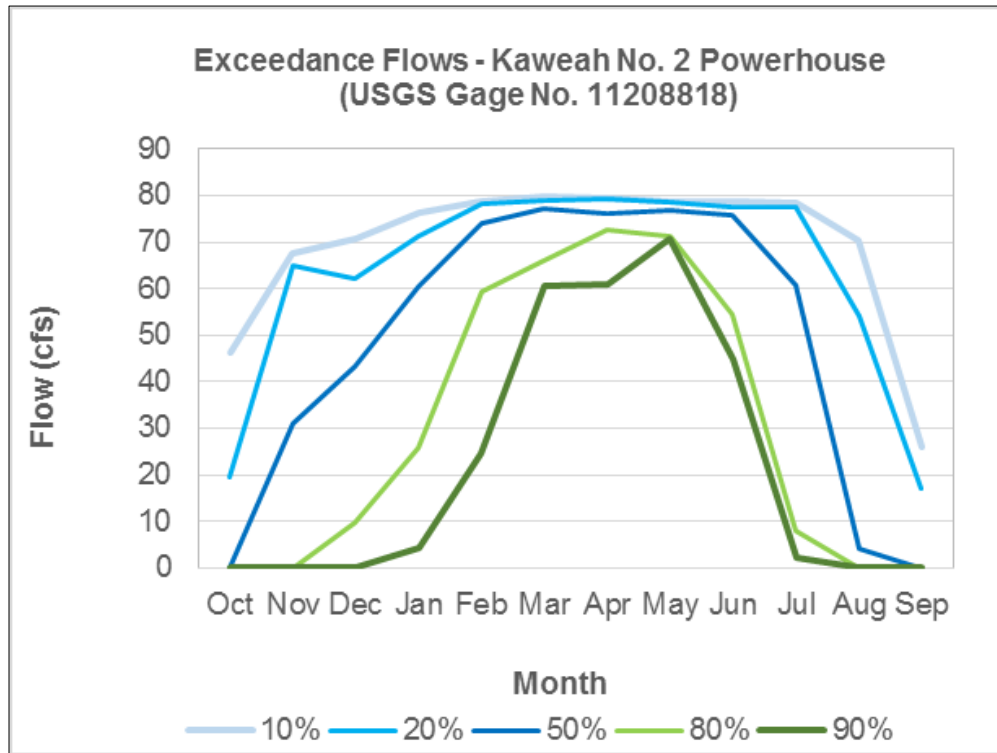
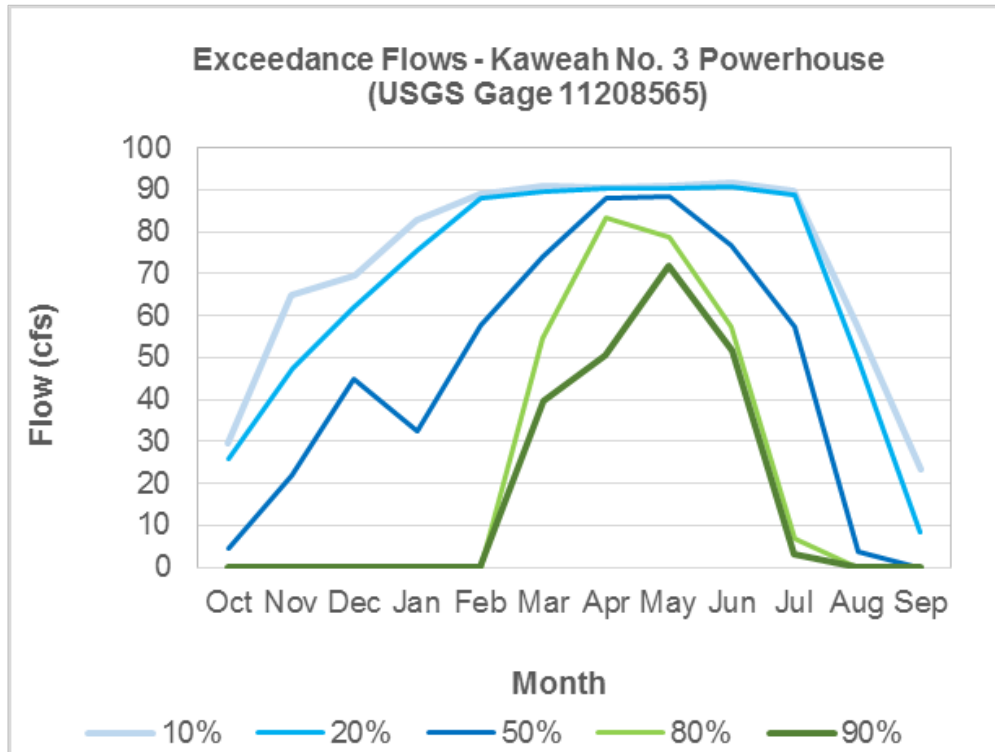


Figure 3.3-6b. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) in the Kaweah River Bypass Reach and Kaweah No. 2 Flowline, and at the Kaweah No. 2 Powerhouse (WY 1994-2014) (continued).¹



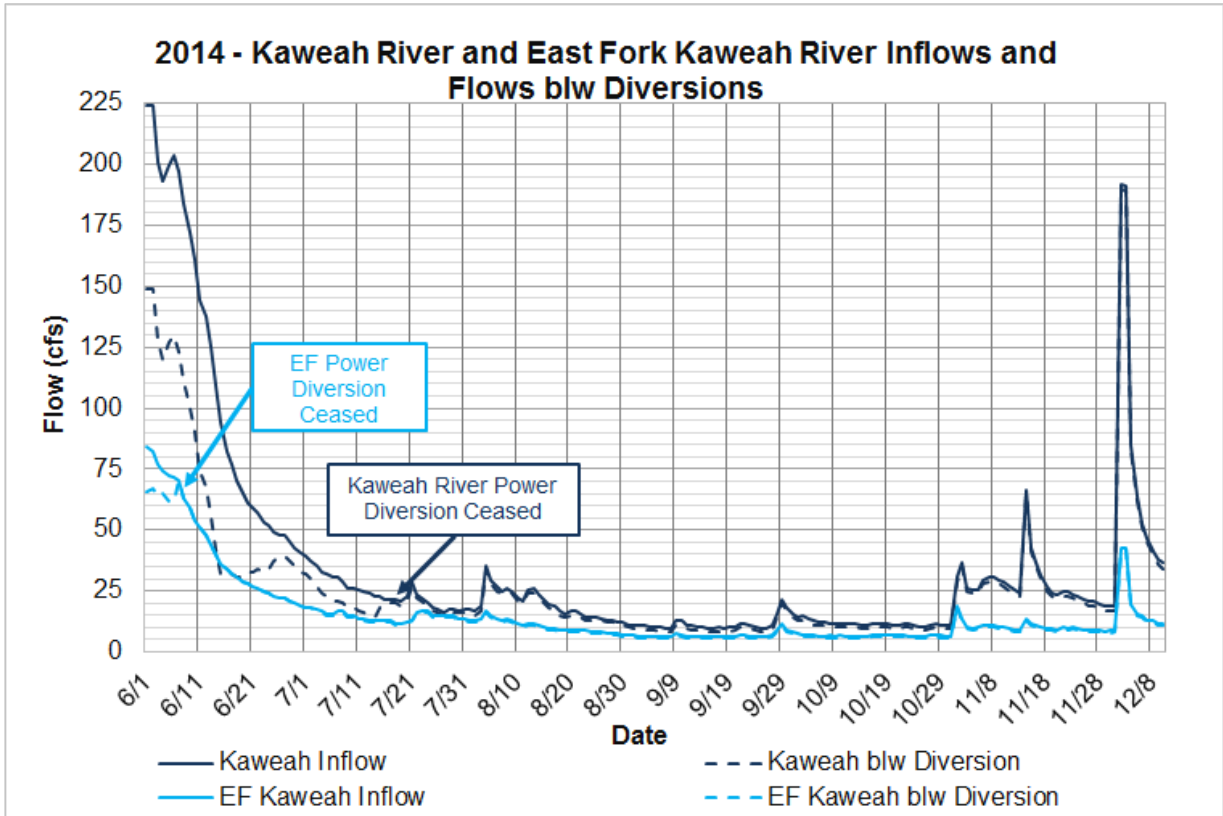
¹ Kaweah No. 2 Powerhouse period of record is from 2002-2014.

Figure 3.3-6c. Monthly Exceedance Flows (10%, 20%, 50%, 80%, and 90%) at the Kaweah No. 3 Powerhouse (WY 2002-2014).¹

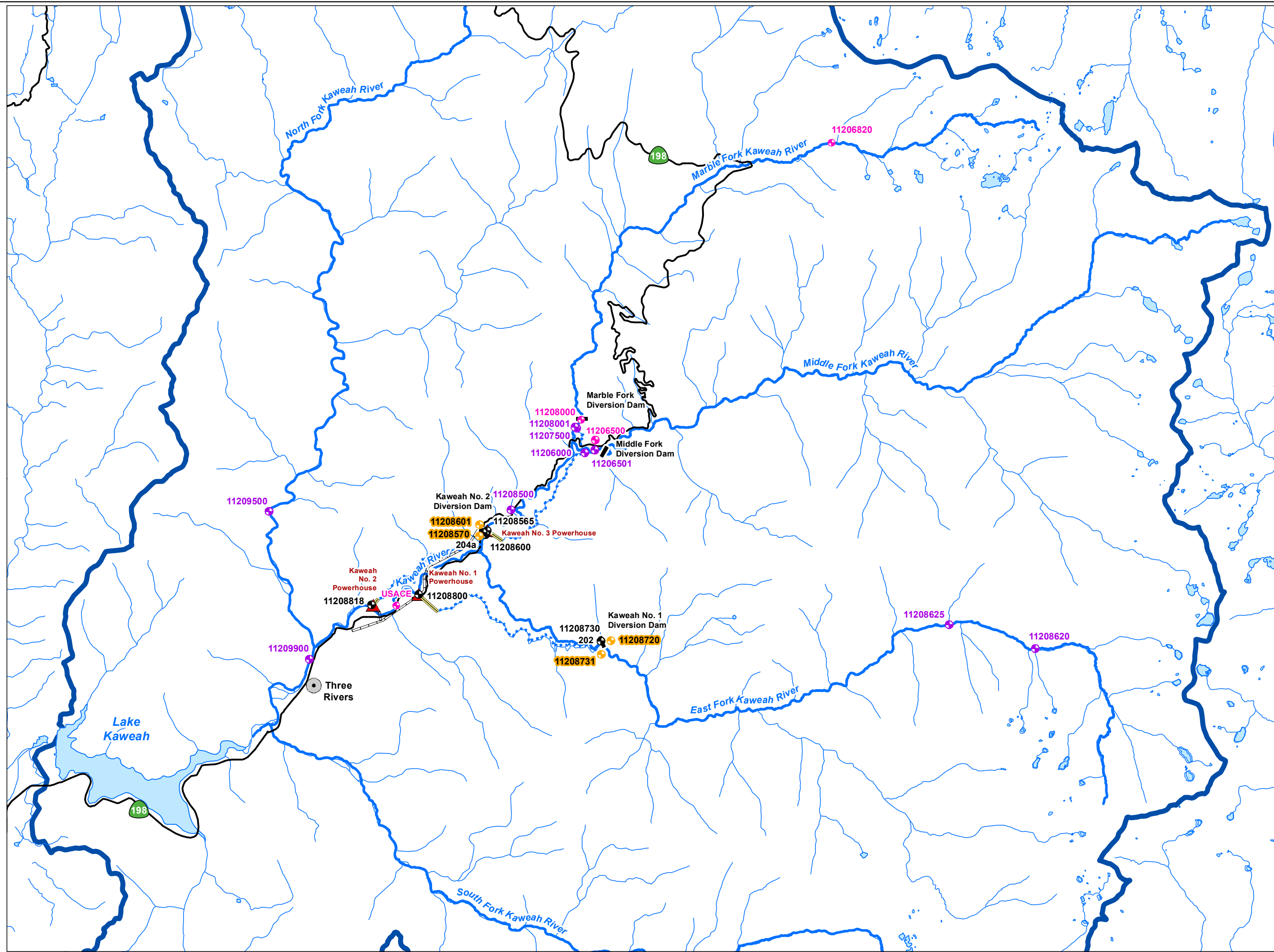


¹ Kaweah No. 3 Powerhouse period of record is from 2002-2014. Extended outages at the powerhouse occurred in April-July 2011 and April-May 2012. These months were not included in the analysis.

Figure 3.3-7. East Fork Kaweah River and Kaweah River Inflows and Flows below the Kaweah No. 1 and 2 Diversions and Timing of Generation (2014).



