

REC 3 WHITEWATER RECREATION ASSESSMENT STUDY BOATING OPPORTUNITIES ANALYSIS

1.0 EXECUTIVE SUMMARY

The number of boating opportunities days (BODs) within the target whitewater flow ranges by water-year (WY) type under existing and unimpaired hydrologic conditions were evaluated.

Under existing hydrology on the Florence Run, South Fork San Joaquin River (SFSJR), BODs would only occur during Wet and Above Normal WYs, with the majority of the days occurring in June and July. In comparison, some BODs would occur during all WY types under unimpaired hydrology, with the greatest numbers of BODs occurring between April and July.

Under existing hydrology on the Tied-for-First Run on the San Joaquin River (SJR), BODs occurred primarily during Wet and Above Normal WY types, with the majority occurring during the spring and early summer. In comparison, under unimpaired hydrology, BODs occur during all WY types. However, flows typically exceed the boating range during the typical or peak boating season.

With existing hydrology on the Chawanakee Gorge Run (SJR), BODs occur during all WY types except Critically Dry years. During Wet WYs, the majority of the BODs occur during April and May. The majority of the BODs occur in May and June during Above Normal and Dry WYs. In comparison, under unimpaired hydrology, BODs occur during all WY types. Few BODs occur during the spring and summer, when flows typically exceed the boating range.

For the Upper Mono Creek Run (Mono Creek), BODs occur during all WY types under existing and unimpaired hydrology. BODs occur throughout the year during Wet WYs under existing hydrology. During Above Normal, Dry, and Critically Dry WYs, fewer BODs occur during the late spring and early summer (April through June). Under unimpaired hydrology, the majority of the opportunities occur between May and July, with fewer opportunities later in the summer during Dry and Critically Dry WYs. Few flows exceeded the boating range under existing or unimpaired hydrology.

2.0 STUDY METHODOLOGY

The stream reaches for which BODs were evaluated included the Florence Lake Run on the SFSJR, Tied-for-First Run, and Chawanakee Gorge Run on the SJR, and Upper Mono Creek Run, on Mono Creek. Refer to the 2002 Draft Technical Report Study REC 3, Whitewater Recreation Assessment Study, Section 4.0 Study Methodology (SCE 2003), for details on reach selection and location information.

The Minimum and Maximum Acceptable Flows were identified for each reach by a single flow study (SFS) and were used to define the range of flows for BODs for each reach. BODs were calculated based on mean daily flows for the existing flow regime data and for the modeled unimpaired hydrological conditions on target stream reaches. A BOD occurred if a measured or modeled daily average flow was equal to or greater than the Minimum Acceptable Flow, and, equal to or less than the Maximum Acceptable Flow. The flow range thresholds are specific to each run. It is important to note that in many cases there were existing or unimpaired instream flows that exceeded the Maximum Acceptable Flow for the target reach. In these cases, a BOD was not included for that day in the total BODs for that WY type and reach.

Further analysis was conducted, at the request of the Recreation Working Group, for the Chawanakee Gorge Run using a more focused criteria which defined a BOD as a continuous flow within the boatable flow range for a period of four hours or more between the hours of 8AM and 4PM. The data used for this analysis consists of 15-minute interval flow data from the stream gage located at Dam No. 6. The analysis of BODs was completed by determining the number of occurrences of a four hour continuous flow within the boatable range. A secondary analysis was conducted by collecting 15-minute interval flow data from the stream gage on Stevenson Creek below Shaver Dam. Stevenson Creek provides additional flow into the Chawanakee Run at a location near the mid-point of the run. The flow contribution from Stevenson Creek to the Chawanakee Gorge Run could result in a combined flow, (Dam No. 6 and Stevenson Creek Flows) that may shift in or out of the boatable range in the lower section of the run.

The flow data was classified by WY type as Wet, Above Normal, Below Normal, Dry, or Critically Dry, in accordance with determinations by the Department of Water Resources, State Water Resources Board Water-year index for the San Joaquin River. The target flow range for existing and unimpaired stream flow data were compared in order to determine the average number of BODs per month that occurred during each WY type. The average number of days per month within the target flow range under existing and unimpaired stream flows were calculated. The BODs were evaluated for each year and boating season (May 1–August 31) by WY type.

2.1 EXISTING HYDROLOGIC CONDITIONS

To estimate boating opportunities under existing conditions, data from the United States Geological Survey (USGS) daily gage records were analyzed between 1983 and 2002. This period of record (POR) was selected to be consistent with the CAWG 6, Hydrology (SCE 2004) quantitative data analyses. These data were also used in analyses completed in this report. This period was selected based on several factors, including the availability of data in electronic format, the need for data representative of the current Big Creek Project facilities, and the need to represent how the Project is currently operated. The gaging stations on the SFSJR, SJR, and Mono Creek, and the periods with data available are provided below:

Florence Lake Run: South Fork San Joaquin River below Hooper Diversion, (USGS #11230215/SCE #129) (1983-1997, 1999-2002).

Tied-For-First-Run: San Joaquin River above Shakeflat Creek (USGS# 11234760/SCE#157) (1983-2002).

Chawanakee Gorge Run: San Joaquin River above Stevenson Creek (USGS#11238600/SCE#124) (1983-1987, 1993-1994, 1996-2002).

Upper Mono Creek Run: Mono Creek below Lake Thomas Edison (USGS#11231500/SCE#119) (1983-2002).

The POR for 15-minute interval flow data for Dam No. 6 and Stevenson Creek (obtained for the focused analysis of the Chawanakee Gorge Run) is from 1996 to 2003. This was the only data available in an electronic format that could be used for the focused analysis of BODs in the Chawanakee Gorge Run.

2.2 UNIMPAIRED HYDROLOGICAL CONDITIONS

Unimpaired flows from 1983 through 2002 were modeled for numerous stream reaches within the Big Creek ALP study area. Refer to CAWG 6, Hydrology (SCE 2004) for the specific approaches, methods, criteria, and assumptions used in the unimpaired flow modeling efforts. Unimpaired flow data was estimated or modeled using two general methods: an area-based or water balance method. This type of methodology for estimating runoff based on watershed area is a standard practice in hydrology. Daily flow and subbasin area from one of the two good reference basins (Bear and Pitman) were used as the basis for scaling and estimating daily flow at other locations.

The unimpaired flow data for BODs was analyzed using the same approach as the existing boating opportunity analysis described in the previous section.

3.0 RESULTS

The average numbers of BODs that occurred during the POR for each whitewater boating reach are summarized by WY type, between May through August (boating season) and discussed in the text. Results of additional analyses are summarized in the Appendices to this Report. Appendix A provides daily flow hydrographs for each whitewater run including summary tables of BODs based on existing hydrology and modeled hydrology, and number of days when flows exceeded the boatable range based on existing hydrology and modeled hydrology. Appendix B provides summary tables for the Florence Run; Appendix C provides summary tables for the Tied-for-First Run; Appendix D provides summary tables for the Chawanakee Gorge Run; and Appendix E provides summary tables for the Mono Run.

3.1 WATER-YEAR TYPES

Based on the Department of Water Resources WY type classification, the WYs from 1983 to 2003 were classified into Wet, Above Normal, Below Normal, Dry, and Critically Dry WYs. During this period, seven years were classified as Wet, three years were Above Normal, there was one Below Normal years, three years were Dry, and seven years were Critically Dry. The following is the year and associated WY type designation for the POR:

Wet Water-years: 1983, 1986, 1993, 1995, 1996, 1997, and 1998 (7 years).

Above Normal Water-years: 1984, 1999, and 2000 (3 years).

Below Normal Water-years: 2003 (1 year).

Dry Water-years: 1985, 2001, and 2002 (3 years).

Critically Dry Water-years: 1987, 1988, 1989, 1990, 1991, 1992, and 1994 (7 years).

3.2 BOATING OPPORTUNITIES

The results of the boating opportunity analyses for each target reach under the existing and unimpaired hydrology are summarized in the following sections.

3.2.1 SOUTH FORK SAN JOAQUIN RIVER – FLORENCE LAKE RUN

The boatable flow range for the Florence Run is from 350 to 2,000 cfs, as determined by the SFS conducted in May 2003 (SCE 2003).

All the BODs under the existing hydrology occurred within Wet and Above Normal WYs. Table REC 3-1 summarizes by WY type the average number of BODs that occurred between May and August under existing and unimpaired hydrology. No BODs occurred during Dry or Critically Dry WYs under existing hydrology. Appendix B provides a summary of BODs for each month of the year by WY type for existing and modeled hydrology (Appendix B, Tables REC 3-B-1 and REC 3-B-2). Under the unimpaired hydrology, BODs occur during all WY types, with the majority occurring between April and June (Appendix B, Table REC 3-B-2).

Under the existing and unimpaired hydrology (1983-2002), flows infrequently exceed the target flow range, except during 1983 and 1995 (Appendix B, Tables REC 3-B-3 and REC 3-B-4). Table REC 3-2 summarizes the flows that exceed the target range. Appendix B includes tables summarizing for each month by WY type the number of days when flows exceeded the boatable range for existing and modeled hydrology. (Appendix B, Tables REC 3-B-3 through REC 3-B-4).

Table REC 3-1. BODs during May to August for Florence Run, South Fork San Joaquin River By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type	# Years	Existing Hydrology				Unimpaired Hydrology				
		May	Jun	July	Aug	May	Jun	July	Aug	
Wet	6 ^b	Mean	0.5	11.5	14.5	4.5	22.3	19.5	25.0	15.5
		Standard Deviation	0.5	8.3	8.5	8.4	2.6	4.8	10.3	11.2
Above Normal	3	Mean	0	0	0.3	0	20.7	28.3	22.7	5.0
		Standard Deviation	0	0	0.6	0	5.1	2.9	7.4	8.7
Dry	3	Mean	0	0	0	0	29.7	25.3	4.0	0
		Standard Deviation					2.3	5.0	3.6	0
Critically Dry	7	Mean	0	0	0	0	27.6	25.9	4.3	0
		Standard Deviation					4.5	6.4	5.9	0

^aBelow Normal WY types did not occur during the POR.

^bExisting hydrology data is not available for 1998. Unimpaired hydrology calculations do not include this year.

Table REC 3-2. Flows during May to August Exceeding Flow Target Range for Florence Run, South Fork San Joaquin River By Water-year, under Existing and Unimpaired Hydrology (1983-2002)^{a,b,c}.