MAPS



- Facilities**
- Powerhouse
 - Diversion
 - Flowline
 - Penstock
 - Transmission Line
 - Project Gage (current)
 - Project Gage (historic)
- Other Features**
- Highway
 - Watercourse
 - Water Body
 - Watershed Boundary
 - Non-Project Gage (current)
 - Non-Project Gage (historic)



Eastern Hydro Generation
Map 3.3-1

Current and Historic Flow Gages in the Bypass Reaches and Flowlines Associated with the Kaweah Project and Other Non-Project Flow Gages in the Kaweah Watershed

Projection: UTM Zone 11
Datum: NAD 83

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APPENDIX 3.3-A

**Historic Water Year Types for the Kaweah River at Terminus Reservoir Based on
Department of Water Resources Bulletin 120 May 1 Runoff Forecast (1938-2016)**

Table 3.3-A-1. Historic Water Year Types for the Kaweah River at Terminus Reservoir Based on Department of Water Resources Bulletin 120 May 1 Runoff Forecast (1938-2016).¹

Year	Apr-Jul Runoff Forecast (TAF)	Water Year Type Classification	Year	Apr-Jul Runoff Forecast (TAF)	Water Year Type Classification	Year	Apr-Jul Runoff Forecast (TAF)	Water Year Type Classification
1938	400	Normal	1973	440	Normal	2007	95	Dry
1939	120	Dry	1974	320	Normal	2008	230	Normal
1940	250	Normal	1975	190	Normal	2009	195	Normal
1941	440	Normal	1976	80	Dry	2010	380	Normal
1942	350	Normal	1977	40	Dry	2011	490	Normal
1943	320	Normal	1978	600	Normal	2012	175	Normal
1944	270	Normal	1979	250	Normal	2013	83	Dry
1945	340	Normal	1980	495	Normal	2014	72	Dry
1946	240	Normal	1981	255	Normal	2015	38	Dry
1947	145	Dry	1982	490	Normal	2016	210	Normal
1948	210	Normal	1983	720	Normal			
1949	170	Dry	1984	220	Normal			
1950	200	Normal	1985	220	Normal			
1951	90	Dry	1986	490	Normal			
1952	600	Normal	1987	110	Dry			
1953	170	Dry	1988	110	Dry			
1954	230	Normal	1989	150	Dry			
1955	180	Normal	1990	95	Dry			
1956	300	Normal	1991	210	Normal			
1957	170	Dry	1992	125	Dry			
1958	490	Normal	1993	360	Normal			
1959	75	Dry	1994	135	Dry			
1960	125	Dry	1995	500	Normal			
1961	55	Dry	1996	320	Normal			
1962	300	Normal	1997	320	Normal			
1963	235	Normal	1998	540	Normal			
1964	140	Dry	1999	160	Dry			
1965	Not Available	Not Available	2000	240	Normal			
1966	110	Dry	2001	190	Normal			
1967	610	Normal	2002	195	Normal			
1968	110	Dry	2003	225	Normal			
1969	800	Normal	2004	160	Dry			
1970	150	Dry	2005	380	Normal			
1971	170	Dry	2006	480	Normal			

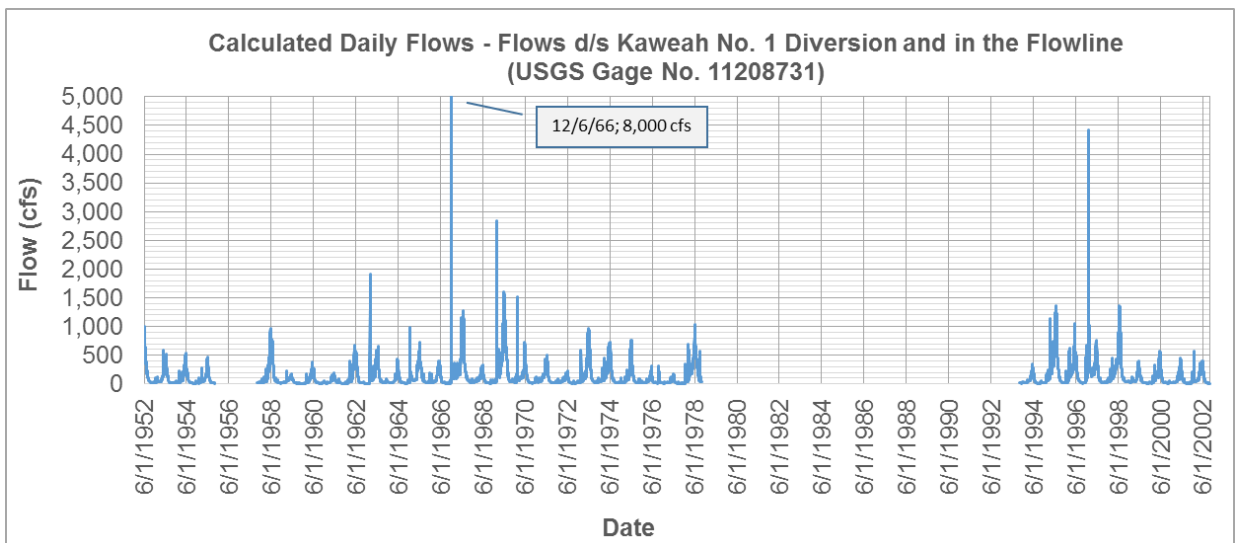
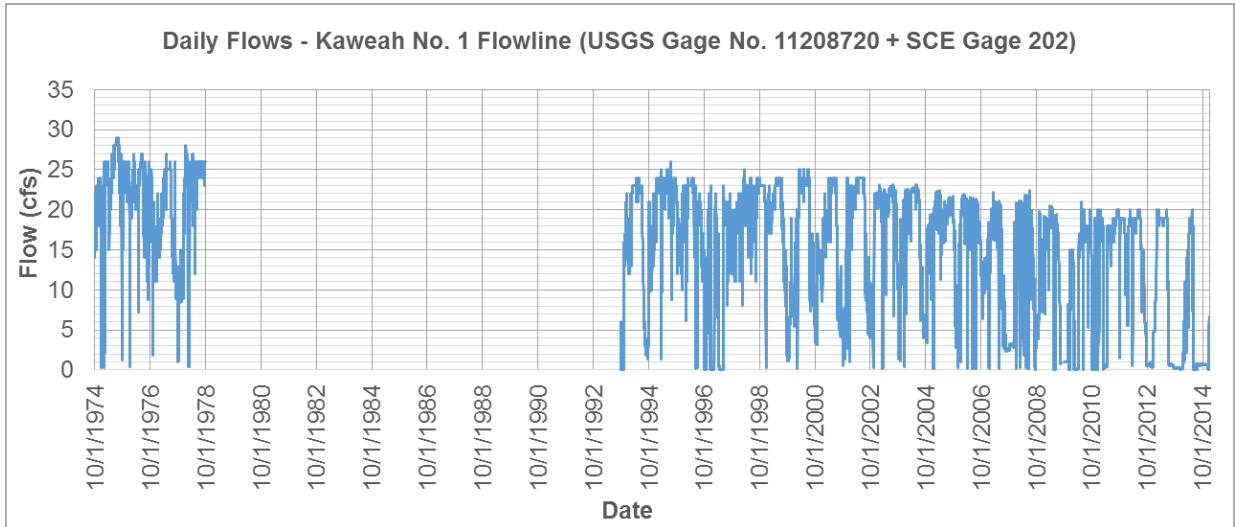
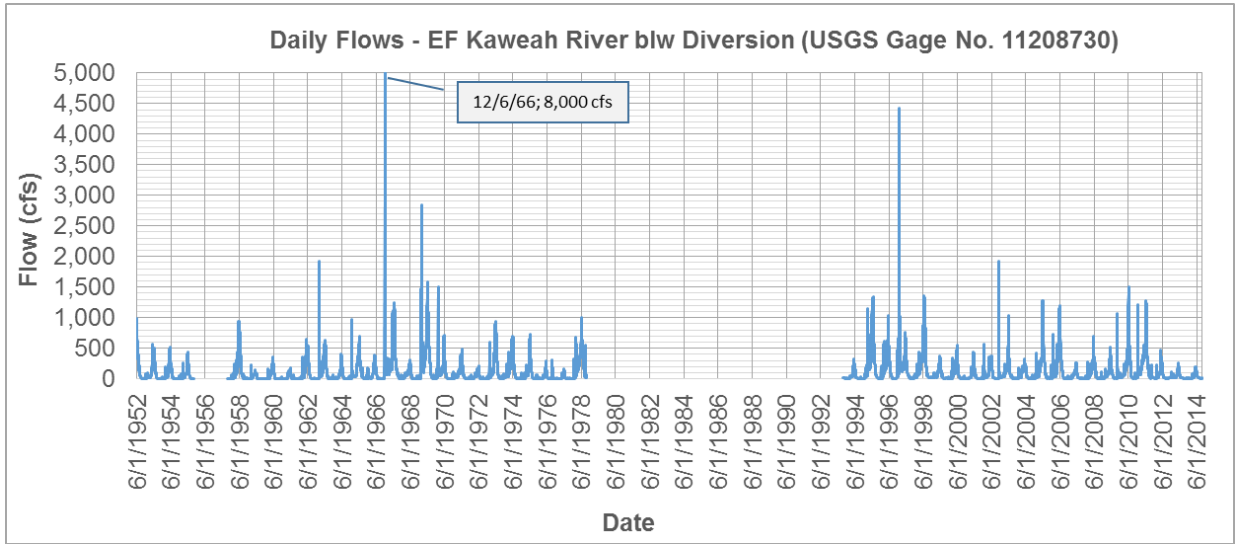
¹Data obtained from: DWR Bulletin 120. Available at: <http://cdec.water.ca.gov/snow/bulletin120/>. Water Year Types for Apr 1 - Jul 1 Forecast of Runoff in the Kaweah River at Terminus Reservoir based on Bulletin 120 May 1 Forecast.

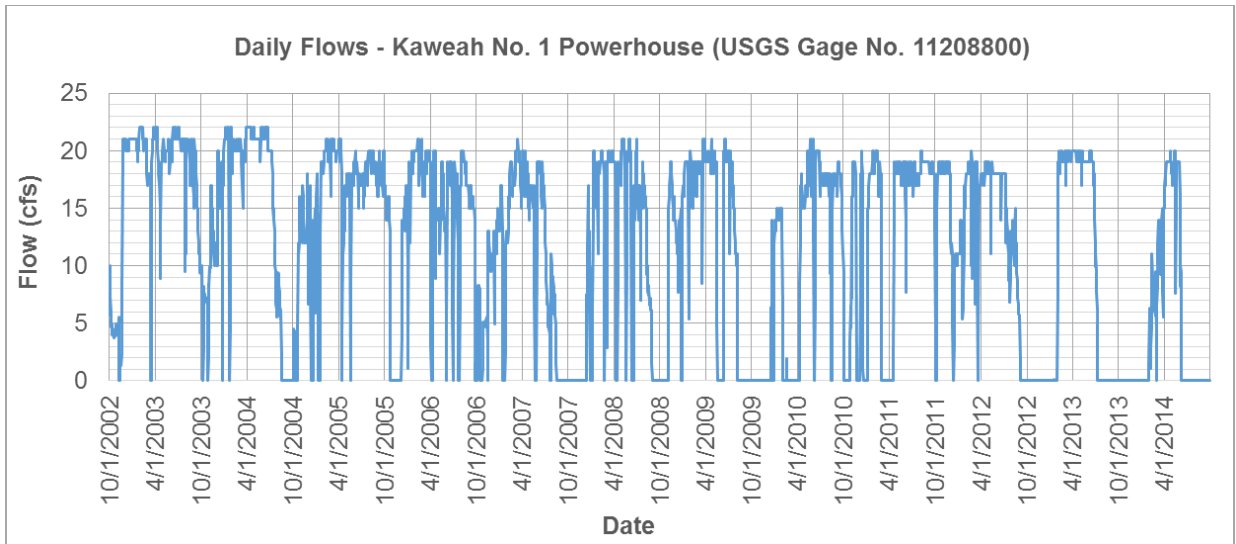
APPENDIX 3.3-B

Daily Flow in Bypass Reaches and Flowlines Associated with the Kaweah Project

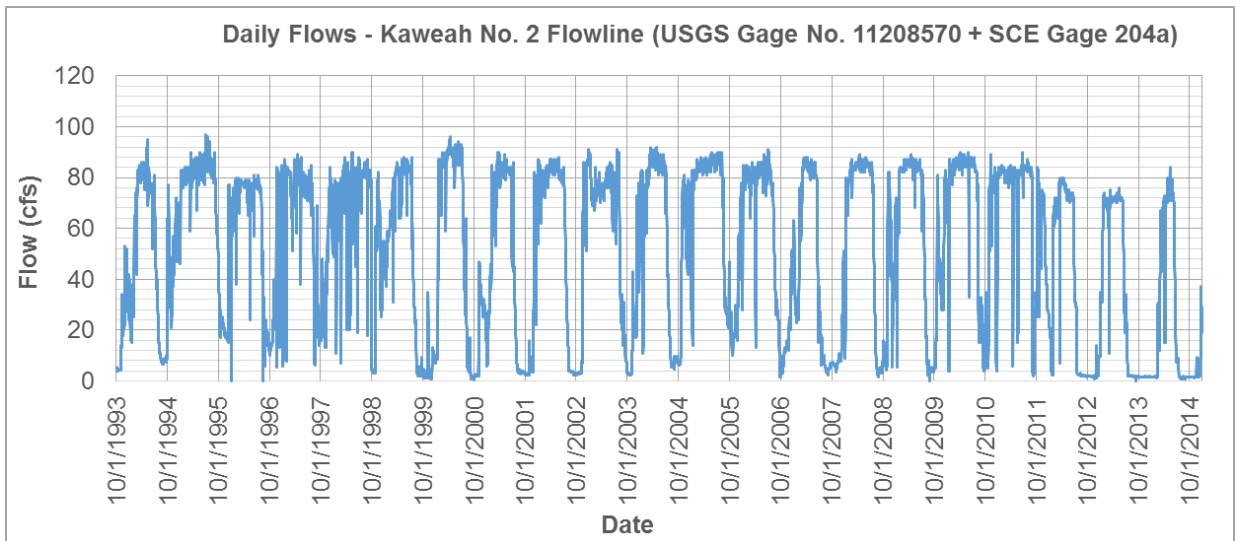
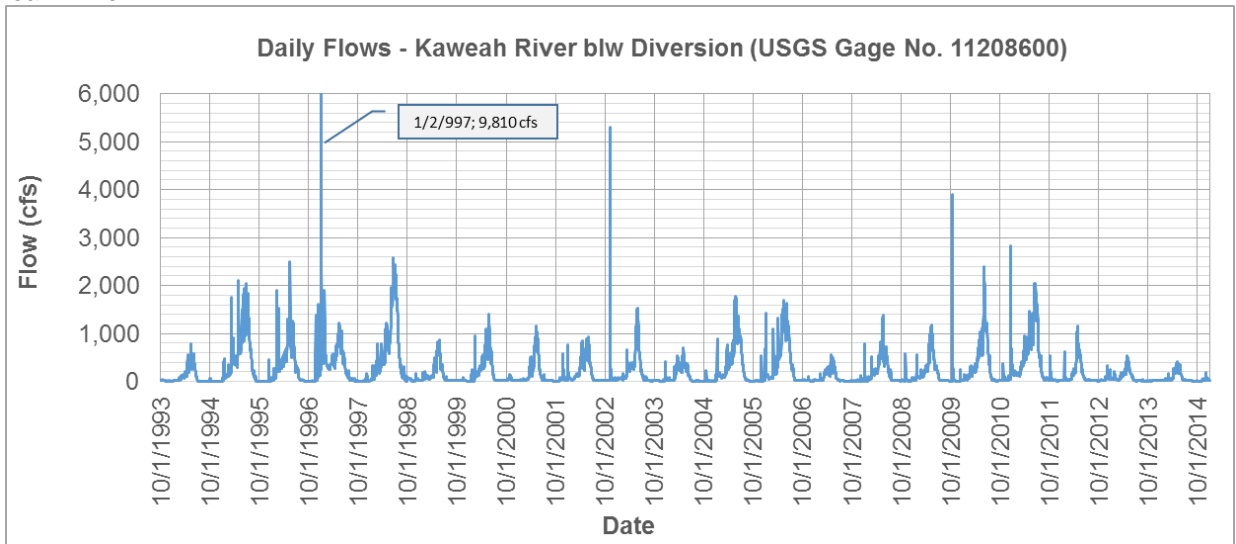
Data are presented for period of record available. Note, y-axis scales are different.

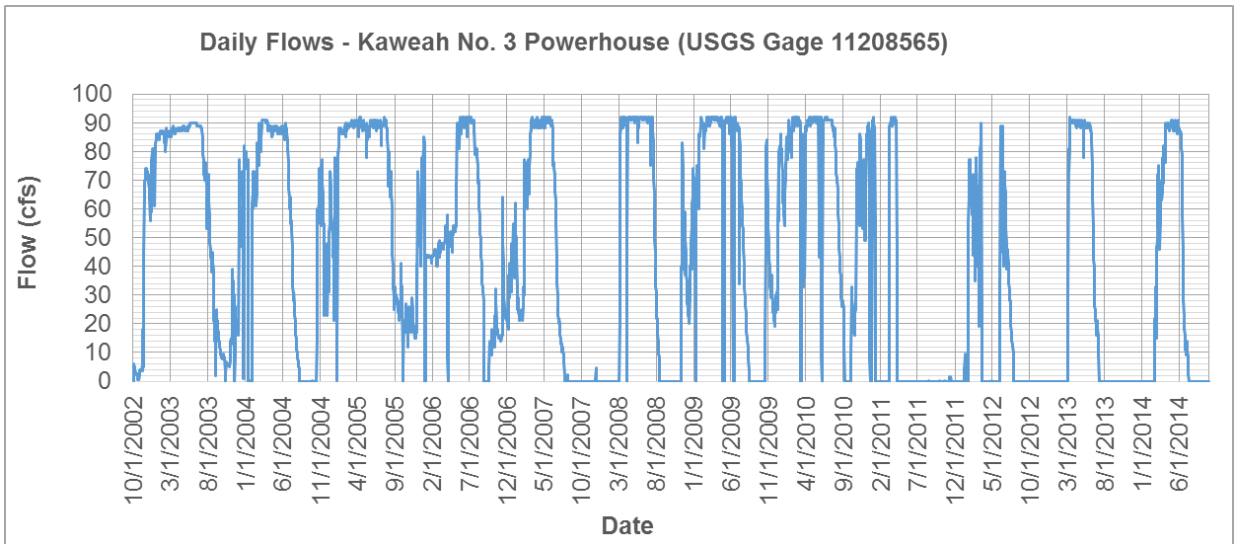
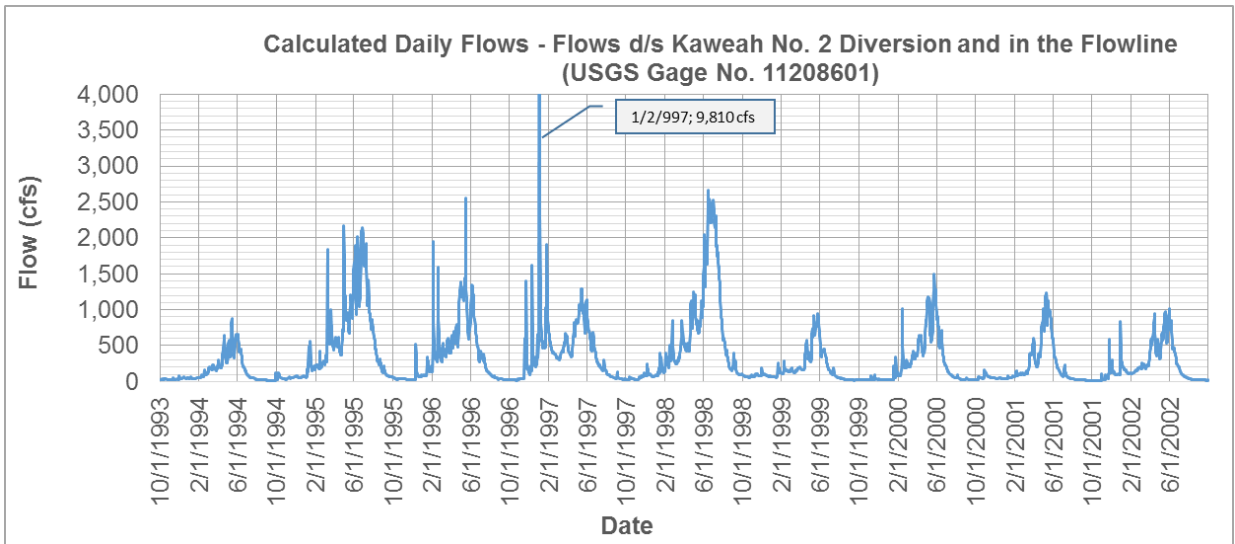
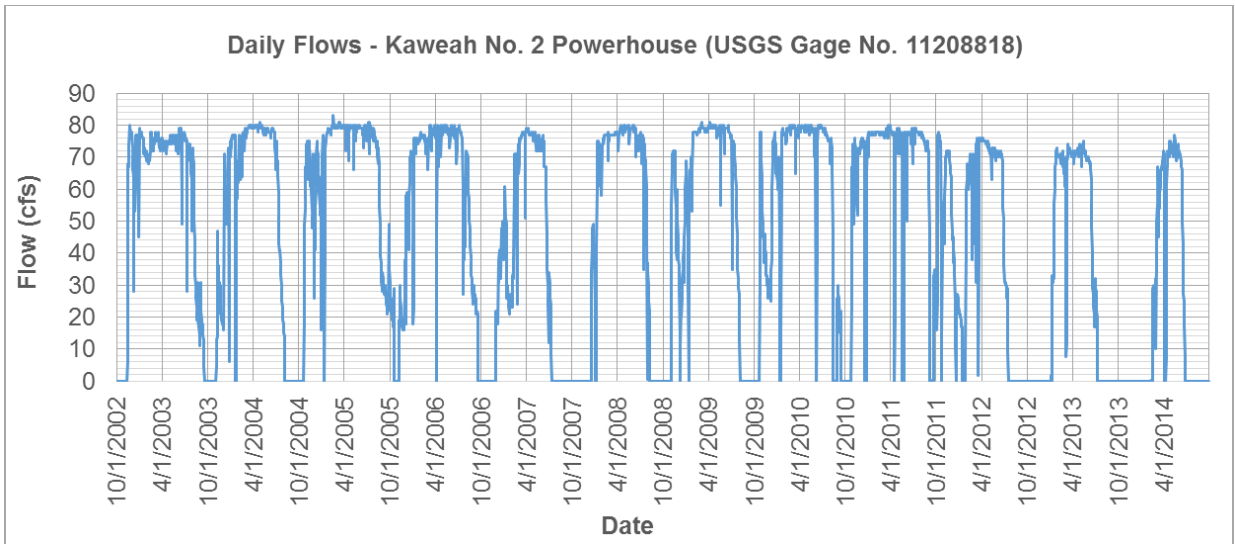
East Fork Kaweah River





Kaweah River





APPENDIX 3.3-C

**Tables of Monthly Summary Statistics (maximum, minimum, average discharge)
and Exceedances for Gaging Stations in Bypass Reaches and Flowlines
Associated with the Kaweah Project**

Table 3.3-C-1. Flow Statistics for Stream Gages and Flowlines Associated with the Kaweah Project for the Available Flow Data Period of Record (1994-2014)¹.

Month	Monthly Exceedance Flows (cfs)					Maximum, Minimum, and Average Monthly Flows (cfs)		
	10%	20%	50%	80%	90%	Max	Min	Average
EF Kaweah River blw Diversion (USGS Gage No. 11208730)								
Oct	37.7	19.3	10.3	7.9	7.7	79.4	5.9	16.2
Nov	77.8	21.9	15.9	8.4	6.7	149.7	6.0	24.1
Dec	134.8	39.2	20.8	10.4	7.2	160.6	6.2	33.4
Jan	92.7	71.5	31.2	20.1	9.7	673.5	8.6	69.7
Feb	177.9	75.9	43.0	19.6	18.3	193.5	14.0	59.7
Mar	201.1	160.6	83.3	53.1	33.7	251.0	19.9	102.7
Apr	320.9	240.3	177.7	123.5	91.8	336.9	78.9	189.8
May	636.3	474.6	363.7	238.3	150.6	750.1	127.8	369.2
Jun	912.3	743.8	217.8	66.0	41.5	1017.0	33.2	347.5
Jul	627.2	208.6	38.7	16.3	13.5	774.7	12.0	138.8
Aug	116.6	34.4	11.3	7.4	6.8	147.7	6.4	28.3
Sep	37.7	19.3	10.3	7.9	7.7	79.4	5.9	16.2
Kaweah No. 1 Flowline (USGS Gage No. 11208720 + SCE Gage 202)								
Oct	19.0	15.6	6.8	1.8	0.8	23.1	0.2	8.1
Nov	18.6	15.3	12.3	3.3	0.9	23.2	0.3	11.0
Dec	20.1	19.2	13.6	7.0	2.4	21.3	0.2	13.1
Jan	21.9	20.7	15.5	9.8	1.5	22.4	0.9	14.8
Feb	21.9	21.3	18.4	15.8	6.8	23.0	0.4	17.4
Mar	22.8	21.5	19.2	16.1	2.1	23.1	0.1	17.5
Apr	23.5	23.1	18.9	16.2	7.3	23.7	5.5	18.5
May	23.9	23.2	19.0	17.7	9.8	23.9	0.0	18.6
Jun	23.6	23.2	18.7	13.3	10.0	23.9	2.5	17.8
Jul	22.2	19.8	17.8	14.1	3.4	22.4	0.6	16.1
Aug	20.7	20.4	13.7	5.5	1.0	21.1	0.7	13.0
Sep	22.3	18.9	9.5	2.7	0.4	22.9	0.0	10.8
Flows d/s Kaweah No. 1 Diversion and in the Flowline (USGS Gage No. 11208731)								
Oct	53.3	28.1	20.8	11.8	10.9	80.4	8.4	24.3
Nov	92.6	37.4	24.5	18.3	12.7	158.7	9.9	35.1
Dec	142.9	53.1	36.0	21.0	15.5	180.4	10.3	46.5
Jan	110.4	85.9	46.8	32.7	23.0	674.4	9.6	84.5
Feb	198.7	86.6	62.7	38.1	36.1	204.5	20.3	77.1
Mar	203.9	183.5	101.7	70.2	52.9	270.1	31.3	120.2
Apr	329.5	251.2	198.3	142.6	113.5	352.9	97.3	208.3
May	655.3	478.8	379.7	259.9	169.0	768.3	145.5	387.9
Jun	934.5	760.6	236.8	86.0	52.7	1034.8	43.6	365.3
Jul	649.0	227.4	59.3	28.4	19.3	794.0	14.7	154.9
Aug	137.0	54.4	21.3	13.5	11.3	168.7	10.4	41.2
Sep	51.4	28.0	19.8	10.9	7.5	67.8	6.7	22.7
Flow to Kaweah No. 1 Powerhouse (USGS Gage No. 11208800)								
Oct	13.7	8.2	2.7	0.0	0.0	14.7	0.0	4.0
Nov	17.4	14.0	8.1	0.0	0.0	18.6	0.0	7.2
Dec	19.2	13.4	9.2	1.3	0.0	20.6	0.0	8.6
Jan	20.0	17.6	14.2	5.4	0.3	20.8	0.2	12.5
Feb	20.9	20.0	18.2	12.5	1.9	21.2	0.1	16.2
Mar	20.0	19.7	18.5	7.0	0.2	20.0	0.0	14.7
Apr	21.1	19.4	18.0	12.0	7.9	21.7	6.7	16.1
May	20.7	19.4	18.1	13.7	10.2	21.1	9.4	16.9
Jun	21.2	19.2	17.6	12.8	5.5	21.3	2.5	15.9
Jul	19.7	17.9	15.0	4.8	0.7	20.4	0.0	12.8
Aug	19.1	18.9	9.9	1.1	0.0	19.2	0.0	9.8