Water-year Type	# Years	Existing Hydrology				Unimpaired Hydrology				
		May	Jun	July	Aug	May	Jun	July	Aug	
Wet	6 ^b	Mean	0.2	6.3	3.0	0	4.2	9.5	6.0	0.5
		Standard Deviation	0.4	9.5	4.8	0	4.0	9.3	9.8	1.2
Above Normal	3	Mean	0	0	0	0	10.3	3.7	0	0
		Standard Deviation					9.1	3.2	0	0
Dry ^c	3	Mean	0	0	0	0	0	0	0	0
		Standard Deviation								
Critically Dry	7	Mean	0	0	0	0	0	0.9	0.1	0.1
		Standard Deviation					0	1.9	0.4	0.4

^aBelow Normal WY types did not occur during the POR.

^bExisting hydrology data is not available for 1998. Unimpaired hydrology calculations do not include this year.

^cFlows did not exceed the boatable range during the Dry WYs.

3.2.2 SAN JOAQUIN RIVER – TIED-FOR-FIRST RUN

The boatable flow range for the Tied-for-First Run is between 700 to 2,000 cfs, as determined by SFS conducted in May 2003.

All available boating opportunity days occurred during Wet and Above Normal WYs under existing hydrology. Table REC 3-3 summarizes the BODs under the existing and unimpaired hydrology. All BODs during Above Normal WYs occur in May and June (Appendix C, Table REC 3-C-1). Appendix C includes tables summarizing BODs for each month by WY type for existing and modeled hydrology. (Appendix C, Tables REC 3-C-1 and REC 3-C-2).

Table REC 3-3. BODs during May to August for Tied-for-First Run, San Joaquin River By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type	# Years	Existing Hydrology				Unimpaired Hydrology				
		May	Jun	July	Aug	May	Jun	July	Aug	
Wet	7	Mean	3.9	2.4	1.9	2.4	0.3	0.4	8.7	11.6
		Standard Deviation	3.7	2.3	1.6	3.3	0.8	0.8	12.1	3.3
Above Normal	3	Mean	4.7	8.7	0	0	0	0	17.7	6.3
		Standard Deviation	7.2	4.2					0.6	9.3
Dry	3	Mean	0	0	0	0	0	12.3	9.0	0
		Standard Deviation						4.9	3.5	0
Critically Dry	7	Mean	0	0	0	0	1.3	15.3	6.7	0.1
		Standard Deviation					2.2	7.0	3.9	0.4

^aBelow Normal WY types did not occur during the POR.

Using unimpaired hydrology, BODs occur during all WY types, with the greatest number of BODs in the early spring and later summer. During Wet, Above Normal, and Dry WYs, few BODs occur in May and June, as the flows typically exceed the target flow range (Appendix C, Table REC-3-C-3). The majority of BODs occur within the boating season during Wet and Critically Dry WYs. Table REC 3-4 summarizes the flows that exceed the target range. Appendix C includes tables summarizing for each month by WY type the number of days when flows exceeded the boatable range for existing and modeled hydrology. (Appendix C, Tables REC 3-C-3 through REC 3-C-4).

Table REC 3-4. Flows during May to August Exceeding Flow Target Range for Tied-for-First Run, San Joaquin River By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type		# Years	Existing Hydrology				Unimpaired Hydrology			
			May	Jun	July	Aug	May	Jun	July	Aug
Wet	Mean	7	17.9	25.3	14.1	1.6	30.7	29.6	22.3	9.7
	Standard Deviation		9.7	5.8	14.6	3.0	0.8	0.8	12.1	11.2
Above Normal	Mean	3	4.3	2.7	0	0	31.0	30.0	6.0	0
	Standard Deviation		4.2	3.8			0	0	6.1	
Dry	Mean	3	0	0	0	0	31.0	16.3	0	0
	Standard Deviation						0	7.2		
Critically Dry	Mean	7	0	0	0	0	29.7	13.4	1.3	0.1
	Standard Deviation						2.2	8.0	3.0	0.4

^aBelow Normal WY types did not occur during the POR.

3.2.3 SAN JOAQUIN RIVER – CHAWANAKEE GORGE RUN

The boatable flow range for Chawanakee Run is from 350 to 1,000 cfs, as determined by SFS conducted in May 2003.

Under existing hydrology, BODs occurred in Wet, Above Normal and Dry WYs. Table REC 3-5 summarizes by water year type the average number of BODs that occurred between May and August under existing and unimpaired hydrology. No BODs occurred during Dry or Critically Dry WYs under existing hydrology. Appendix D provides a summary of BODs for each month of the year by WY type for existing and modeled hydrology (Appendix D, Tables REC 3-D-1 and REC 3-D-2). The majority of the BODs occur between March and April of Wet WYs (Appendix D, Table REC 3-D-1).

Under the unimpaired hydrology, BODs occur during all WY types, with the greatest number of days occurring in the early spring and later summer. Few BODs occur in May and June during all WY types, as the flows typically exceed the target flow range (Appendix D, Tables REC 3-D-3 and REC 3-D-4).

Table REC 3-6 summarizes the flows exceeding the target range. Appendix D includes tables summarizing for each month by WY type the number of days when flows exceeded the boatable range for existing and modeled hydrology. (Appendix D, Tables REC 3-D-3 through REC 3-D-4).

Table REC 3-5. BODs during May to August for Chawanakee Gorge Run, San Joaquin River By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type		# Years	Existing Hydrology				Unimpaired Hydrology			
			May	Jun	July	Aug	May	Jun	July	Aug
Wet	Mean	6 ^b	4.0	1.3	3.2	1.7	0	0	0.2	17.5
	Standard Deviation		3.2	2.4	4.3	2.6			0.4	10.6
Above Normal	Mean	3	3.3	7.0	0	0	0	0	9.7	16.7
	Standard Deviation		4.9	4.0					8.4	10.7
Dry	Mean	3	1.3	0.3	0	0	0	4.3	20.7	0.7
	Standard Deviation		2.3	0.6				5.1	9.0	1.2
Critically Dry	Mean	2 ^b	0	0	0	0	0	3.0	20.0	0
	Standard Deviation							4.2	2.8	

^aBelow Normal WY types did not occur during the POR.

^bExisting hydrology data is not available for 1988, 1989, 1990, 1991, 1992 and 1995. Unimpaired hydrology calculations do not include these years.

Table REC 3-6. Days With Flows during May to August Exceeding Flow Target Range for Chawanakee Gorge Run, San Joaquin River By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type		# Years	Existing Hydrology				Unimpaired Hydrology			
			May	Jun	July	Aug	May	Jun	July	Aug
Wet	Mean	6 ^b	23.7	27.3	13.8	3.3	31.0	30.0	30.8	12.3
	Standard Deviation		6.8	4.5	13.4	6.8	0	0	0.4	11.7
Above Normal	Mean	3	6.7	9.3	0	0	31.0	30.0	21.3	0.7
	Standard Deviation		7.2	7.0			0	0	8.4	1.2
Dry	Mean	3	0	0	0	0	31.0	25.7	3.0	0
	Standard Deviation						0	5.1	3.0	
Critically Dry	Mean	2 ^b	0	0	0	0	31.0	27.0	0.5	0.5
	Standard Deviation						0	4.2	0.7	0.7

^aBelow Normal WY types did not occur during the POR.

^bExisting hydrology data is not available for 1988, 1989, 1990, 1991, 1992 and 1995. Unimpaired hydrology calculations do not include these years.

A focused analysis was conducted for the Chawanakee Gorge Run using a criteria which defined a BOD as a continuous flow within the boatable flow range for a period of four hours or more between the hours of 8AM and 4PM. The data used for this analysis consists of 15-minute interval flow data from the stream gage located at Dam No. 6 and from Stevenson Creek. Under existing hydrology, BODs occurred in Wet, Above Normal and Below Normal WYs. Table REC 3-7 summarizes the BODs under existing hydrology only, and compares that information with the existing hydrology data for daily means for the equivalent POR. As shown in Table REC 3-7 a greater number of boating opportunity days are calculated for the Chawanakee Gorge Run using the refined BOD criteria. Table 3-8 provides a comparison of BODs calculated for 15-minute interval flows below Dam No. 6 versus the BODs calculated for combined flows of 15-minute interval data from Dam No. 6 and Stevenson Creek. A greater number of BODs were determined using only the 15 minute flow data from the gage below Dam No. 6. A lower number is recorded for the combined flows because the additional input from Stevenson Creek would increase the flow in the lower portion of the reach above the target flow range. Appendix F provides summary tables of the occurrences of flow events in the Chawanakee Gorge Run within the boatable flow range as determined by the 15-minute flow interval data.

Table REC 3-7. BODs during May to August for Chawanakee Gorge Run, San Joaquin River By Water-year, Existing Hydrology (1996-2003)^a.

Water-year Type	# Years	Existing Hydrology 15-minute Data				Existing Hydrology Daily Mean Data			
		May	Jun	July	Aug	May	Jun	July	Aug
Wet	3 ^b	6	3	1	2	11	8	8	5
Above Normal	2	6	5	0	0	9	18	0	0
Below Normal ^c	1	2	0	0	0	N/A	N/A	N/A	N/A

^a Dry, and Critically Dry WY types did not provide data within the Supplemental Criteria.

^b 15-Minute interval existing hydrology data is not available for 1988 through 1994. Unimpaired hydrology calculations do not include these years.

^c Below normal data (2003) not available for Daily Mean calculation.

Table REC 3-8. Comparison of 15-Minute Data Boating Opportunity Days between SJR Gage Data, and SJR Gage Data and Stevenson Creek Data Combined.

SJR Only			SJR and Stevenson Combined			
1996 Wet	February	1		1996	February	1
	March	8			March	9
	April	14			April	13
	May	6			May	6
	June	2			June	2
	July	1			July	1
	Total	32			December	0
				Total	32	
1997 Wet	January	8		1997	January	1
	February	25			February	26
	March	9			March	8
	April	3			April	0
	May	2			June	1
	June	6			Total	36
	Total	53				
1998 Wet	March	3		1998	March	2
	April	1			April	4
	May	9			May	1
	July	1			August	2
	August	6			Total	9
	Total	20				
1999 Above Normal	May	1		1999	May	1
	June	2			June	2
	Total	3			Total	3
2000 Above Normal	April	4		2000	May	6
	May	10			June	3
	June	5			Total	9
	Total	19				
2003 Below Normal	May	2		2003	May	2
	Total	2			June	0
					Total	2

3.2.4 MONO CREEK - UPPER MONO CREEK RUN

The boatable flow range for Mono Creek below Vermilion Dam, Upper Mono Creek Run is from 250 to 2,000 cfs, as determined by SFS.