Month	Monthly Exceedance Flows (cfs)					Maximum, Minimum, and Average Monthly Flows (cfs)		
	10%	20%	50%	80%	90%	Max	Min	Average
Sep	18.2	17.3	0.3	0.0	0.0	18.3	0.0	6.8
Kaweah River blw Diversion (USGS Gage No. 11208600)								
Oct	88.3	46.0	16.6	13.1	11.9	233.5	11.8	35.7
Nov	145.7	52.9	20.3	13.3	11.4	334.8	5.7	47.2
Dec	255.2	94.3	27.7	16.5	15.6	349.7	5.9	64.7
Jan	199.2	174.0	74.0	37.7	24.1	1250.3	17.2	142.7
Feb	357.1	152.5	102.0	40.7	32.4	439.2	30.4	127.5
Mar	385.1	339.8	210.5	118.9	83.7	521.2	51.3	228.2
Apr	664.8	580.2	406.0	262.4	231.2	694.4	212.9	423.4
May	1128.9	983.7	823.1	403.7	282.5	1331.1	271.0	752.0
Jun	1529.3	1362.0	468.0	110.0	67.6	2008.7	64.6	649.9
Jul	1099.3	427.4	62.4	22.2	16.5	1571.1	13.3	271.2
Aug	238.1	37.5	24.1	18.4	13.9	253.6	12.4	51.3
Sep	44.5	22.8	14.9	12.1	9.8	90.1	8.3	20.6
Kaweah No. 2 Flowline (USGS Gage No. 11208570 + SCE Gage 204a)								
Oct	41.1	26.9	8.7	2.2	1.9	58.8	1.6	15.7
Nov	67.6	65.1	34.7	7.0	1.9	71.0	1.6	33.6
Dec	75.0	65.5	49.9	25.2	8.3	75.9	1.6	45.2
Jan	78.1	75.4	62.0	35.8	17.6	82.5	1.7	54.3
Feb	83.1	82.1	77.2	65.7	55.2	83.7	14.7	71.8
Mar	87.0	85.2	79.9	73.0	66.3	87.5	58.3	78.8
Apr	87.2	85.8	82.7	74.6	61.8	90.9	44.7	78.7
May	86.7	85.3	82.6	73.2	72.5	88.3	65.4	80.1
Jun	86.6	83.8	80.3	66.6	51.4	89.3	46.9	76.3
Jul	86.4	83.9	69.0	22.9	11.9	89.7	4.7	59.8
Aug	81.9	61.3	13.5	4.8	2.0	83.2	1.3	30.2
Sep	64.1	27.1	6.6	3.1	1.8	71.7	1.5	16.4
Flow to Kaweah No. 2 Powerhouse (USGS Gage No. 11208818)								
Oct	46.1	19.7	0.0	0.0	0.0	57.4	0.0	10.0
Nov	67.6	65.1	31.2	0.0	0.0	68.2	0.0	31.1
Dec	70.7	62.0	43.4	9.9	0.0	71.6	0.0	39.9
Jan	76.3	71.3	60.3	25.7	4.2	77.2	0.0	51.0
Feb	78.9	78.1	74.2	59.3	24.6	79.2	13.4	67.3
Mar	79.7	79.0	77.2	66.0	60.4	79.9	58.3	74.1
Apr	79.6	79.2	76.1	72.5	60.8	79.6	56.2	74.7
May	78.8	78.7	76.7	71.3	70.6	78.8	70.3	75.5
Jun	78.7	77.5	75.8	54.3	44.9	78.9	43.6	69.2
Jul	78.4	77.6	60.8	8.0	2.2	78.6	0.0	46.9
Aug	70.3	53.9	4.2	0.0	0.0	74.7	0.0	21.5
Sep	25.8	17.0	0.0	0.0	0.0	28.7	0.0	6.9
Flows d/s Kaweah No. 2 Diversion and in the Flowline (USGS Gage No. 11208601)								
Oct	142.0	60.8	32.7	19.9	18.3	260.4	16.4	51.4
Nov	189.9	96.1	55.3	33.4	24.0	377.4	20.6	80.8
Dec	329.0	135.8	90.3	49.7	26.8	409.6	24.2	109.8
Jan	275.2	245.0	136.8	77.8	52.0	1292.7	18.9	197.0
Feb	436.4	234.2	184.9	102.6	91.2	514.1	57.5	199.3
Mar	458.4	417.8	291.9	188.1	159.7	600.2	109.6	307.0
Apr	741.8	632.5	491.4	339.9	306.0	771.5	273.5	502.1
May	1213.9	1052.5	905.0	486.7	355.9	1413.8	345.6	832.0
Jun	1612.1	1442.5	555.2	179.6	116.8	2075.0	114.0	726.2
Jul	1188.5	513.6	133.9	50.8	31.1	1647.5	24.6	331.0
Aug	320.3	93.7	37.0	22.2	18.6	334.2	17.9	81.4
Sep	92.0	44.0	24.5	16.5	14.6	161.8	11.3	36.9

Month	Monthly Exceedance Flows (cfs)					Maximum, Minimum, and Average Monthly Flows (cfs)		
	10%	20%	50%	80%	90%	Max	Min	Average
Flow to Kaweah No. 3 Powerhouse (USGS Gage 11208565) ²								
Oct	29.3	25.8	4.5	0.0	0.0	30.8	0.0	10.5
Nov	64.7	47.2	22.0	0.1	0.0	69.3	0.0	24.7
Dec	69.7	62.0	45.0	0.0	0.0	71.9	0.0	36.0
Jan	82.8	75.4	32.5	0.0	0.0	85.6	0.0	37.5
Feb	89.1	88.1	57.9	0.0	0.0	89.3	0.0	49.0
Mar	90.8	89.4	74.0	54.4	39.8	91.3	36.2	72.1
Apr	90.3	90.1	87.9	83.3	50.5	90.3	47.0	83.8
May	91.0	90.3	88.5	78.7	71.8	91.1	71.3	86.0
Jun	91.5	90.6	76.7	57.1	51.8	91.6	51.2	74.7
Jul	89.6	88.7	57.5	6.7	3.1	89.6	2.8	49.9
Aug	57.7	49.5	3.7	0.0	0.0	60.5	0.0	18.3
Sep	23.4	8.2	0.0	0.0	0.0	27.6	0.0	4.1

¹Data at powerhouses are available from 2002-2014.

² Extended outages at Kaweah No. 3 Powerhouse occurred in April-July 2011 and April-May 2012. These months were not included in the analysis.

APPENDIX 3.3-D

**Monthly Average Flows by Year in Bypass Reaches and Flowlines Associated
with the Kaweah Project over the Available Flow Data Period of Record**

Table 3.3-D-1. Monthly Average Flows by Year in Bypass Reaches and Flowlines Associated with the Kaweah Project over the Available Flow Data Period of Record.

Note: See Tables 3.3-4 and 3.3-5 for data gaps/ time periods with missing data.

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
EF Kaweah River blw Diversion (USGS Gage No. 11208730)												
1952									632.3	229.7	50.1	6.2
1953	1.5	3.7	9.7	33.1	19.4	28.6	130.8	177.2	323.9	87.1	4.9	0.2
1954	0.4	0.6	2.9	11.6	23.5	48.6	190.9	369.2	142.4	21.1	0.8	0.5
1955	0.9	2.6	2.5	5.2	30.3	29.8	68.8	232.5	209.9	27.0	0.3	0.3
1956-57	no data											
1958	0.5	1.2	7.4	11.6	35.1	78.1	203.4	663.0	614.2	189.3	34.0	5.9
1959	0.3	7.6	0.2	1.2	16.7	26.5	79.2	84.9	38.4	0.8	0.6	0.7
1960	0.7	0.8	0.6	1.1	15.9	29.0	115.1	206.1	112.6	4.8	0.6	0.8
1961	0.8	1.4	2.0	0.5	0.4	6.8	62.2	119.2	48.2	0.9	4.8	1.0
1962	1.2	0.9	1.6	2.7	71.3	25.1	249.9	377.3	362.1	83.5	5.3	0.6
1963	1.4	0.5	0.4	59.3	169.4	46.3	122.4	411.6	415.6	115.3	16.5	5.5
1964	4.2	16.5	10.0	16.6	2.2	15.3	79.5	231.2	149.3	17.8	1.1	0.8
1965	3.5	5.2	109.9	68.6	41.0	45.0	151.4	342.8	420.6	147.1	55.4	9.9
1966	1.7	26.3	25.3	19.5	13.9	55.2	219.8	312.2	69.0	6.9	1.1	0.6
1967	0.5	13.6	593.9	114.4	103.6	131.3	157.1	582.1	820.1	552.4	148.3	48.6
1968	13.6	12.8	23.8	19.3	41.1	62.2	114.4	224.1	129.0	13.5	1.4	0.7
1969	2.9	5.2	20.0	358.6	219.1	160.4	350.1	943.8	965.7	451.3	96.5	22.8
1970	22.4	10.2	30.8	137.5	51.5	85.3	127.5	451.2	279.0	45.3	3.7	1.1
1971	1.0	12.7	17.4	30.1	31.6	54.8	120.1	255.6	338.0	64.7	8.4	2.5
1972	1.2	3.6	13.2	12.8	10.6	58.4	55.1	130.3	77.7	2.4	1.9	2.9
1973	0.8	4.6	17.6	80.9	50.4	78.7	181.5	662.9	654.1	138.6	25.0	1.9
1974	10.1	12.3	20.8	73.4	37.9	113.1	200.7	494.8	430.6	87.9	15.1	4.5
1975	2.3	2.6	8.6	7.0	22.9	52.0	72.9	404.3	472.2	80.3	7.1	3.2

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976	12.6	5.5	6.9	4.3	4.1	24.2	67.7	166.2	21.3	1.8	1.4	26.1
1977	12.6	4.0	1.3	1.9	2.1	2.3	45.2	54.8	60.9	2.0	2.1	2.0
1978	3.5	1.3	29.7	38.5	103.3	191.2	222.9	466.5	713.8	306.6	63.3	73.9
1979-93	no data											
1994	14.8	6.8	5.1	5.7	13.5	35.7	90.9	194.0	108.2	12.7	6.6	6.8
1995	7.7	6.0	6.2	53.9	57.7	251.0	228.6	415.9	923.2	660.7	147.7	30.1
1996	8.9	6.5	20.2	31.7	181.7	166.6	288.4	534.1	330.0	70.2	12.1	7.2
1997	10.2	83.9	160.6	673.5	193.5	174.8	243.2	486.4	278.9	62.5	13.7	7.3
1998	10.4	15.1	24.0	51.1	144.0	136.7	225.3	343.6	1017.0	774.7	122.4	45.1
1999	18.3	19.1	21.4	24.3	40.2	32.9	89.2	275.3	137.6	30.0	7.3	12.9
2000	12.4	8.2	7.1	20.1	55.9	73.5	169.0	393.8	183.9	26.5	8.8	7.9
2001	19.5	10.1	8.4	9.0	19.1	71.1	142.9	339.7	83.5	17.6	6.4	6.3
2002	8.6	22.1	48.2	40.8	29.9	56.3	206.9	281.6	180.1	21.9	6.8	6.4
2003	5.9	149.7	29.4	34.1	43.2	85.8	143.4	427.5	337.2	47.4	21.4	9.1
2004	7.8	8.0	22.8	20.1	30.3	127.6	168.6	230.2	102.9	16.4	7.6	8.9
2005	10.2	9.7	13.1	75.9	39.1	98.9	186.4	647.6	603.3	207.8	35.7	14.1
2006	10.9	16.6	39.9	93.2	46.6	128.5	336.9	750.1	618.2	172.1	26.3	10.5
2007	12.9	11.3	12.4	16.3	18.2	58.6	118.6	200.5	44.7	12.0	7.3	8.1
2008	7.8	9.0	11.7	30.4	50.2	80.9	166.5	333.3	251.7	49.5	8.0	12.3
2009	7.9	17.0	11.3	30.7	42.8	65.6	167.6	383.8	131.8	29.2	12.7	10.4
2010	79.4	22.5	27.9	29.2	77.4	127.9	200.3	387.8	775.3	208.7	28.8	9.1
2011	25.4	21.2	144.4	88.2	70.0	204.0	324.5	409.4	814.3	325.4	64.5	17.4
2012	39.0	19.6	12.7	30.3	21.4	52.4	195.4	270.6	61.6	13.4	7.6	8.2
2013	11.6	16.8	36.3	32.7	18.7	40.5	115.6	145.1	33.2	16.3	10.4	6.9
2014	8.2	9.6	10.2	8.6	14.0	19.9	78.9	127.8	41.1	14.1	9.7	6.0
Kaweah No. 1 Flowline (USGS Gage No. 11208720 + SCE Gage 202)												
1975	17.2	21.5	19.8	20.5	22.6	24.9	19.2	25.5	27.3	28.2	26.1	18.9