Under existing hydrology, BODs occurred in all WY types (except Below Normal WYs, which did not occur in the POR evaluated). Flows within the boating range occurred throughout the year during Wet WYs. During Above Normal, Dry, and Critically Dry WYs, fewer BODs occur between April and June (Appendix E, Table REC 3-E-1). Table REC 3-9 summarizes the BODs by WY type between May through August, using existing and unimpaired hydrology. Appendix E provides a summary of BODs for each month of the year by WY type for existing and modeled hydrology (Appendix E, Tables REC 3-E-1 and REC 3-E-2).

Table REC 3-9. BODs during May to August for Upper Mono Creek Run, By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type	# Years	Existing Hydrology				Unimpaired Hydrology				
		May	Jun	July	Aug	May	Jun	July	Aug	
Wet	7	Mean	10.3	11.3	22.0	16.4	28.1	29.6	27.4	10.3
		Standard Deviation	11.4	12.7	6.7	12.4	5.1	0.8	4.9	11.7
Above Normal	3	Mean	0	0	16.0	20.3	26.7	30.0	14.0	0.3
		Standard Deviation			4.0	17.6	3.1	0	10.2	0.6
Dry	3	Mean	0	0	6.7	19.3	28.7	18.0	1.0	0
		Standard Deviation			11.5	16.9	4.0	12.8	1.7	
Critically Dry	7	Mean	0	2.7	11.6	15.6	18.6	16.0	1.1	0.3
		Standard Deviation		4.3	13.8	10.3	7.3	8.2	3.0	0.5

^aBelow Normal WY types did not occur during the POR.

During Wet and Above Normal WYs under unimpaired hydrology, flows are typically within the target flow range for the entire months of May and June (Appendix E, Table REC 3-E-2). However, few flows occur within the target range between August and February during all WY types.

No flows exceeded the target flow range under existing hydrology and only a few flows in wet years exceed the target flow ranged for the unimpaired hydrology as summarized in Table REC 3-10. Appendix E includes tables summarizing for each month by WY type the number of days when flows exceeded the boatable range for existing and modeled hydrology. (Appendix E, Tables REC 3-E-3 through REC 3-E-4).

Table REC 3-10. Days With Flows during May to August Exceeding Flow Target Range for Upper Mono Creek Run, By Water-year, Existing and Unimpaired Hydrology (1983-2002)^a.

Water-year Type		# Years	Existing Hydrology				Unimpaired Hydrology			
			May	Jun	July	Aug	May	Jun	July	Aug
Wet	Mean	7	0	0	0	0	0.1	0.3	0	0
	Standard Deviation						0.4	0.5		
Above Normal	Mean	3	0	0	0	0	0	0	0	0
	Standard Deviation									
Dry	Mean	3	0	0	0	0	0	0	0	0
	Standard Deviation									
Critically Dry	Mean	7	0	0	0	0	0	0	0	0
	Standard Deviation									

^aBelow Normal WY types did not occur during the POR.

4.0 LITERATURE CITED

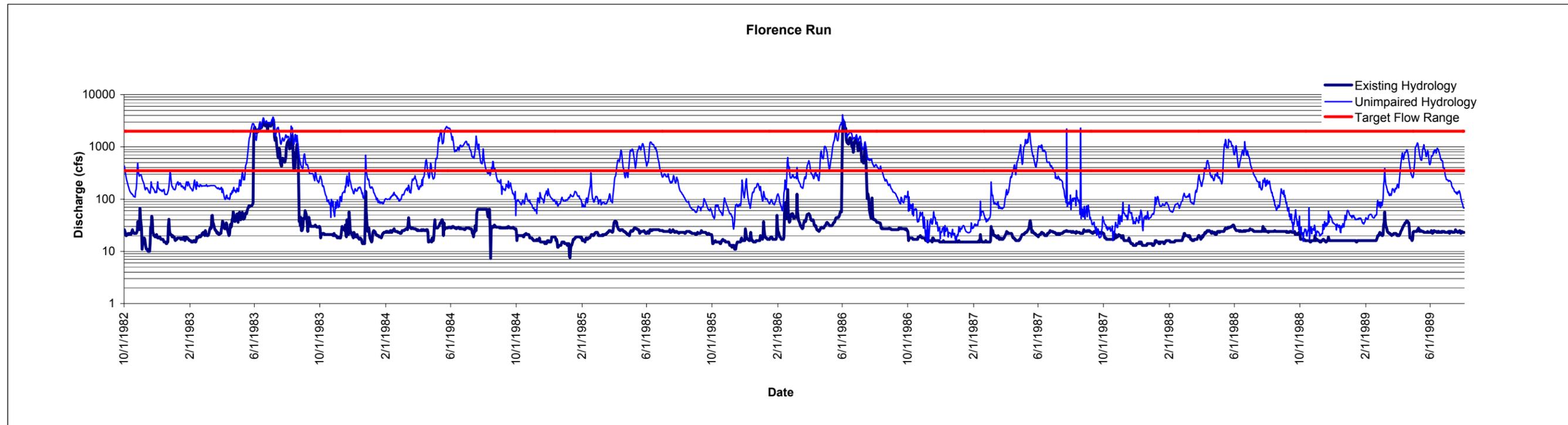
Southern California Edison. 2003. 2002 Draft Technical Study Report Package for the Big Creek Hydroelectric System Alternative Licensing Process. October 2003.

Southern California Edison (SCE). 2004. 2003 Draft Technical Study Reports (First Distribution) for the Big Creek Hydroelectric System Alternative Licensing Process. August 2004.

APPENDIX A
Daily Flows (1983 to 2002)

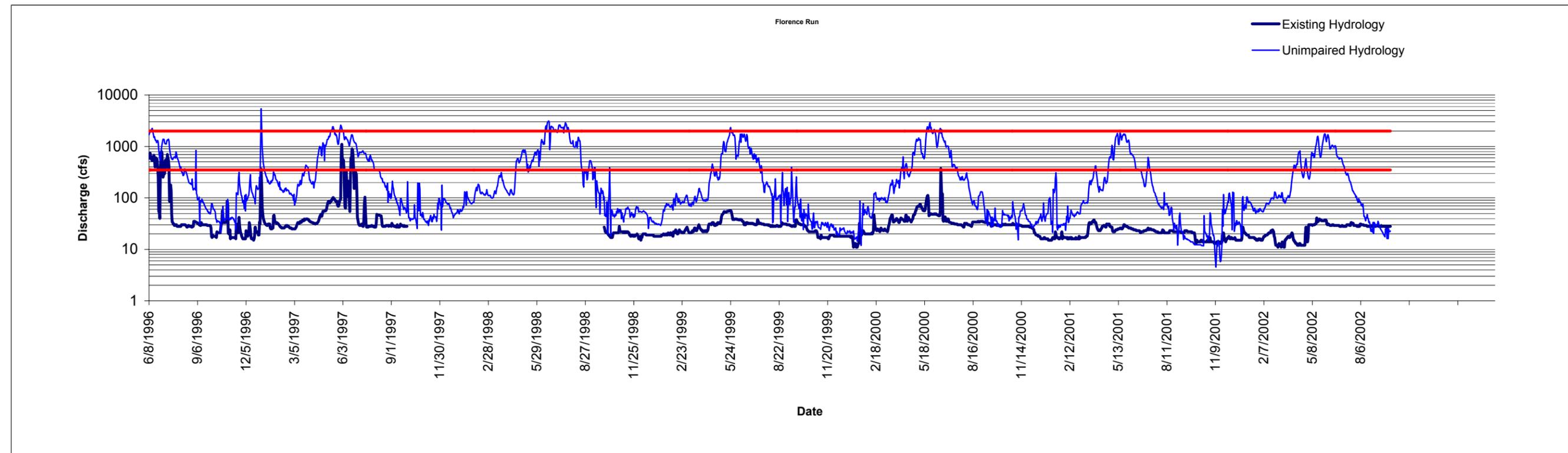
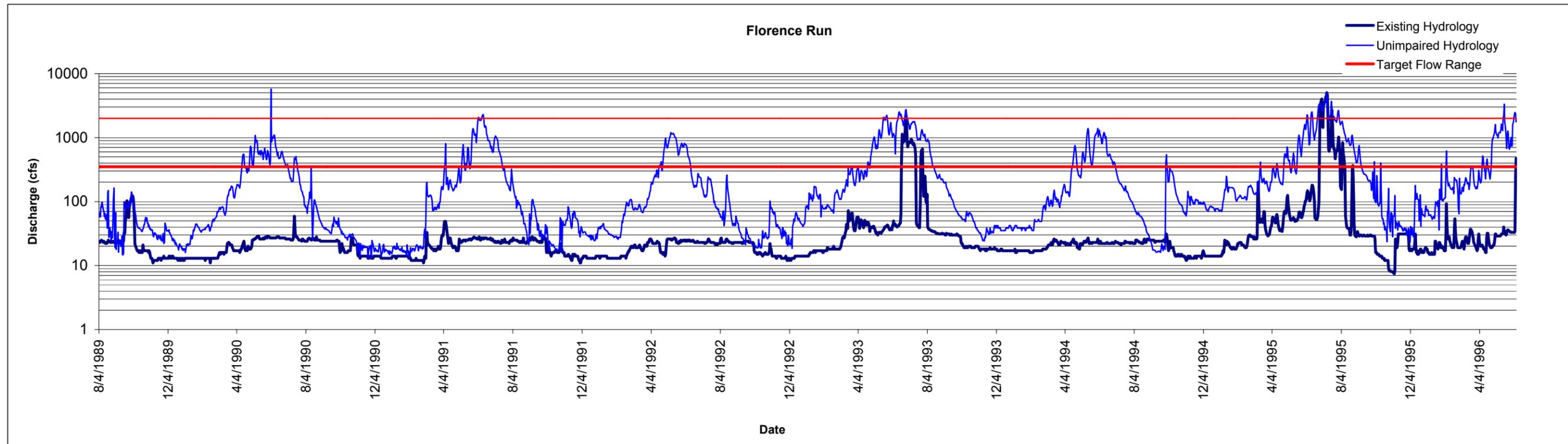
Florence Lake Run
Tied-for-First Run
Chawanakee Gorge Run
Upper Mono Creek Run

Appendix A. REC 3 A-1. Florence Lake Run, South Fork San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (350 to 2,000 cfs). Note, flow is log-scale.