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976	23.4	24.7	24.3	18.0	23.3	23.5	21.0	25.3	26.1	18.2	15.6	19.8
1977	22.7	15.7	12.9	16.6	16.8	20.6	23.0	24.6	25.1	16.6	14.6	9.1
1978	7.8	11.2	15.8	26.6	22.8	23.2	24.0	24.7	25.6	26.0	25.9	25.6
1979-93	no data											
1994	0.2	12.0	17.2	14.7	19.6	23.0	22.9	22.8	22.9	14.3	4.3	3.4
1995	15.7	14.5	17.3	21.9	23.0	19.1	23.2	23.2	22.8	22.3	21.1	22.9
1996	19.4	15.2	17.7	22.4	21.1	23.1	23.4	20.5	9.8	19.2	18.9	13.8
1997	7.7	14.2	20.1	0.9	11.0	17.8	5.5	0.0	13.1	19.3	19.6	17.0
1998	15.4	15.4	19.5	20.7	17.8	22.3	22.5	22.4	17.9	19.2	20.6	22.6
1999	23.1	23.2	17.4	20.2	18.5	19.3	22.0	23.4	23.5	21.2	14.8	8.1
2000	1.8	9.5	7.9	10.9	15.4	22.8	23.7	23.9	23.9	19.3	10.5	10.8
2001	3.7	14.6	11.9	13.8	18.4	18.5	21.2	23.2	23.3	16.8	6.8	7.5
2002	2.3	9.4	20.2	20.6	21.3	21.6	23.5	23.9	23.6	19.7	10.8	7.5
2003	5.8	9.0	21.3	21.7	22.0	16.8	19.6	20.7	21.9	22.4	20.5	16.0
2004	7.9	13.1	16.7	19.9	21.3	21.1	22.5	22.2	22.1	15.3	7.6	5.2
2005	8.2	14.5	13.3	12.6	21.2	21.1	17.4	18.8	19.6	19.9	20.7	20.1
2006	14.1	4.3	13.8	17.9	21.2	20.4	16.0	18.1	16.7	14.1	20.0	16.5
2007	10.4	11.1	13.2	9.6	17.8	19.9	18.9	13.4	19.2	7.8	5.2	2.6
2008	3.1	3.1	8.3	15.5	18.2	19.8	17.1	18.4	13.9	17.9	12.7	3.9
2009	4.9	15.3	12.6	17.0	17.5	18.5	18.9	9.5	11.6	15.1	3.3	0.0
2010	1.0	2.8	6.2	13.8	0.4	0.1	10.7	17.8	16.7	17.5	15.6	17.4
2011	1.9	11.6	6.8	15.5	18.1	1.1	6.9	17.8	17.3	17.6	19.0	19.2
2012	15.6	19.0	15.4	13.3	18.9	16.0	18.5	19.0	19.2	14.1	10.9	3.1
2013	0.7	0.7	2.0	7.0	18.4	19.1	19.0	19.0	18.2	2.9	0.7	0.3
2014	0.2	0.3	0.2	0.9	6.4	11.3	18.5	17.7	2.5	0.6	0.7	0.7
2015	0.7	0.7	2.3									

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Flows d/s Kaweah No. 1 Diversion and in the Flowline (USGS Gage No. 11208731)												
1952									660.1	257.7	78.3	34.4
1953	25.9	26.4	38.0	60.3	46.1	56.0	158.6	205.2	352.2	115.4	31.6	22.5
1954	20.0	17.9	20.0	30.5	50.4	76.3	219.0	397.6	171.2	50.0	23.7	18.8
1955	11.0	17.4	23.2	29.7	56.6	57.6	96.3	260.3	238.9	54.9	24.0	17.5
1956-57	no data											
1958	20.8	25.3	32.1	34.6	61.8	105.0	229.8	690.0	641.1	218.3	60.7	33.0
1959	25.0	17.2	18.7	23.9	40.5	55.1	107.6	113.2	66.5	21.8	14.8	12.6
1960	10.2	9.4	10.2	15.0	42.0	57.6	143.9	234.5	141.1	30.4	18.5	10.4
1961	10.7	17.6	17.9	14.5	17.8	30.8	89.9	146.9	76.6	21.2	25.0	16.8
1962	10.6	10.5	13.8	18.2	97.4	51.6	277.2	403.4	384.3	104.8	27.9	19.1
1963	17.6	12.3	11.0	67.3	190.7	70.8	144.4	431.9	441.2	139.4	42.3	30.4
1964	29.4	42.3	32.3	24.3	27.3	38.6	104.4	256.3	174.8	43.5	20.5	17.6
1965	11.3	25.8	134.2	90.5	65.9	69.1	172.1	356.5	441.3	168.9	71.3	31.9
1966	22.7	45.2	40.4	35.5	35.0	66.4	236.4	327.8	91.7	27.7	16.7	13.2
1967	11.0	29.0	596.8	133.7	127.6	155.8	180.8	608.5	846.9	579.0	174.2	73.7
1968	33.6	32.5	38.3	41.7	63.3	79.4	133.9	249.7	154.9	35.8	21.0	14.0
1969	17.0	25.8	36.0	372.1	223.0	160.5	368.2	965.9	987.9	475.8	121.4	45.5
1970	42.2	33.9	49.5	153.7	75.2	106.1	147.8	473.0	299.3	69.1	25.3	15.9
1971	14.8	28.6	40.1	48.9	52.5	75.2	143.3	281.3	364.0	89.0	30.1	16.8
1972	17.5	22.5	31.0	29.1	34.4	79.5	80.9	156.3	103.7	22.2	12.8	19.0
1973	16.0	26.1	35.2	86.6	74.4	99.7	206.0	688.1	680.7	164.6	51.0	23.9
1974	27.5	36.0	47.3	94.0	59.1	133.5	225.9	521.2	457.2	114.0	39.4	18.9
1975	19.4	24.1	28.4	27.5	45.5	76.9	92.1	429.7	499.5	108.5	33.3	22.1
1976	36.0	30.2	31.3	22.4	27.6	47.6	88.7	191.5	47.4	20.2	16.9	46.0
1977	35.3	19.7	13.9	18.2	18.7	22.9	68.1	79.5	86.1	18.4	16.8	11.1
1978	11.4	12.4	45.5	65.1	126.1	214.4	246.9	491.3	739.5	332.6	89.2	99.5

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1979-93	no data											
1994	15.0	18.7	22.1	20.4	33.1	58.7	113.8	216.8	131.0	26.9	10.8	10.2
1995	23.4	20.6	23.5	75.8	80.6	269.9	251.8	439.2	945.0	682.2	168.7	53.0
1996	28.3	21.7	37.8	54.0	202.8	189.6	311.8	554.5	339.7	89.4	31.0	21.0
1997	17.9	98.2	180.4	674.3	204.5	192.6	248.5	486.4	292.0	81.8	33.2	24.4
1998	25.7	30.5	43.5	71.6	161.9	159.1	247.9	366.1	1036.1	793.3	143.0	67.8
1999	41.3	42.1	38.9	44.5	58.8	52.1	111.2	298.7	161.0	51.2	21.9	20.9
2000	14.2	17.7	15.1	31.0	71.2	96.3	192.8	417.7	207.9	45.7	19.3	18.8
2001	23.1	24.8	20.1	22.6	37.6	89.6	164.2	362.9	106.7	34.5	13.1	13.7
2002	10.9	31.6	68.5	61.4	51.0	77.8	230.4	305.6	203.9	41.6	17.5	13.7
Flow to Kaweah No. 1 Powerhouse (USGS Gage No. 11208800)												
2003	5.0	8.2	20.6	20.8	21.2	15.9	18.6	19.9	20.9	20.4	19.2	15.0
2004	6.1	11.9	15.9	18.1	20.1	20.0	21.7	21.1	21.3	13.9	3.6	0.0
2005	5.4	13.4	9.3	11.6	20.0	20.0	15.9	16.8	17.9	17.9	18.8	18.0
2006	11.3	0.0	11.2	17.2	19.9	19.0	12.8	15.0	14.7	12.0	18.5	13.0
2007	3.6	7.9	11.8	8.8	16.6	18.8	17.7	11.8	17.6	6.5	3.1	0.0
2008	0.0	0.0	6.0	14.4	17.8	18.2	13.7	17.1	12.6	16.1	9.3	0.0
2009	0.0	14.7	11.3	17.3	17.9	18.9	19.2	9.4	13.0	16.3	1.8	0.0
2010	0.0	0.0	2.1	14.1	0.1	0.0	10.7	18.2	16.5	17.9	13.8	16.8
2011	1.8	11.5	5.6	14.9	18.5	0.6	6.7	18.3	17.6	17.9	19.0	18.3
2012	14.7	18.6	9.0	11.9	17.4	13.9	18.3	18.0	17.9	13.0	10.5	0.6
2013	0.0	0.0	0.0	0.3	19.0	19.5	19.8	19.0	18.1	2.3	0.0	0.0
2014	0.0	0.0	0.0	0.2	6.3	11.3	18.6	18.3	2.5	0.0	0.0	0.0
Kaweah River blw Diversion (USGS Gage No. 11208600)												
1994	27.0	10.2	9.4	20.1	32.1	107.9	249.0	451.3	250.1	11.7	11.2	8.0
1995	13.0	5.7	5.9	141.2	154.8	521.2	507.4	955.9	1500.1	1130.6	252.0	26.3
1996	11.8	11.4	43.6	72.9	439.2	341.9	633.3	1050.9	705.7	166.5	24.1	12.0

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1997	12.1	152.4	271.5	1250.3	364.1	388.1	483.7	895.5	510.3	133.1	34.9	16.1
1998	11.8	17.2	26.4	91.8	294.1	331.5	598.4	850.0	2008.7	1571.1	253.6	90.1
1999	62.2	16.6	48.2	49.1	87.6	81.1	229.7	604.7	262.4	33.9	22.8	18.2
2000	18.5	29.7	16.4	37.0	140.0	212.7	456.7	920.9	441.7	36.0	24.2	23.8
2001	48.6	34.6	18.1	27.3	32.1	171.8	341.3	833.6	150.0	33.6	21.0	13.3
2002	15.2	86.1	97.1	82.9	68.9	137.8	463.3	586.1	389.5	34.9	20.5	15.3
2003	16.9	334.8	29.0	67.5	80.8	208.3	304.9	812.6	632.7	74.0	28.2	14.4
2004	16.4	14.0	42.8	40.7	46.2	305.5	314.2	382.4	153.6	13.3	13.6	8.3
2005	24.4	11.4	15.5	182.2	101.8	257.2	390.9	1137.5	1072.9	436.9	33.1	13.1
2006	15.5	13.4	82.7	199.9	115.4	238.9	668.3	1331.1	1149.8	326.8	29.7	19.0
2007	25.6	25.3	16.3	23.7	35.6	145.0	245.4	357.6	72.5	16.2	12.4	10.7
2008	13.6	15.7	22.0	75.1	112.8	198.0	390.3	673.0	494.4	88.1	22.4	14.5
2009	15.5	56.3	25.6	95.1	102.2	171.4	388.7	853.5	274.0	50.8	23.3	14.4
2010	233.5	13.3	33.6	63.9	117.6	223.9	421.1	769.4	1415.0	389.2	38.2	18.0
2011	35.5	26.0	349.7	192.3	143.4	357.6	694.4	990.7	1532.5	817.4	112.8	46.5
2012	91.2	21.7	16.7	77.5	30.4	106.8	472.4	488.7	100.0	31.8	24.8	15.3
2013	18.4	39.5	109.4	65.4	40.2	114.2	251.7	274.2	64.6	19.4	16.7	12.6
2014	14.8	19.0	22.6	17.2	42.8	51.3	212.9	271.0	67.0	19.8	17.9	9.8
2015	10.3	26.3	55.2									
Kaweah No. 2 Flowline (USGS Gage No. 11208570 + SCE Gage 204a)												
1994	4.4	20.6	37.2	24.5	54.3	80.3	80.6	80.3	73.8	43.8	9.6	11.6
1995	42.6	45.4	58.4	75.3	81.6	79.0	83.0	82.1	82.9	89.7	82.1	68.0
1996	28.0	19.6	45.9	63.5	74.9	77.6	76.6	73.0	76.8	77.2	39.1	17.0
1997	16.2	45.4	75.9	42.4	81.6	72.4	82.3	76.0	75.9	77.3	40.2	28.8
1998	25.4	39.6	68.0	63.9	58.4	79.5	44.7	73.4	66.3	76.4	80.5	71.7
1999	8.7	66.1	42.8	48.1	65.1	76.6	74.4	82.9	83.1	62.1	12.6	3.7
2000	2.1	3.6	8.6	36.6	81.1	87.5	90.9	88.3	89.3	64.3	14.4	3.3

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2001	2.0	29.9	24.7	23.9	68.8	79.3	83.2	83.8	77.8	42.5	4.6	3.5
2002	3.0	6.8	66.5	76.3	79.1	82.2	84.0	84.4	80.7	54.6	6.8	3.0
2003	3.0	42.6	75.8	78.4	75.4	75.3	75.6	79.9	79.1	78.6	39.6	13.3
2004	2.8	20.5	53.9	66.5	70.8	87.1	87.3	85.5	83.0	46.4	7.7	8.1
2005	25.5	65.8	56.9	69.8	83.1	84.3	84.6	86.4	86.8	86.6	63.1	27.5
2006	18.0	20.2	57.7	75.4	79.6	80.4	77.2	82.7	83.3	83.3	53.9	19.0
2007	6.3	13.2	36.4	35.6	54.8	83.8	84.3	82.4	65.7	17.9	5.6	5.2
2008	6.4	7.5	26.9	62.1	82.2	84.4	85.1	84.6	85.0	73.6	11.5	3.9
2009	8.7	62.2	37.2	62.0	82.8	85.4	86.0	83.7	84.0	64.4	9.3	4.1
2010	27.0	40.5	61.3	59.0	83.7	85.7	86.2	86.7	79.9	84.8	44.2	16.6
2011	26.6	71.0	59.8	82.5	81.9	81.1	77.1	65.4	82.8	84.1	83.2	25.1
2012	58.8	67.8	37.1	16.9	68.0	70.2	78.2	73.2	67.6	16.7	2.5	2.1
2013	1.9	1.7	8.2	47.0	69.4	65.9	71.9	72.4	49.8	11.3	1.9	1.8
2014	1.6	1.6	1.6	1.7	14.7	58.3	60.7	74.5	46.9	4.7	1.3	1.5
2015	1.5	1.8	11.9									
Flow to Kaweah No. 2 Powerhouse (USGS Gage No. 11208818)												
2003	0.0	40.7	68.7	74.0	72.8	75.3	74.1	75.5	75.5	68.8	34.5	9.1
2004	0.0	23.8	52.5	62.7	71.3	79.1	79.6	78.7	76.9	43.8	2.1	0.0
2005	19.7	64.3	55.4	65.3	79.2	79.9	79.0	78.6	78.9	78.6	60.0	28.7
2006	11.7	16.0	55.7	69.5	75.5	77.1	73.2	78.2	77.0	65.0	49.9	15.6
2007	0.0	0.3	33.8	33.5	50.7	75.1	77.5	74.2	58.7	8.5	0.0	0.0
2008	0.0	0.0	16.5	60.4	76.0	77.3	78.4	78.8	75.6	62.8	5.7	0.0
2009	0.0	55.5	34.3	60.2	78.1	79.0	79.5	78.0	78.3	58.7	2.7	0.0
2010	19.6	38.6	57.6	54.7	78.2	78.5	79.0	78.2	76.0	77.3	28.6	10.3
2011	11.1	68.2	71.6	77.2	77.9	77.7	74.0	70.3	76.0	77.9	74.7	19.0
2012	57.4	66.2	33.1	14.0	65.1	66.4	74.7	71.3	66.1	14.6	0.0	0.0
2013	0.0	0.0	0.0	40.7	68.9	65.4	71.5	71.4	47.8	7.2	0.0	0.0

Water Year and Location	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2014	0.0	0.0	0.0	0.0	13.4	58.3	56.2	72.4	43.6	0.0	0.0	0.0
Flows d/s Kaweah No. 2 Diversion and in the Flowline (USGS Gage No. 11208601)												
1994	31.2	30.7	46.6	44.6	86.4	188.2	329.6	531.6	323.9	55.5	20.8	19.7
1995	55.8	51.4	64.4	216.5	236.4	600.2	590.6	1037.7	1582.9	1220.0	334.1	94.2
1996	39.8	31.0	89.5	136.4	514.2	419.5	709.7	1123.8	782.2	243.6	60.7	29.0
1997	22.6	191.6	340.8	1282.7	437.9	454.5	561.8	970.2	585.8	207.7	70.8	43.1
1998	37.2	56.8	94.5	155.7	352.6	411.1	643.2	924.0	2076.3	1649.1	334.2	161.8
1999	70.6	82.8	91.0	97.2	152.8	157.7	304.1	687.5	345.5	95.9	35.4	21.8
2000	20.5	33.3	25.0	73.7	221.1	300.3	547.6	1009.0	531.0	100.3	38.7	27.2
2001	50.5	64.4	42.8	51.2	100.9	251.0	424.5	917.7	227.8	76.1	25.6	16.9
2002	18.3	92.9	163.6	159.2	148.0	220.1	547.3	670.5	470.3	89.5	27.5	18.5
Flow to Kaweah No. 3 Powerhouse (USGS Gage 11208565)												
2002										2.89	42.60	71.87
2003	85.61	85.43	87.03	87.87	88.87	89.60	76.39	43.97	13.47	6.15	19.27	53.32
2004	32.71	72.34	89.13	87.83	87.71	81.97	33.52	1.49	0.00	25.71	54.03	49.35
2005	74.81	87.86	89.74	89.57	88.19	89.77	89.61	60.52	27.60	17.88	19.37	64.48
2006	36.73	44.00	48.23	46.99	76.42	91.20	87.74	48.59	3.49	17.07	24.53	33.90
2007	32.29	54.82	86.23	90.17	90.61	62.27	10.10	0.07	0.0	0.0	0.18	0.0
2008	0.0	0.0	76.03	86.23	91.06	91.60	76.16	7.82	0.0	0.0	35.80	40.71
2009	67.68	89.29	91.29	82.60	71.29	71.43	57.45	5.85	0.0	25.87	31.40	60.39
2010	76.39	88.50	58.48	90.33	87.90	76.69	89.35	50.97	4.77	30.84	69.30	57.97
2011	24.78	0.0	67.77	22.63	0.0	0.0	0.0	0.00	0.00	0.00	0.17	0.0
2012	18.74	60.90	36.16	0.00	0.0	61.20	21.38					
2013	0.0	0.0	72.00	89.93	88.94	54.43	4.45					
2014	0.0	5.35	63.13	86.63	88.94	51.17	2.82					

APPENDIX 3.3-E

**Annual Maximum Instantaneous Peak Flows (cfs) for Bypass Reaches and
Flowlines Associated with the Kaweah Project**

Table 3.3-E-1. Annual Maximum Instantaneous Peak Flows (cfs) for Waters Associated with the Kaweah Project.

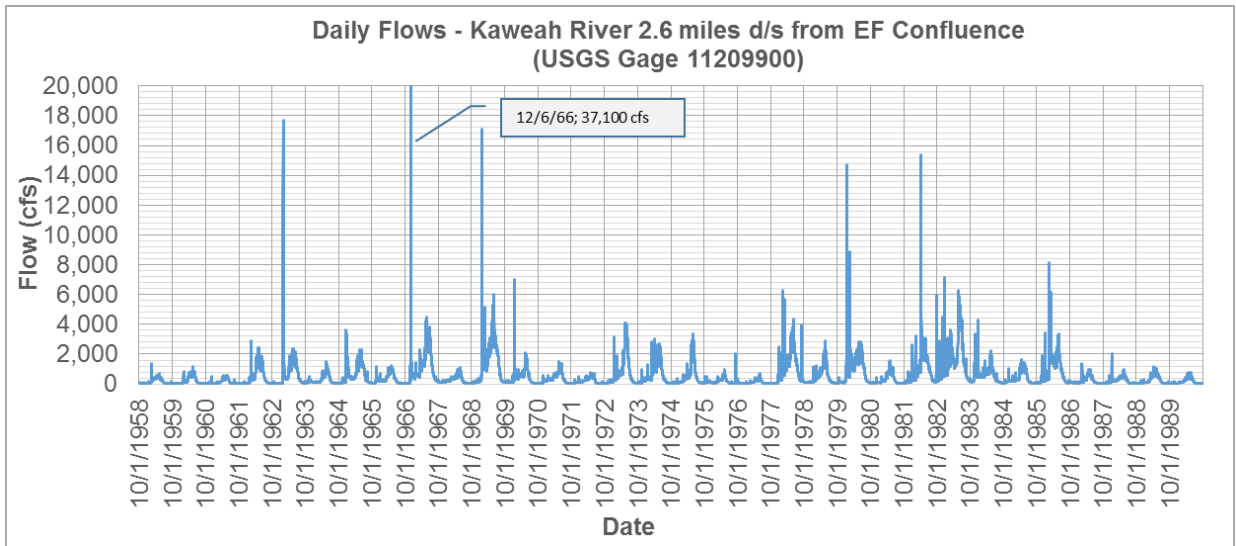
Water Year	EF Kaweah River blw Diversion		Kaweah River blw Diversion	
	USGS Gage 11208730		USGS Gage 11208600	
	Flow (cfs)	Date	Flow (cfs)	Date
1953	1050	4/27/53		
1954	630	1/24/54		
1955	1090	2/16/55		
1956				
1957				
1958	1070	5/22/58		
1959	541	2/16/59		
1960	855	2/1/60		
1961	231	5/17/61		
1962	755	5/5/62		
1963	2850	2/1/63		
1964	480	5/20/64		
1965	1510	12/23/64		
1966	541	12/29/65		
1967	13000	12/6/66		
1968	424	5/29/68		
1969	4700	1/25/69		
1970	3220	1/16/70		
1971	632	6/15/71		
1972	428	6/8/72		
1973	1220	5/28/73		
1974	876	6/6/74		
1975	1050	6/1/75		
1976	522	9/11/76		
1977	276	5/31/77		
1978	1160	6/8/78		
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				

Water Year	EF Kaweah River blw Diversion		Kaweah River blw Diversion	
	USGS Gage 11208730		USGS Gage 11208600	
	Flow (cfs)	Date	Flow (cfs)	Date
1988				
1989				
1990				
1991				
1992				
1993				
1994	427	5/14/94	1140	5/14/94
1995	1690	3/10/95	3000	4/30/95
1996	1700	2/19/96	3780	2/19/96
1997	11300	1/2/97	29000	1/2/97
1998	1530	7/1/98	3170	7/2/98
1999	466	5/25/99	1260	5/25/99
2000	910	2/14/00	1940	5/23/00
2001	544	5/10/01	1640	5/8/01
2002	1070	12/29/01	2330	11/24/01
2003	5680	11/8/02	15700	11/8/02
2004	476	12/24/03	1000	12/24/03
2005	1540	5/27/05	2440	5/16/05
2006	1500	6/4/06	2420	12/31/05
2007	318	5/12/07	783	4/29/07
2008	1250	1/5/08	2510	1/5/08
2009	687	5/11/09	1520	5/9/09
2010	2600	10/14/09	9000	10/14/09
2011	2250	12/19/10	5170	12/19/10
2012	878	10/5/11	1930	10/5/11
2013	331	4/29/13	889	12/2/12
2014	249	5/17/14	638	5/3/14