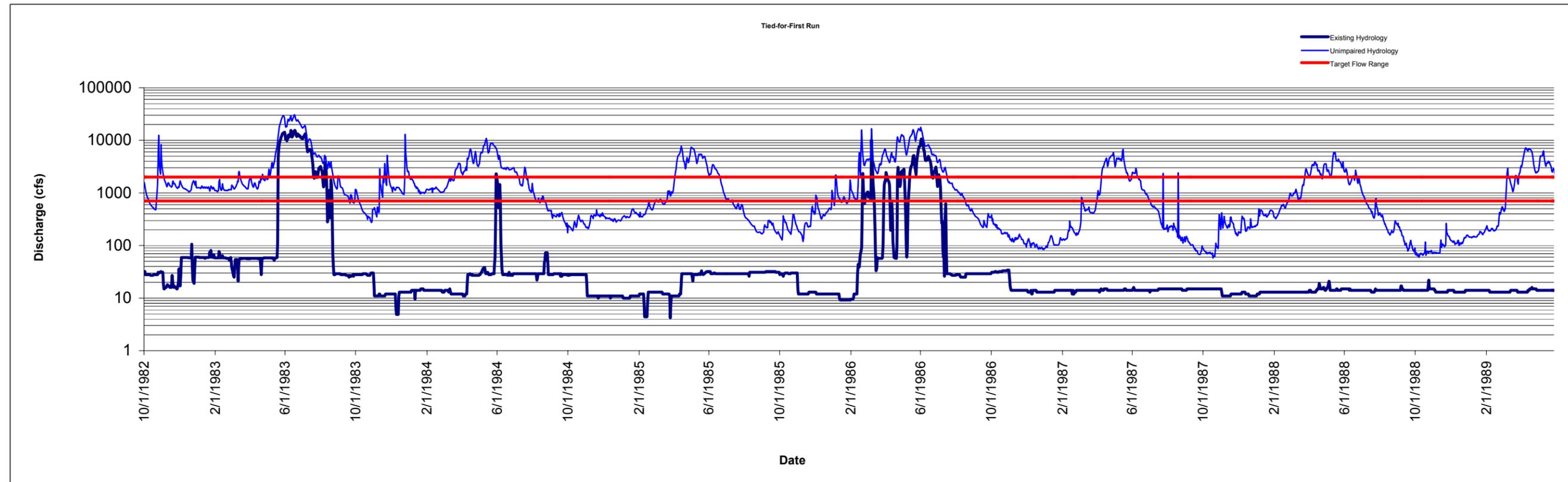


Water-year Types			
WET	ABOVE NORMAL	DRY	CRITICALLY DRY
1983	1984	1985	1987
1986	1999	2001	1988
1993	2000	2002	1989
1995			1990
1996			1991
1997			1992
1998			1994

Appendix A. REC 3 A-1. Florence Lake Run, South Fork San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (350 to 2,000 cfs). Note, flow is log-scale.



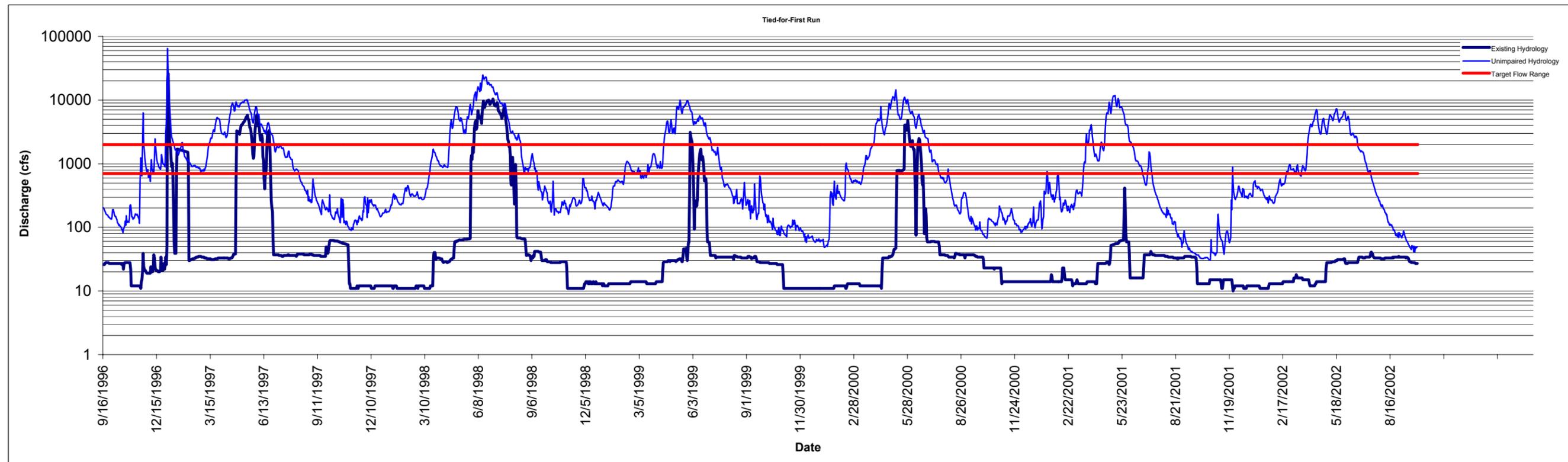
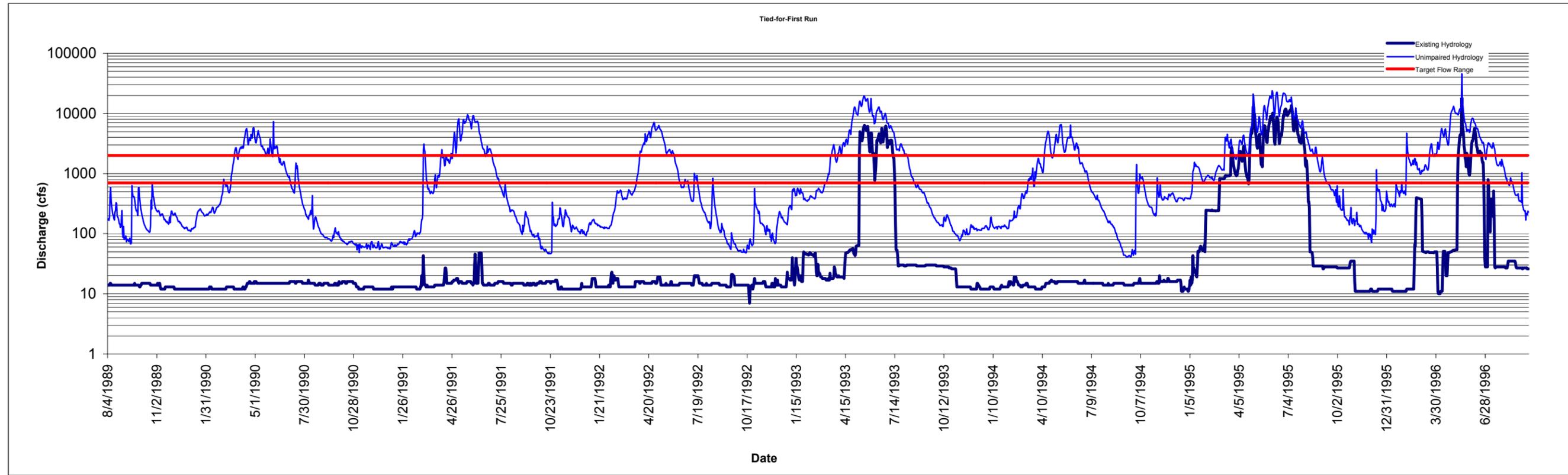
Appendix A. REC 3 A-2. Tied-for-First Run, San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (700 to 2,000 cfs). Note, flow is log-scale.



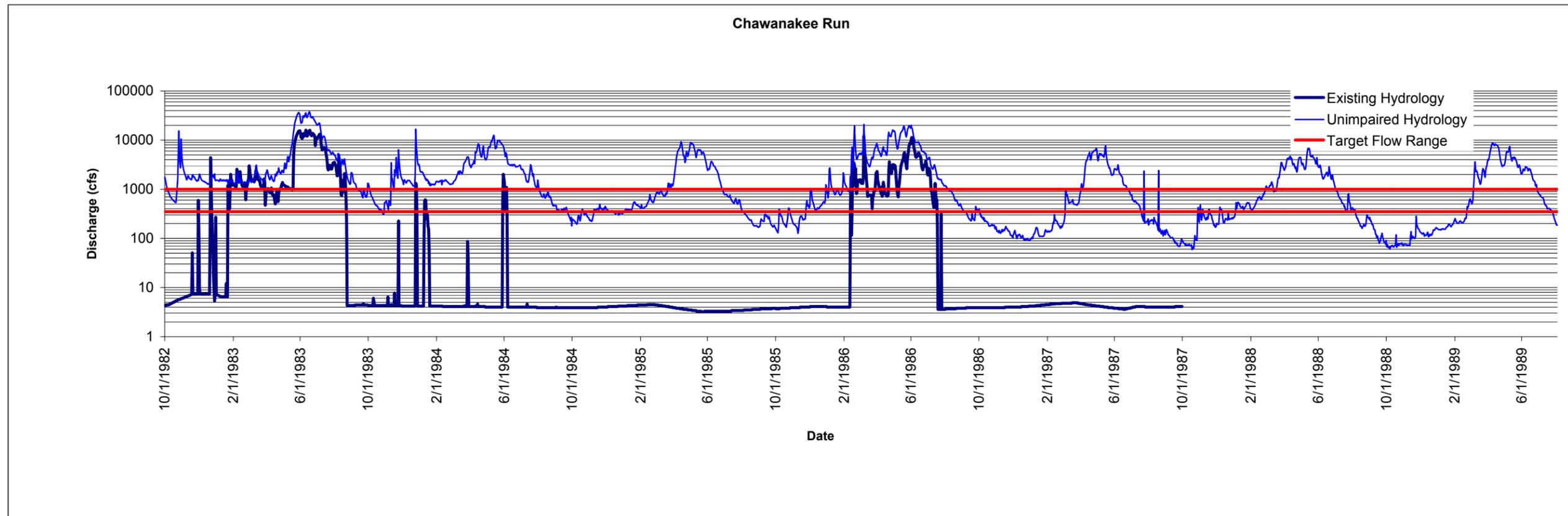
Water-year Types

WET	ABOVE NORMAL	DRY	CRITICALLY DRY
1983	1984	1985	1987
1986	1999	2001	1988
1993	2000	2002	1989
1995			1990
1996			1991
1997			1992
1998			1994

Appendix A. REC 3 A-2. Tied-for-First Run, San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (700 to 2,000 cfs). Note, flow is log-scale.



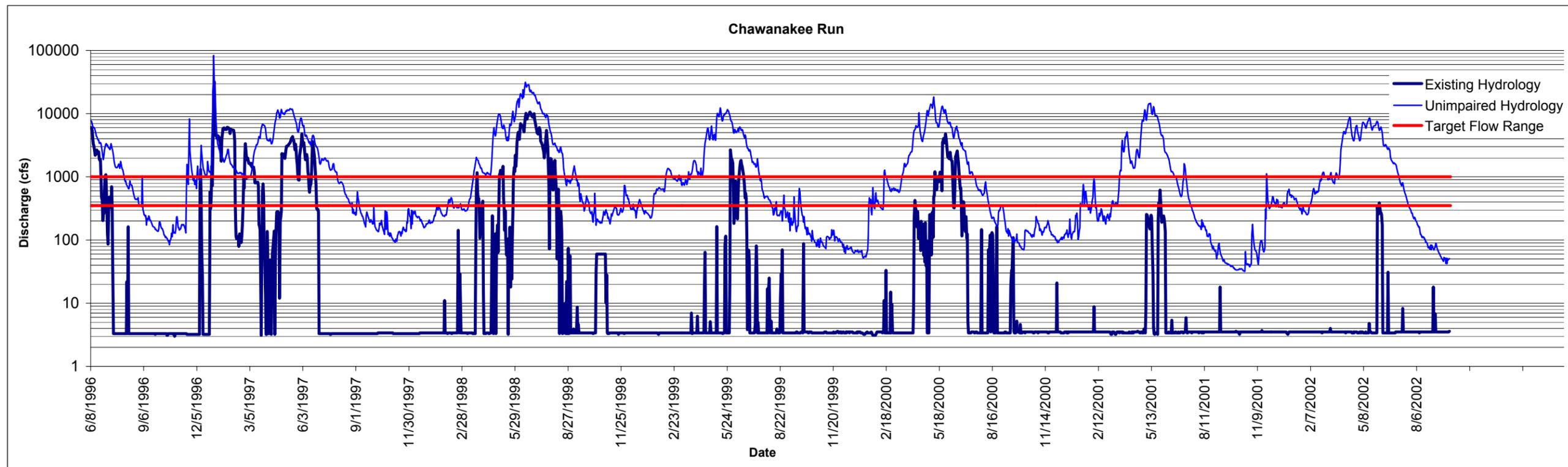
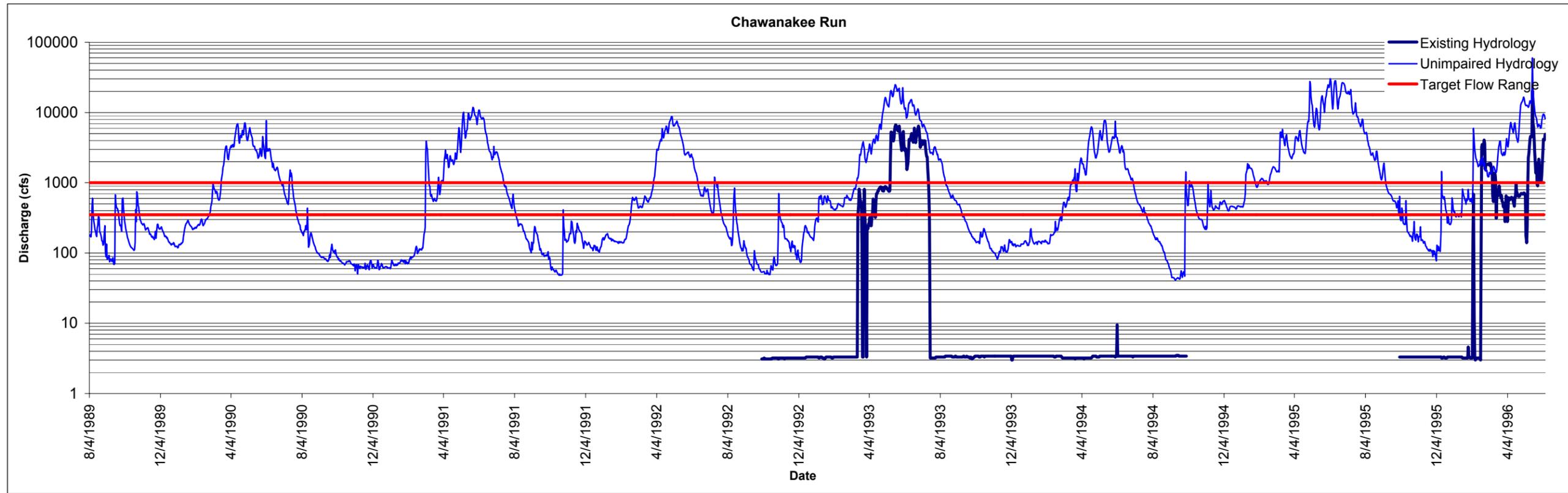
Appendix A. REC 3 A-3. Chawanakee Run, San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (350 to 1,000 cfs). Note, flow is log-scale.



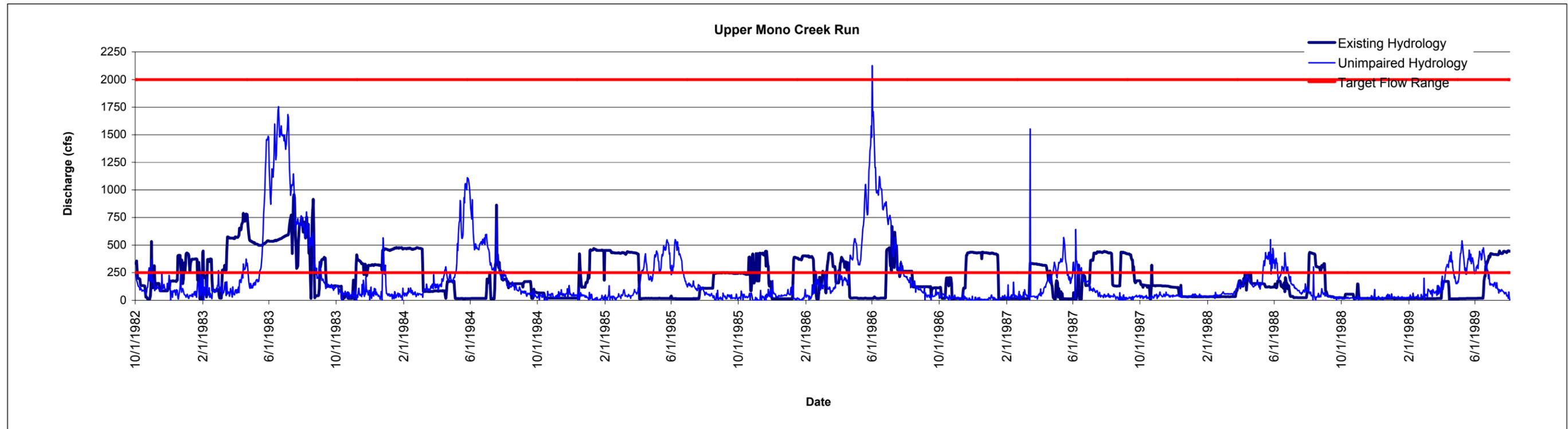
Water-year Types

WET	ABOVE NORMAL	DRY	CRITICALLY DRY
1983	1984	1985	1987
1986	1999	2001	1988
1993	2000	2002	1989
1995			1990
1996			1991
1997			1992
1998			1994

Appendix A. REC 3 A-3. Chawanakee Run, San Joaquin River, daily flow hydrographs from 1983-2002. The target flow range is shaded (350 to 1,000 cfs). Note, flow is log-scale.



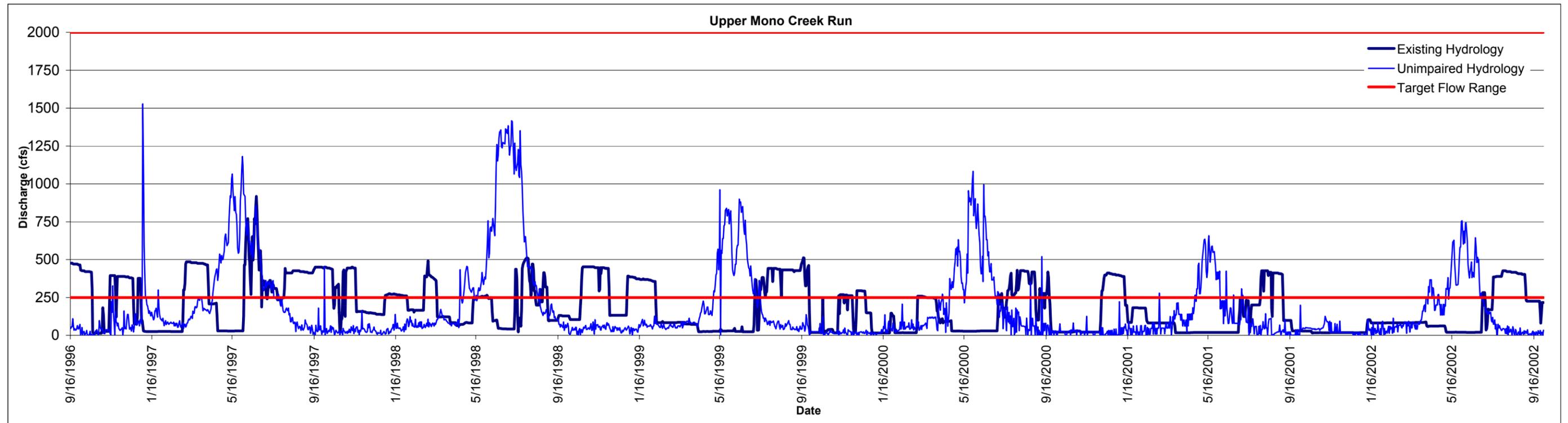
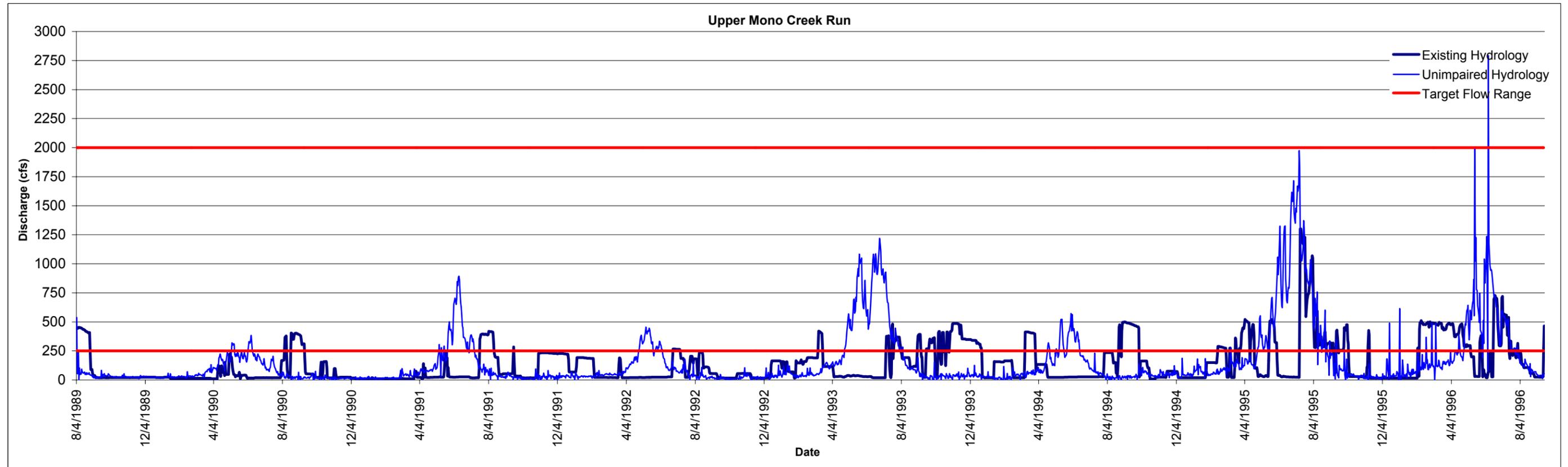
Appendix A. REC 3 A-4. Upper Mono Creek Run, Mono Creek, daily flow hydrographs from 1983-2002. The target flow range is shaded (250 to 2,000 cfs). Note, flow is log-scale.