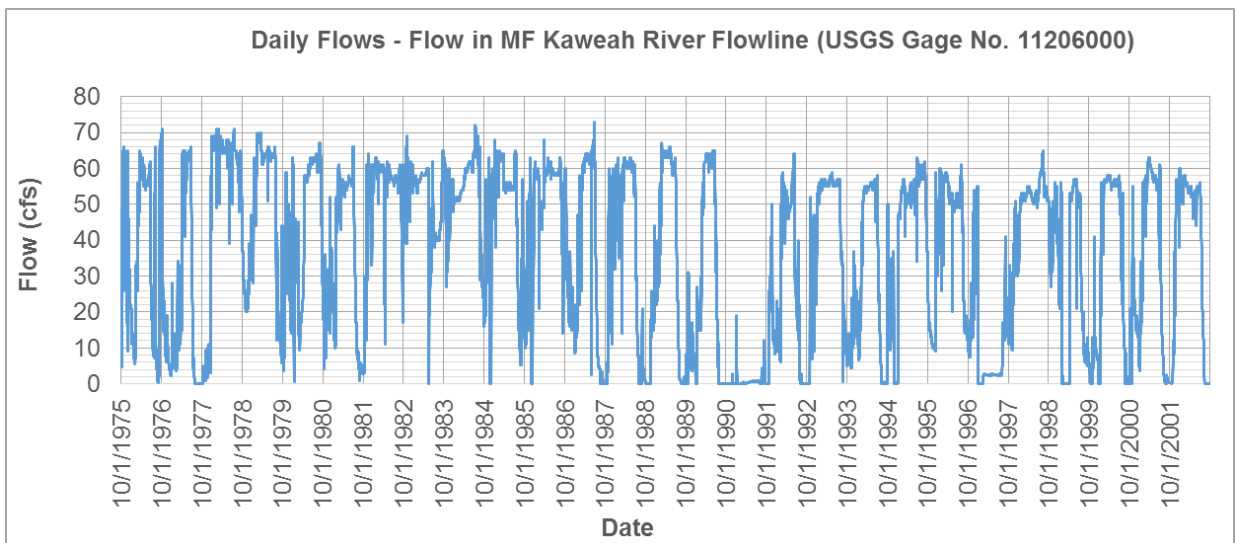
APPENDIX 3.3-F

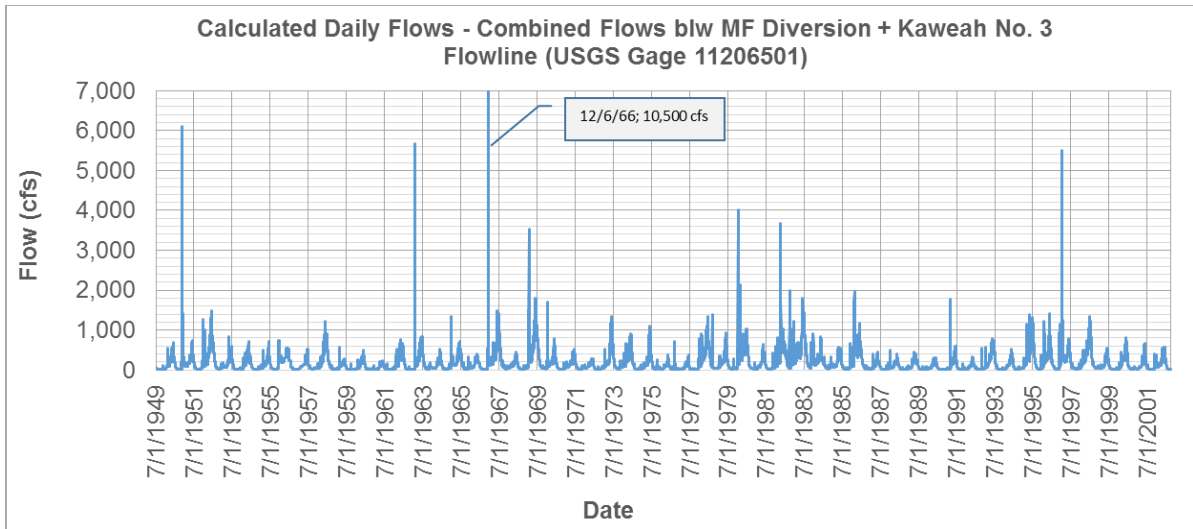
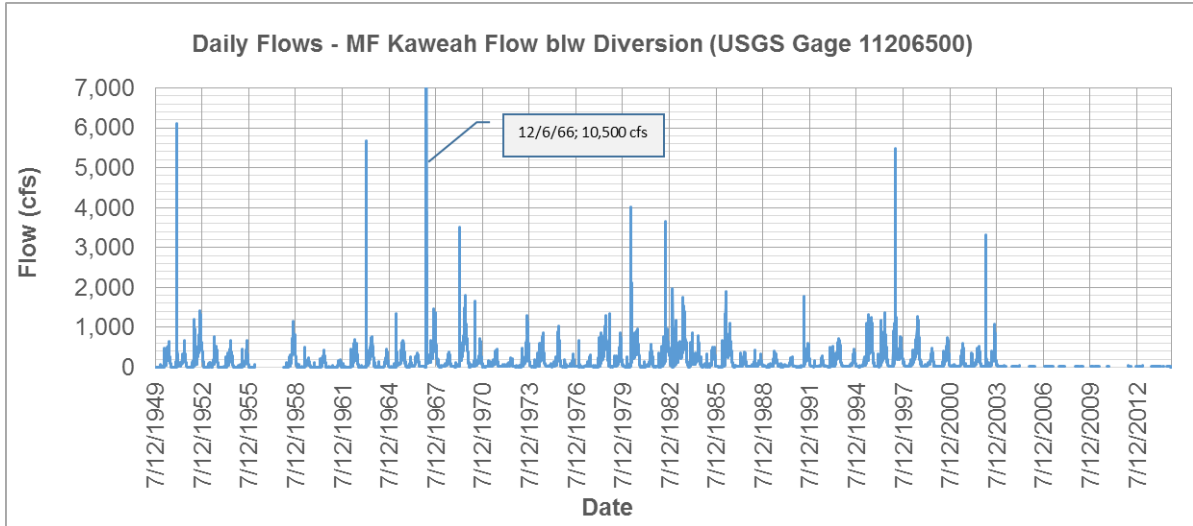
**Hydrology for Other River Reaches in the Watershed – Daily Flows and Annual
Maximum Instantaneous Peak Flows**

Kaweah River – Downstream of the Kaweah River Bypass Reach

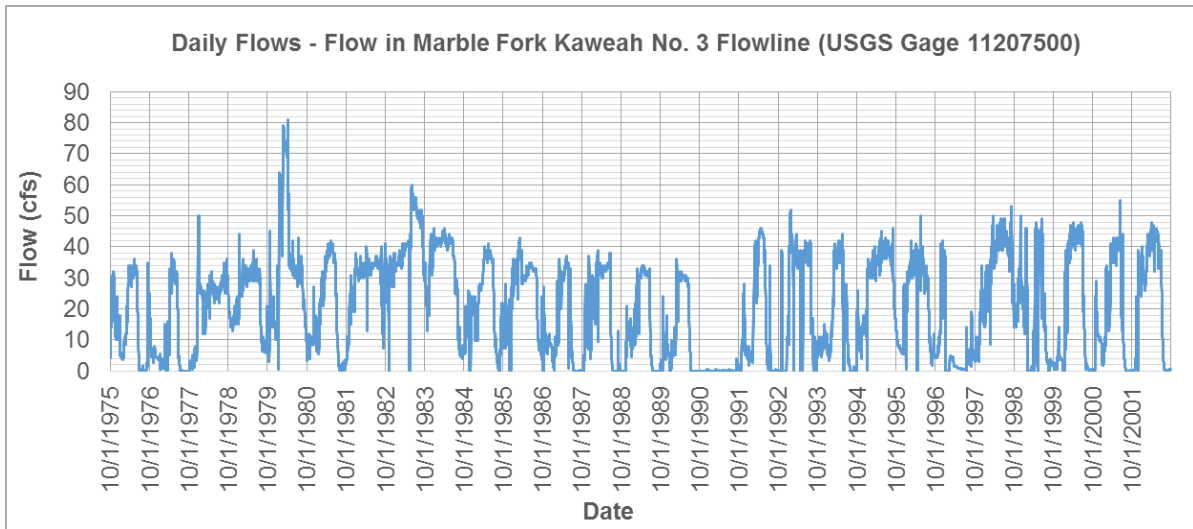


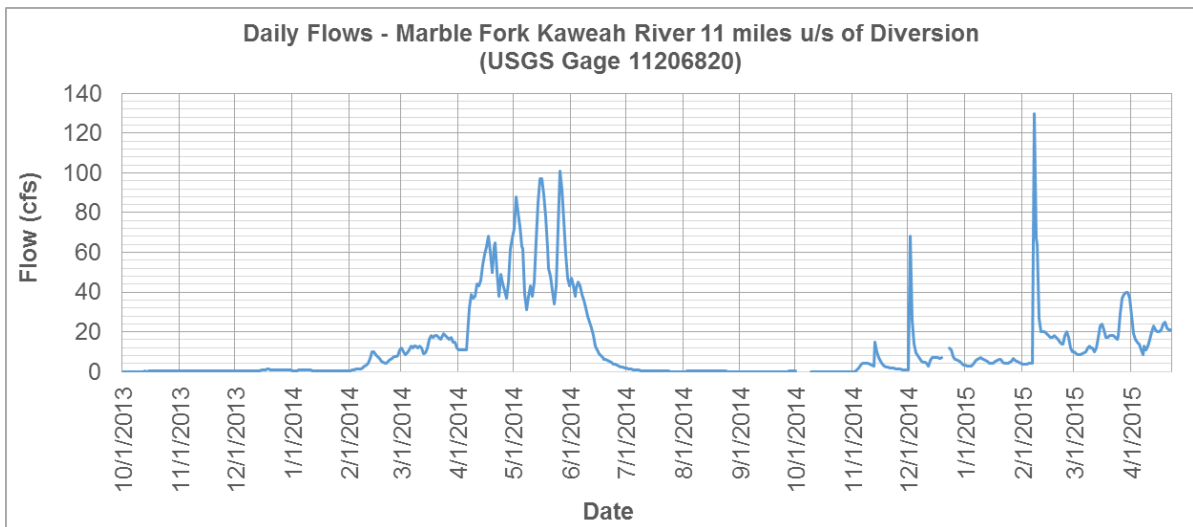
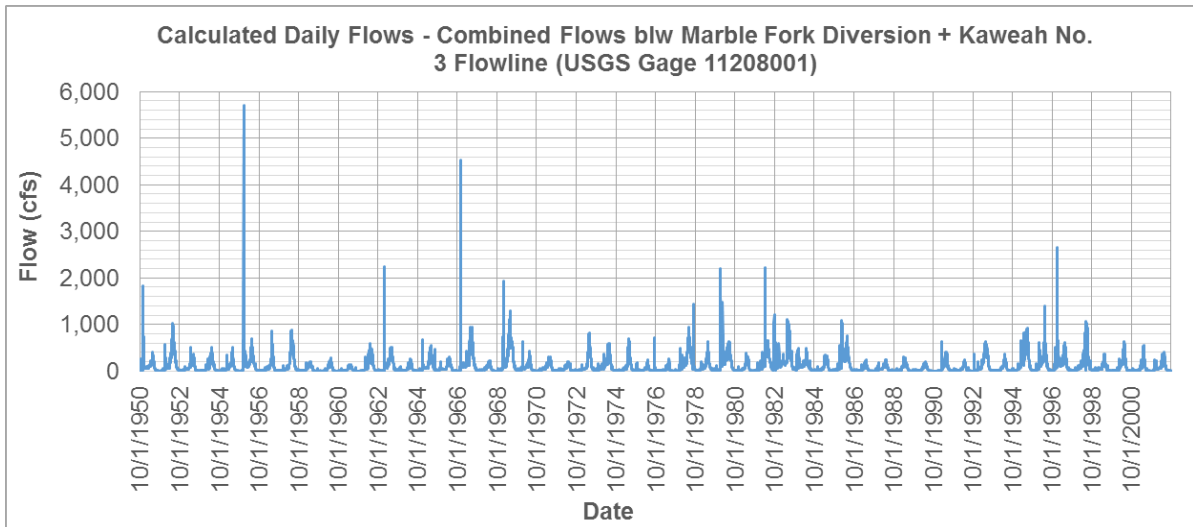
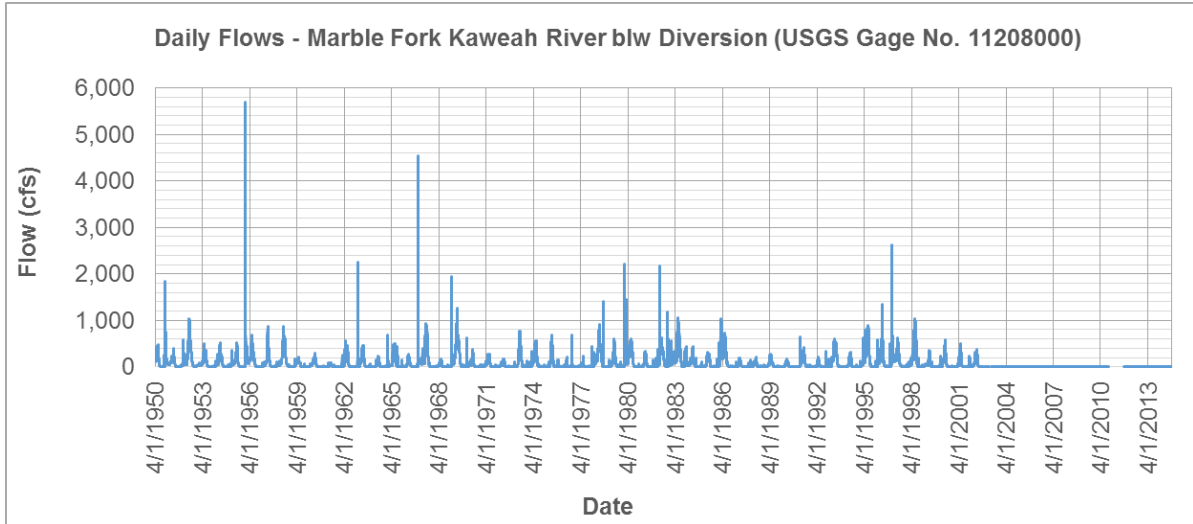
Middle Fork Kaweah River upstream of the Bypass Reaches Associated with the Project



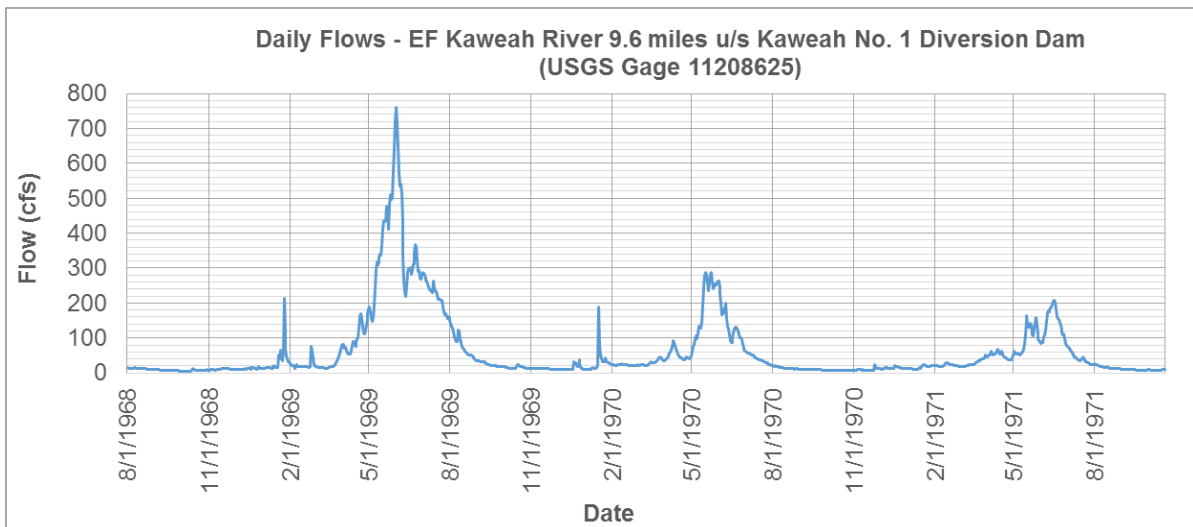
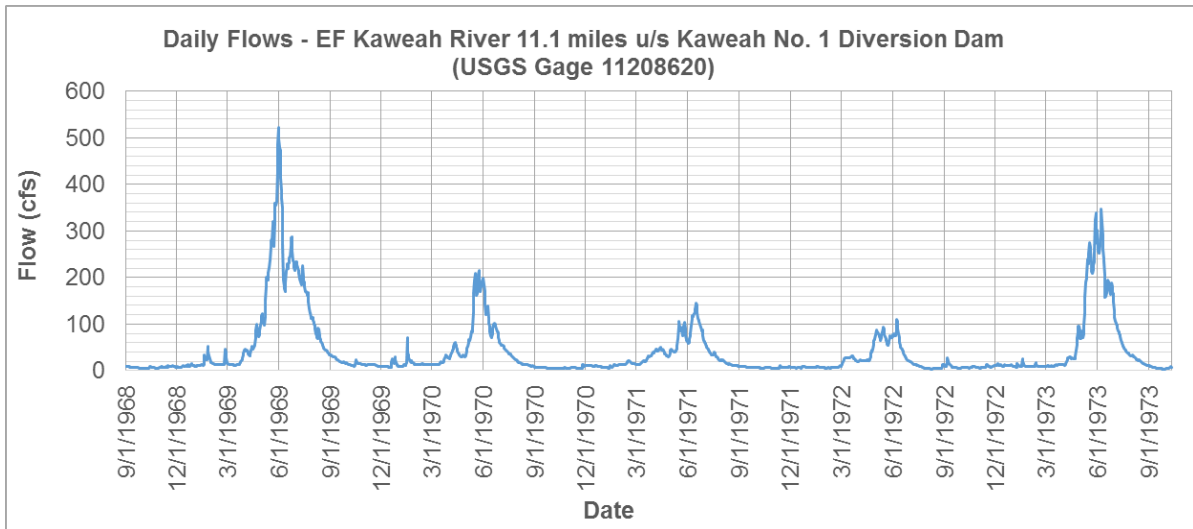