Water-year Types

WET	ABOVE NORMAL	DRY	CRITICALLY DRY
1983	1984	1985	1987
1986	1999	2001	1988
1993	2000	2002	1989
1995			1990
1996			1991
1997			1992
1998			1994

Appendix A. REC 3 A-4. Upper Mono Creek Run, Mono Creek, daily flow hydrographs from 1983-2002. The target flow range is shaded (250 to 2,000 cfs). Note, flow is log-scale.



APPENDIX B
Florence Lake Run (Summary Tables)

Appendix B. Table REC 3 B-1. Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002. ^{a, b, c, d}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	0	0	0	0	0	0	0	1	5	24	21	0	51	4.3	51.0	12.8
1986	0	0	0	0	0	0	0	1	23	15	0	0	39	3.3	39.0	9.8
1993	0	0	0	0	0	0	0	0	10	18	0	0	28	2.3	28.0	7.0
1995	0	0	0	0	0	0	0	0	1	20	6	0	27	2.3	27.0	6.8
1996	0	0	0	0	0	0	0	0	19	10	0	0	29	2.4	29.0	7.3
1997	0	0	0	1	0	0	0	1	11	0	0	0	13	1.1	12.0	3.0
AVERAGE/Month	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.5	11.5	14.5	4.5	0.0	SUM	187		186

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	1.0	0.3
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	SUM	1		1

^a The boatable flow range is between 350 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows were not within the boatable flow range during Dry and Critically Dry WYs.

^d Existing hydrology is not available for 1998.

Appendix B. Table REC 3 B-2. Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002. ^{a,b,c}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	4	0	0	0	0	0	0	10	5	18	28	9	74	6.2	61.0	15.3
1986	0	0	0	0	5	7	13	25	24	31	12	0	117	9.8	92.0	23.0
1993	0	0	0	0	0	0	10	26	20	31	14	0	101	8.4	91.0	22.8
1995	0	0	0	0	0	1	10	24	16	8	31	8	98	8.2	79.0	19.8
1996	2	0	0	1	1	0	12	28	23	31	7	1	106	8.8	89.0	22.3
1997	0	0	0	6	0	6	16	21	29	31	1	0	110	9.2	82.0	20.5
1998	0	0	0	0	0	0	11	29	16	8	21	11	96	8.0	74.0	18.5
AVERAGE/Month	1.0	0.0	0.0	1.2	1.0	2.3	10.2	22.3	19.5	25.0	15.5	3.0	SUM	702		568

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	2	0	0	0	8	15	30	31	15	0	101	8.4	91.0	22.8
1999	1	0	0	0	0	0	4	25	30	20	0	1	81	6.8	75.0	18.8
2000	0	0	0	0	0	0	15	22	25	17	0	0	79	6.6	64.0	16.0
AVERAGE/Month	0.3	0.0	0.7	0.0	0.0	0.0	9.0	20.7	28.3	22.7	5.0	0.3	SUM	261		230

Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1985	0	0	0	0	0	0	17	31	26	0	0	0	74	6.2	57.0	14.3
2001	0	0	0	0	0	1	8	31	20	5	0	0	65	5.4	56.0	14.0
2002	0	0	0	0	0	0	20	27	30	7	0	0	84	7.0	64.0	16.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.3	15.0	29.7	25.3	4.0	0.0	0.0	SUM	223		177

Appendix B. Table REC 3 B-2 (continued). Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002. ^{a,b,c}

Critically Dry Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1987	0	0	0	0	0	0	13	31	28	1	0	0	73	6.1	60.0	15.0	
1988	0	0	0	0	0	0	10	21	30	4	0	0	65	5.4	55.0	13.8	
1989	0	0	0	0	0	1	20	30	27	0	0	0	78	6.5	57.0	14.3	
1990	0	0	0	0	0	0	11	30	29	8	0	0	78	6.5	67.0	16.8	
1991	0	0	0	0	0	0	3	21	25	16	0	0	65	5.4	62.0	15.5	
1992	0	0	0	0	0	0	10	31	12	0	0	0	53	4.4	43.0	10.8	
1994	0	0	0	0	0	0	9	29	30	1	0	3	72	6.0	60.0	15.0	
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.1	10.9	27.6	25.9	4.3	0.0	0.4	SUM	484		404	

^a The boatable flow range is between 350 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Unimpaired hydrology for 1998 is not included as existing hydrology is not available for comparison.

Appendix B. Table REC 3 B-3. Number of Flow Days Exceeding Boating Range under Existing Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002. a, b, c,d

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	0	0	0	0	0	0	0	1	25	7	0	0	33	2.8	33.0	8.3
1986	0	0	0	0	0	0	0	0	7	0	0	0	7	0.6	7.0	1.8
1993	0	0	0	0	0	0	0	0	2	0	0	0	2	0.2	2.0	0.5
1995	0	0	0	0	0	0	0	0	4	11	0	0	15	1.3	15.0	3.8
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	6.3	3.0	0.0	0.0	SUM	57		57

^a The boatable flow range is between 350 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows did not exceed the boatable flow range during Above Normal, Dry, and Critically Dry WYs.

^d Existing hydrology is not available for 1998.

Appendix B. Table REC 3 B-4. Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002 ^{a, b, c.}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	0	0	0	0	0	0	0	7	25	13	3	0	48	4.0	48	12.0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1993	0	0	0	0	0	0	0	5	10	0	0	0	15	1.3	15	3.8
1995	0	0	0	0	0	0	0	0	14	23	0	0	37	3.1	37	9.3
1996	0	0	0	0	0	0	0	3	7	0	0	0	10	0.8	10	2.5
1997	0	0	0	2	0	0	0	10	1	0	0	0	13	1.1	11	2.8
AVERAGE/Month	0.0	0.0	0.0	0.3	0.0	0.0	0.0	4.2	9.5	6.0	0.5	0.0	SUM	123		121

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	0	0	0	0	0	20	6	0	0	0	26	2.2	26	6.5
1999	0	0	0	0	0	0	0	2	0	0	0	0	2	0.2	2	0.5
2000	0	0	0	0	0	0	0	9	5	0	0	0	14	1.2	14	3.5
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	3.7	0.0	0.0	0.0	SUM	151		14

Appendix B. Table REC 3-B-4 (continued). Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Florence Run, South Fork San Joaquin River between 1983 and 2002 ^{a, b, c.}

Critically Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1987	0	0	0	0	0	0	0	0	0	1	1	0	2	0.2	2	0.5
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1990	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	1	0.3
1991	0	0	0	0	0	0	0	0	5	0	0	0	5	0.4	5	1.3
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.1	0.0	SUM	8	8	

^a Flows did not exceed the boatable flow range during the Dry WYs.

^b Below Normal WYs did not occur during the period of record.

^c Unimpaired hydrology for 1998 is not provided as existing hydrology is not available for comparison.

APPENDIX C
Tied-for-First Run (Summary Tables)

Appendix C. Table REC 3 C-1. Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Tied-for-First Run, San Joaquin River between 1983 and 2002. ^{a, b, c}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	0	0	0	0	0	0	0	0	0	2	8	0	10	0.8	10	2.5
1986	0	0	0	0	6	11	10	4	4	4	0	0	39	3.3	12	3.0
1993	0	0	0	0	0	0	0	0	4	3	0	0	7	0.6	7	1.8
1995	0	0	0	0	1	28	16	4	0	0	5	0	54	4.5	9	2.3
1996	0	0	0	0	0	0	0	11	5	1	0	0	17	1.4	17	4.3
1997	0	0	0	20	6	0	0	3	4	0	0	0	33	2.8	7	1.8
1998	0	0	0	0	0	0	0	5	0	3	4	0	12	1.0	12	3.0
AVERAGE/Month	0.0	0.0	0.0	2.9	1.9	5.6	3.7	3.9	2.4	1.9	2.4	0.0	SUM	172		74

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	0	0	0	0	0	1	4	0	0	0	5	0.4	5	1.3
1999	0	0	0	0	0	0	0	0	12	0	0	0	12	1.0	12	3.0
2000	0	0	0	0	0	0	0	13	10	0	0	0	23	1.9	23	5.8
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	8.7	0.0	0.0	0.0	SUM	40		40

^a The boatable flow range is between 700 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows were not within the boatable flow range during Dry and Critically Dry WYs.

Appendix C. Table REC 3 C-2. Number of boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Tied-For-First Run, San Joaquin River between 1983 and 2002. ^{a, b}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	11	27	31	31	28	29	28	2	0	0	8	24	219	18.3	10	2.5
1986	0	0	5	19	13	0	0	0	0	15	16	0	68	5.7	31	7.8
1993	0	0	0	0	0	14	0	0	0	0	14	0	28	2.3	14	3.5
1995	7	1	0	22	28	14	0	0	0	0	7	11	90	7.5	7	1.8
1996	0	0	1	1	23	21	0	0	2	15	13	1	77	6.4	30	7.5
1997	0	9	25	17	28	12	0	0	1	31	10	0	133	11.1	42	10.5
1998	0	0	0	0	0	14	19	0	0	0	13	13	59	4.9	13	3.3
AVERAGE/Month	2.6	5.3	8.9	12.9	17.1	14.9	6.7	0.3	0.4	8.7	11.6	7.0	SUM	674		147

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	5	13	24	30	29	19	0	0	0	18	17	0	155	12.9	35	8.8
1999	0	0	0	0	19	21	14	0	0	18	0	0	72	6.0	18	4.5
2000	0	0	0	0	6	18	1	0	0	17	2	0	44	3.7	19	4.8
AVERAGE/Month	1.7	4.3	8.0	10.0	18.0	19.3	5.0	0.0	0.0	17.7	6.3	0.0	SUM	271		72

Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1985	0	0	0	0	1	21	2	0	10	7	0	0	41	3.4	17	4.3
2001	0	0	0	1	1	6	16	0	18	7	0	0	49	4.1	25	6.3
2002	0	1	0	0	6	26	0	0	9	13	0	0	55	4.6	22	5.5
AVERAGE/Month	0.0	0.3	0.0	0.3	2.7	17.7	6.0	0.0	12.3	9.0	0.0	0.0	SUM	145		64

Appendix C. Table REC 3 C-2 (continued). Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Tied-For-First Run, San Joaquin River between 1983 and 2002. ^{a, b}

Critically Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1987	0	0	0	0	0	2	8	6	21	2	0	0	39	3.3	29	7.3
1988	0	0	0	0	5	24	2	0	20	8	0	0	59	4.9	28	7.0
1989	0	0	0	0	0	18	0	2	13	4	0	0	37	3.1	19	4.8
1990	0	0	0	0	0	10	0	1	21	11	0	0	43	3.6	33	8.3
1991	0	0	0	0	0	8	22	0	1	12	0	0	43	3.6	13	3.3
1992	0	0	0	0	0	4	3	0	16	7	1	0	31	2.6	24	6.0
1994	0	0	0	0	0	14	16	0	15	3	0	3	51	4.3	18	4.5
AVERAGE/Month	0.0	0.0	0.0	0.0	0.7	11.4	7.3	1.3	15.3	6.7	0.1	0.4	SUM	303		164

^a The boatable flow range is between 700 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

Appendix C. Table REC 3 C-3. Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Tied-for-First Run, San Joaquin River between 1983 and 2002. ^{a, b, c}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	0	0	0	0	0	0	0	12	30	29	8	0	79	6.6	79	19.8
1986	0	0	0	0	1	3	8	22	26	1	0	0	61	5.1	49	12.3
1993	0	0	0	0	0	0	0	22	26	10	0	0	58	4.8	58	14.5
1995	0	0	0	0	0	3	13	27	30	31	3	0	107	8.9	91	22.8
1996	0	0	0	0	0	0	0	13	20	0	0	0	33	2.8	33	8.3
1997	0	0	0	4	0	0	3	28	15	0	0	0	50	4.2	43	10.8
1998	0	0	0	0	0	0	0	1	30	28	0	0	59	4.9	59	14.8
AVERAGE/Month	0.0	0.0	0.0	0.6	0.1	0.9	3.4	17.9	25.3	14.1	1.6	0.0	SUM	447		412

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	0	0	0	0	0	1	0	0	0	0	1	0.1	1	0.3
1999	0	0	0	0	0	0	0	3	1	0	0	0	4	0.3	4	1.0
2000	0	0	0	0	0	0	0	9	7	0	0	0	16	1.3	16	4.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	2.7	0.0	0.0	0.0	SUM	21		21

^a The boatable flow range is between 700 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows did not exceed the boatable flow range during Dry and Critically Dry WYs.

Appendix C. Table REC 3 C-4. Number of boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Tied-For-First Run, San Joaquin River between 1983 and 2002 ^{a,b}.

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	7	3	0	0	0	2	2	29	30	31	23	1	128	10.7	113	28.3
1986	0	0	0	2	15	31	30	31	30	16	0	0	155	12.9	77	19.3
1993	0	0	0	0	0	8	30	31	30	31	4	0	134	11.2	96	24.0
1995	0	0	0	0	0	17	30	31	30	31	24	0	163	13.6	116	29.0
1996	0	0	0	0	3	10	30	31	28	16	0	0	118	9.8	75	18.8
1997	0	3	3	14	0	19	30	31	29	0	0	0	129	10.8	60	15.0
1998	0	0	0	0	0	0	11	31	30	31	17	0	120	10.0	109	27.3
AVERAGE/Month	1.0	0.9	0.4	2.3	2.6	12.4	23.3	30.7	29.6	22.3	9.7	0.1	SUM	947		646

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	7	7	1	0	12	30	31	30	13	0	0	131	10.9	74	18.5
1999	0	0	0	0	0	0	16	31	30	3	0	0	80	6.7	64	16.0
2000	0	0	0	0	0	0	29	31	30	2	0	0	92	7.7	63	15.8
AVERAGE/Month	0.0	2.3	2.3	0.3	0.0	4.0	25.0	31.0	30.0	6.0	0.0	0.0	SUM	303		201

Appendix C. Table REC 3 C-4 (continued). Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Tied-For-First Run, San Joaquin River between 1983 and 2002 ^{a,b}.

Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
	1985	0	0	0	0	0	0	28	31	20	0	0	0	79	6.6	51
2001	0	0	0	0	0	7	14	31	8	0	0	0	60	5.0	39	9.8
2002	0	0	0	0	0	2	30	31	21	0	0	0	84	7.0	52	13.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	3.0	24.0	31.0	16.3	0.0	0.0	0.0	SUM	223		142

Critically Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
	1987	0	0	0	0	0	0	22	25	9	1	1	0	58	4.8	36
1988	0	0	0	0	0	7	28	31	10	0	0	0	76	6.3	41	10.3
1989	0	0	0	0	0	8	30	29	17	0	0	0	84	7.0	46	11.5
1990	0	0	0	0	0	6	30	30	9	0	0	0	75	6.3	39	9.8
1991	0	0	0	0	0	4	8	31	29	8	0	0	80	6.7	68	17.0
1992	0	0	0	0	0	0	27	31	5	0	0	0	63	5.3	36	9.0
1994	0	0	0	0	0	0	14	31	15	0	0	0	60	5.0	46	11.5
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	3.6	22.7	29.7	13.4	1.3	0.1	0.0	SUM	496		312

^a The boatable flow range is between 700 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

APPENDIX D
Chawanakee Gorge Run (Summary Tables)

Appendix D. Table REC 3 D-1. Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b, c, d}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1983	0	1	0	3	1	2	22	1	0	0	5	0	35	2.9	6	1.5
1986	0	0	0	0	4	14	12	3	0	10	0	0	43	3.6	13	3.3
1993	0	0	0	0	0	7	21	9	0	1	0	0	38	3.2	10	2.5
1996	0	0	0	0	1	17	29	7	2	7	0	0	63	5.3	16	4.0
1997	0	0	5	0	4	10	0	2	6	0	0	0	27	2.3	8	2.0
1998	0	0	0	0	0	4	2	2	0	1	5	0	14	1.2	8	2.0
AVERAGE/Month	0.0	0.2	0.8	0.5	1.7	9.0	14.3	4.0	1.3	3.2	1.7	0.0	SUM	220		61

Above Normal Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1984	0	0	1	3	0	0	0	1	3	0	0	0	8	0.7	4	1.0
1999	0	0	0	0	0	0	0	0	11	0	0	0	11	0.9	11	2.8
2000	0	0	0	0	0	0	1	9	7	0	0	0	17	1.4	16	4.0
AVERAGE/Month	0.0	0.0	0.3	1.0	0.0	0.0	0.3	3.3	7.0	0.0	0.0	0.0	SUM	36		31

Dry Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
2001	0	0	0	0	0	0	0	4	0	0	0	0	4	0.3	4	1.0
2002	0	0	0	0	0	0	0	0	1	0	0	0	1	0.1	1	0.3
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.3	0.0	0.0	0.0	SUM	5		5

^a The boatable flow range is between 350 and 1,000 cfs

^b Below Normal WYs did not occur during the period of record.

^c Flows were not within the boatable flow range during Critically Dry WYs.

^d Existing hydrology data is not available for 1988, 1989, 1990, 1991, 1992, and 1995

Appendix D. Table REC 3 D-2. Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b, c}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1983	17	0	0	0	0	0	0	0	0	0	0	18	35	2.9	0	0.0
1986	4	7	29	23	6	0	0	0	0	0	24	11	104	8.7	24	6.0
1993	2	0	0	25	28	12	0	0	0	0	19	10	96	8.0	19	4.8
1995	18	25	31	15	4	0	0	0	0	0	0	22	115	9.6	0	0.0
1996	4	0	11	24	4	0	0	0	0	0	28	1	72	6.0	28	7.0
1997	0	5	6	0	2	3	0	0	0	1	24	5	46	3.8	25	6.3
1998	0	0	0	1	12	8	0	0	0	0	10	22	53	4.4	10	2.5
AVERAGE/Month	4.5	2.0	7.7	12.2	8.7	3.8	0.0	0.0	0.0	0.2	17.5	11.2	SUM	406		106

Above Normal Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1984	24	11	0	0	0	0	0	0	0	0	29	20	84	7.0	29	7.3
1999	2	1	16	13	18	18	0	0	0	14	10	5	97	8.1	24	6.0
2000	0	0	0	9	19	15	0	0	0	15	11	2	71	5.9	26	6.5
AVERAGE/Month	8.7	4.0	5.3	7.3	12.3	11.0	0.0	0.0	0.0	9.7	16.7	9.0	SUM	252		79

Dry Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)	
													Total/year	Average/Month	Total/year	Average/Month
1985	2	21	13	30	28	21	0	0	3	31	2	0	151	12.6	36	9.0
2001	0	0	0	13	6	14	0	0	10	15	0	0	58	4.8	25	6.3
2002	0	3	21	16	21	18	0	0	0	16	0	0	95	7.9	16	4.0
AVERAGE/Month	0.7	8.0	11.3	19.7	18.3	17.7	0.0	0.0	4.3	20.7	0.7	0.0	SUM	304		77

Appendix D. Table REC 3 D-2 (continued). Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b, c}

Critically Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1987	1	0	0	0	0	27	1	0	6	18	0	0	53	4.4	24	6.0
1988	1	5	5	28	26	5	0	0	0	27	6	0	103	8.6	33	8.3
1989	0	0	0	0	7	6	0	0	2	25	3	8	51	4.3	30	7.5
1990	7	0	0	0	3	17	0	0	2	20	1	0	50	4.2	23	5.8
1991	0	0	0	0	0	20	0	0	0	15	5	0	40	3.3	20	5.0
1992	1	0	0	0	11	28	0	0	17	21	4	0	82	6.8	42	10.5
1994	0	0	0	0	0	21	0	0	0	22	0	2	45	3.8	22	5.5
AVERAGE/Month	0.5	0.0	0.0	0.0	0.0	24.0	0.5	0.0	3.0	20.0	0.0	1.0	SUM	424		194

^a The boatable flow range is between 350 and 1,000 cfs

^b Below Normal WYs did not occur during the period of record.