Marble Fork Kaweah River upstream of the Bypass Reaches Associated with the Project

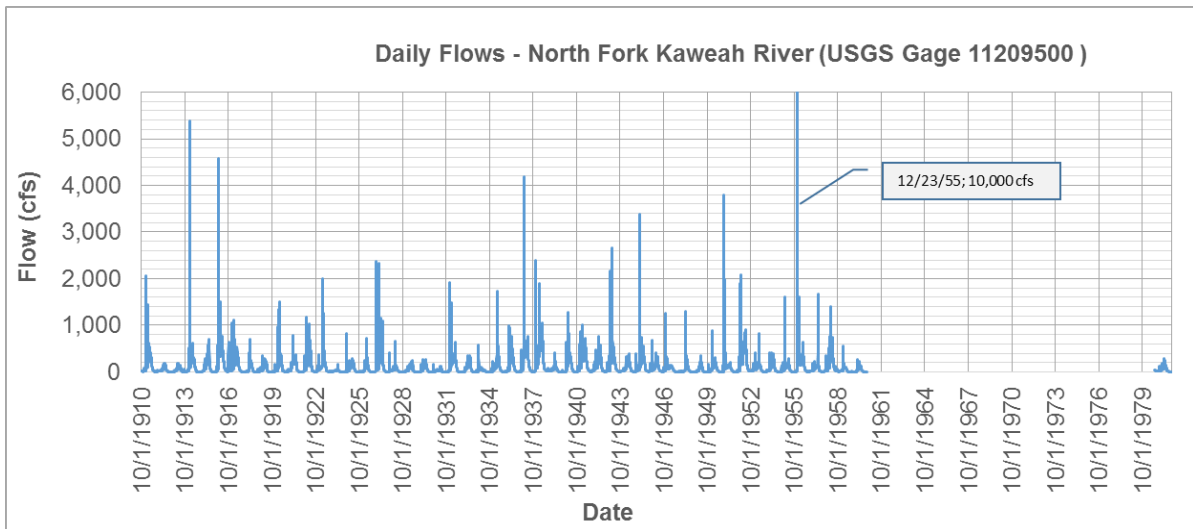
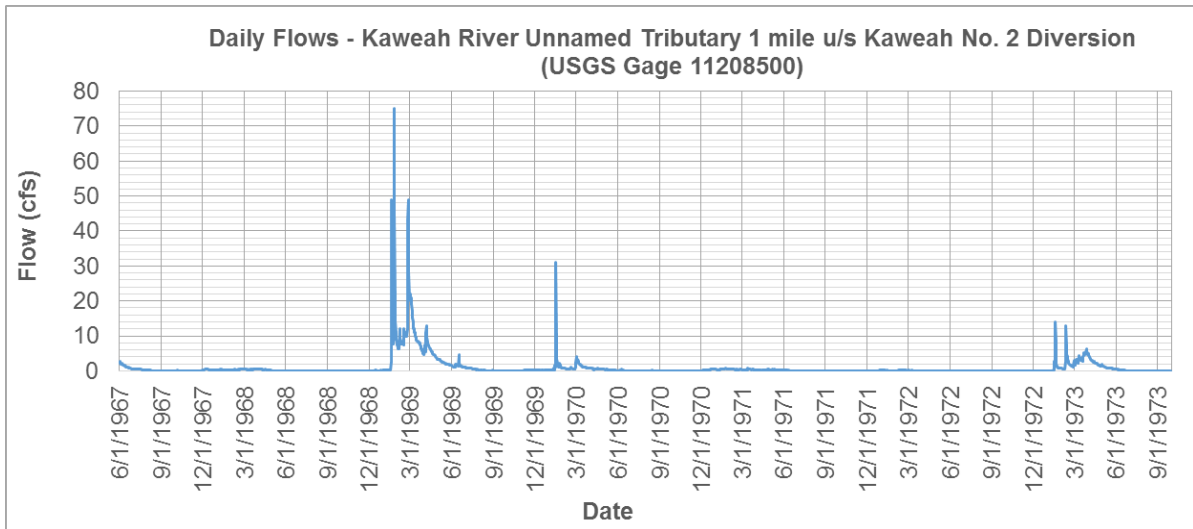




East Fork Kaweah River upstream of Kaweah No. 1 Diversion Dam



Tributaries to Kaweah River



Annual Maximum Instantaneous Peak Flows (cfs) for Other Reaches in the Watershed.

Water Year	MF Kaweah Flow blw Diversion		Marble Fork Kaweah River blw Diversion		EF Kaweah River 9.6 miles u/s Kaweah No. 1 Diversion Dam		Kaweah River Unnamed Tributary 1 mile u/s Kaweah No. 2 Diversion		North Fork Kaweah River		Kaweah River 2.6 miles d/s from EF Confluence	
	USGS Gage 11206500		USGS Gage 11208000		USGS Gage 11208625		USGS Gage 11208500		USGS Gage 11209500		USGS Gage 1209900	
	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)	Flow (cfs)	Date	Date	Flow (cfs)	Date	Flow (cfs)	Date
1911									2710	1/31/11		
1912									178	4/11/12		
1913									196	4/1/13		
1914									7400	1/25/14		
1915									940	4/30/15		
1916									5380	1/17/16		
1917									3050	2/21/17		
1918									900	3/18/18		
1919									360	2/11/19		
1920									1500	4/17/20		
1921									1040	3/13/21		
1922									1740	2/11/22		
1923									2860	4/6/23		
1924									182	4/11/24		
1925									1080	11/9/24		
1926									730	4/8/26		
1927									4650	2/16/27		
1928									915	3/27/28		
1929									780	6/16/29		
1930									326	5/3/30		
1931									250	11/17/30		
1932									4200	12/28/31		
1933									340	5/29/33		
1934									1220	12/13/33		
1935									3240	4/8/35		
1936									2430	2/2/36		
1937									6200	2/6/37		
1938									11200	12/11/37		
1939									700	4/2/39		
1940									2550	2/26/40		
1941									2260	2/11/41		
1942									1580	4/4/42		
1943									5870	1/21/43		
1944									1220	3/4/44		
1945									5550	2/1/45		
1946									1070	12/22/45		
1947									2680	11/23/46		

Water Year	MF Kaweah Flow blw Diversion		Marble Fork Kaweah River blw Diversion		EF Kaweah River 9.6 miles u/s Kaweah No. 1 Diversion Dam		Kaweah River Unnamed Tributary 1 mile u/s Kaweah No. 2 Diversion		North Fork Kaweah River		Kaweah River 2.6 miles d/s from EF Confluence	
	USGS Gage 11206500		USGS Gage 11208000		USGS Gage 11208625		USGS Gage 11208500		USGS Gage 11209500		USGS Gage 1209900	
	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)	Flow (cfs)	Date	Date	Flow (cfs)	Date	Flow (cfs)	Date
1948									2460	4/10/48		
1949									469	4/21/49		
1950	894	2/6/50	677	5/29/50					1670	2/6/50		
1951	17500	11/19/50	4000	11/18/50					10800	11/19/50		
1952	1680	12/29/51	1150	5/27/52					2890	1/25/52		
1953	1500	4/27/53	1080	4/27/53					2490	4/27/53		
1954	870	5/19/54	651	5/19/54					1430	1/24/54		
1955	1160	2/16/55	715	6/7/55					2860	2/16/55		
1956	46800	12/23/55	12500	12/23/55					21500	12/23/55	60000	12/23/55
1957			1900	5/19/57					3790	5/19/57		
1958	1350	5/1958	1220	5/22/58					2160	4/3/58		
1959	999	2/16/59	339	2/16/59					1280	2/16/59	3400	2/16/59
1960	1060	2/1/60	414	5/11/60			8.7	2/1/60	778	2/1/60	3030	2/1/60
1961	262	8/11/61	160	5/24/61			17	12/1/60			1160	12/2/60
1962	860	5/5/62	748	5/5/62							6180	2/9/62
1963	11800	2/1/63	3830	2/1/63			152	2/1/63			30900	2/1/63
1964	636	5/20/64	355	5/20/64							1970	5/20/64
1965	2370	12/23/64	2370	8/15/65			57	12/27/64			6050	12/23/64
1966	549	11/22/65	402	5/6/66			2.9	12/30/65			1680	11/23/65
1967	23300	12/6/66	6400	12/6/66			879	12/6/66	23900	12/6/66	73000	12/5/66
1968	610	5/28/68	278	5/28/68			0.9	3/16/68			1520	5/29/68
1969	6580	1/25/69	2610	1/25/69	934	5/31/69	203	1/25/69			24200	1/25/69
1970	2890	1/16/70	1310	1/16/70	450	1/16/70	80	1/16/70			13400	1/16/70
1971	638	6/15/71	392	6/8/71	266	6/15/71	1.4	3/13/71			1830	5/16/71
1972	526	6/8/72	283	6/5/72	14.5	7/13/72	1.2	1/4/72			1120	6/8/72
1973	1550	5/28/73	1010	5/28/73			37	1/18/73			8070	1/18/73
1974	1200	4/1/74	797	5/27/74							6330	4/2/74
1975	1370	6/1/75	954	6/1/75							4250	6/1/75
1976	1220	9/11/76	1740	9/11/76							4400	9/11/76
1977	549	6/9/77	406	6/9/77							1240	6/9/77
1978	2030	9/5/78	2790	9/5/78							9460	3/4/78
1979	1120	5/21/79	806	5/21/79							3620	5/21/79
1980	7740	1/12/80	3040	1/13/80							23600	1/12/80
1981	711	5/1/1981	430	5/1/81					421	3/20/81	1970	5/2/81
1982	5610	4/11/82	3140	4/11/82							23700	4/11/82
1983	2290	10/26/82	1590	10/26/82							14300	12/22/82
1984	2700	11/24/83	1360	11/24/83							11500	11/24/83
1985	623	5/23/85	405	4/14/85							2030	11/28/84

Water Year	MF Kaweah Flow blw Diversion		Marble Fork Kaweah River blw Diversion		EF Kaweah River 9.6 miles u/s Kaweah No. 1 Diversion Dam		Kaweah River Unnamed Tributary 1 mile u/s Kaweah No. 2 Diversion		North Fork Kaweah River		Kaweah River 2.6 miles d/s from EF Confluence	
	USGS Gage 11206500		USGS Gage 11208000		USGS Gage 11208625		USGS Gage 11208500		USGS Gage 11209500		USGS Gage 1209900	
	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)	Flow (cfs)	Date	Date	Flow (cfs)	Date	Flow (cfs)	Date
1986	1910	2/19/86	1040	2/19/86							15800	2/13/86
1987	774	5/15/87	464	5/12/87							3220	2/13/87
1988	691	1/5/88	355	5/15/88							3530	1/5/88
1989	494	5/7/89	365	5/7/89							1420	4/11/89
1990	361	5/6/90	253	4/27/90							1010	5/7/90
1991	5110	3/4/91	1940	3/4/91								
1992	625	10/26/91	310	4/29/92								
1993	974	1/7/93	1710	10/30/92								
1994	666	5/14/94	511	5/14/94								
1995	1930	4/30/95	1410	7/8/95								
1996	2460	2/5/96	2170	5/16/96								
1997	18400	1/2/97	6760	1/2/97							54900	1/2/97
1998	1470	6/15/98	2100	9/3/98								
1999	706	5/25/99	755	7/13/99								
2000	983	5/23/00	869	5/23/00								
2001	773	5/8/01	755	5/8/01								
2002	1610	11/24/01										
2003	10800	11/8/02										
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												