^c Existing hydrology data is not available for 1988, 1989, 1990, 1991, 1992, and 1995

Appendix D. Table REC 3 D-3. Number of Flow Days Exceeding Boating Range under Existing Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b, c, d}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept		Water-year (Oct-Sept)		Boating Season (May-Aug)	
														Total/year	Average/Month	Total/year	Average/Month
1983	0	0	2	7	27	29	8	30	30	31	17	0		181	15.1	108	27.0
1986	0	0	0	0	12	17	18	28	30	7	0	0		112	9.3	65	16.3
1993	0	0	0	0	0	0	0	22	30	14	0	0		66	5.5	66	16.5
1996	0	0	0	0	11	12	0	21	25	2	0	0		71	5.9	48	12.0
1997	0	0	2	31	12	12	3	29	19	0	0	0		108	9.0	48	12.0
1998	0	0	0	0	0	1	0	12	30	29	3	0		75	6.3	74	18.5
AVERAGE/Month	0.0	0.0	0.7	6.3	10.3	11.8	4.8	23.7	27.3	13.8	3.3	0.0	SUM	613		409	

Above Normal Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept		Water-year (Oct-Sept)		Boating Season (May-Aug)	
														Total/year	Average/Month	Total/year	Average/Month
1984	0	0	2	0	0	0	0	2	2	0	0	0		6	0.5	4	1.0
1999	0	0	0	0	0	0	0	3	10	0	0	0		13	1.1	13	3.3
2000	0	0	0	0	0	0	0	15	16	0	0	0		31	2.6	31	7.8
AVERAGE/Month	0.0	0.0	0.7	0.0	0.0	0.0	0.0	6.7	9.3	0.0	0.0	0.0	SUM	50		48	

^a The boatable flow range is between 350 and 1,000 cfs

^b Below Normal WYs did not occur during the period of record.

^c Flows did not exceed the boatable flow range during Dry and Critically Dry WYs.

^d Existing hydrology data is not available for 1988, 1989, 1990, 1991, 1992, and 1995

Appendix D. Table REC 3 D-4. Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1983	14	30	31	31	28	31	30	31	30	31	31	12	330	27.5	123	30.8	
1986	0	0	2	8	22	31	30	31	30	31	7	0	192	16.0	99	24.8	
1993	0	0	0	0	0	19	30	31	30	31	12	0	153	12.8	104	26.0	
1995	1	1	0	16	24	31	30	31	30	31	31	7	233	19.4	123	30.8	
1996	0	0	1	0	25	31	30	31	30	31	3	1	183	15.3	95	23.8	
1997	0	9	25	31	26	28	30	31	30	30	0	0	240	20.0	91	22.8	
1998	0	0	0	0	0	13	30	31	30	31	21	6	162	13.5	113	28.3	
AVERAGE/Month	2.3	6.5	9.8	11.7	16.8	25.5	30.0	31.0	30.0	30.8	12.3	3.2	SUM	1493		748	

Above Normal Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1984	3	19	31	31	29	31	30	31	30	31	2	0	268	22.3	94	23.5	
1999	0	0	0	0	10	13	30	31	30	17	0	0	131	10.9	78	19.5	
2000	0	0	0	0	3	16	30	31	30	16	0	0	126	10.5	77	19.3	
AVERAGE/Month	1.0	6.3	10.3	10.3	14.0	20.0	30.0	31.0	30.0	21.3	0.7	0.0	SUM	525		249	

Dry Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1985	0	0	0	0	0	10	30	31	27	0	0	0	98	8.2	58	14.5	
2001	0	0	0	0	0	12	30	31	20	3	0	0	96	8.0	54	13.5	
2002	0	1	0	0	3	13	30	31	30	6	0	0	114	9.5	67	16.8	
AVERAGE/Month	0.0	0.3	0.0	0.0	1.0	11.7	30.0	31.0	25.7	3.0	0.0	0.0	SUM	308		179	

Appendix D. Table REC 3 D-4 (continued). Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Chawanakee Run, San Joaquin River between 1983 and 2002. ^{a, b}

Critically Dry Water- years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1987	0	0	0	0	0	0	29	31	24	1	1	0	86	7.2	57	14.3	
1988	0	0	0	0	3	26	30	31	30	2	0	0	122	10.2	63	15.8	
1989	0	0	0	0	0	25	30	31	28	0	0	0	114	9.5	59	14.8	
1990	0	0	0	0	0	14	30	31	28	5	0	0	108	9.0	64	16.0	
1991	0	0	0	0	0	7	30	31	30	16	0	0	114	9.5	77	19.3	
1992	0	0	0	0	0	3	30	31	13	3	0	0	80	6.7	47	11.8	
1994	0	0	0	0	0	10	30	31	30	0	0	1	102	8.5	61	15.3	
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	5.0	29.5	31.0	27.0	0.5	0.5	0.5	SUM	726		428	

^a The boatable flow range is between 350 and 1,000 cfs

^b Existing hydrology data is not available for 1988, 1989, 1990, 1991, 1992, and 1995. The unimpaired hydrology calculations do not include these years.

APPENDIX E
Upper Mono Creek Run (Summary Tables)

Appendix E. Table REC 3 E-1. Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002.^{a, b}

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	5	1	11	24	9	24	30	31	30	31	19	11	226	18.8	111	27.8
1986	6	20	0	23	16	17	17	0	4	29	12	0	144	12.0	45	11.3
1993	0	0	0	0	0	8	0	0	0	18	2	21	49	4.1	20	5.0
1995	0	0	0	0	14	14	19	14	0	22	31	23	137	11.4	67	16.8
1996	4	3	0	0	24	31	30	12	14	23	0	17	158	13.2	49	12.3
1997	18	16	23	0	0	28	10	0	27	20	30	30	202	16.8	77	19.3
1998	23	16	1	31	3	17	0	15	4	11	21	0	142	11.8	51	12.8
AVERAGE/Month	8.0	8.0	5.0	11.1	9.4	19.9	15.1	10.3	11.3	22.0	16.4	14.6	SUM	1058		420

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	22	31	31	29	6	0	0	0	12	0	0	131	10.9	12	3.0
1999	12	30	5	31	8	0	0	0	0	20	31	26	163	13.6	51	12.8
2000	0	18	13	0	0	13	0	0	0	16	30	14	104	8.7	46	11.5
AVERAGE/Month	4.0	23.3	16.3	20.7	12.3	6.3	0.0	0.0	0.0	16.0	20.3	13.3	SUM	398		109

Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1985	0	0	2	27	28	31	2	0	0	0	0	6	96	8.0	0	0.0
2001	0	0	25	11	0	0	0	0	0	0	27	4	67	5.6	27	6.8
2002	0	0	0	0	0	0	0	0	0	20	31	3	54	4.5	51	12.8
AVERAGE/Month	0.0	0.0	9.0	12.7	9.3	10.3	0.7	0.0	0.0	6.7	19.3	4.3	SUM	217		78

Appendix E. Table REC 3 E-1 (continued). Number of Boating Opportunity Days (BODs) under Existing Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002.^{a, b}

Critically Dry Water years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1987	0	13	31	16	0	17	17	0	2	30	16	19	161	13.4	48	12.0
1988	1	0	0	0	0	0	3	0	0	0	29	0	33	2.8	29	7.3
1989	0	0	0	0	0	0	0	0	11	31	27	0	69	5.8	69	17.3
1990	0	0	0	0	0	0	0	0	0	0	17	11	28	2.3	17	4.3
1991	0	0	0	0	0	0	0	0	0	13	13	1	27	2.3	26	6.5
1992	0	0	0	0	0	0	0	0	6	7	0	0	13	1.1	13	3.3
1994	17	30	23	0	0	18	0	0	0	0	7	28	123	10.3	7	1.8
AVERAGE/Month	2.6	6.1	7.7	2.3	0.0	5.0	2.9	0.0	2.7	11.6	15.6	8.4	SUM 454		209	

^a The boatable flow range is between 250 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

Appendix E. Table REC 3 E-2. Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002^{a, b}.

Wet Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1983	4	0	0	1	0	1	10	17	30	31	26	3	123	10.3	104	26.0
1986	0	0	0	0	0	3	12	31	29	26	0	0	101	8.4	86	21.5
1993	0	0	0	0	0	0	6	31	30	31	5	0	103	8.6	97	24.3
1995	0	0	0	0	0	1	4	31	30	31	24	4	125	10.4	116	29.0
1996	0	0	1	1	2	1	9	29	28	23	0	0	94	7.8	80	20.0
1997	0	1	0	6	0	2	14	31	30	19	0	0	103	8.6	80	20.0
1998	1	0	0	0	0	0	6	27	30	31	17	0	112	9.3	105	26.3
AVERAGE/Month	0.7	0.1	0.1	1.1	0.3	1.1	8.7	28.1	29.6	27.4	10.3	1.0	SUM	761		668

Above Normal Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1984	0	0	4	0	0	0	5	26	30	25	0	0	90	7.5	81	20.3
1999	0	0	0	0	0	0	0	24	30	12	0	0	66	5.5	66	16.5
2000	0	0	0	0	0	0	8	30	30	5	1	1	75	6.3	66	16.5
AVERAGE/Month	0.0	0.0	1.3	0.0	0.0	0.0	4.3	26.7	30.0	14.0	0.3	0.3	SUM	231		213

Dry Water-years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1985	0	0	0	0	0	0	11	31	21	0	0	0	63	5.3	52	13.0
2001	0	0	0	0	0	1	4	31	4	3	0	0	43	3.6	38	9.5
2002	0	0	0	0	0	0	12	24	29	0	0	0	65	5.4	53	13.3
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.3	9.0	28.7	18.0	1.0	0.0	0.0	SUM	171		143

Appendix E. Table REC 3 E-2 (continued). Number of Boating Opportunity Days (BODs) under Unimpaired Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002^{a, b}.

Critically Dry Water years													Water-year (Oct-Sept)		Boating Season (May-Aug)	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total/year	Average/Month	Total/year	Average/Month
1987	0	0	0	0	0	1	6	20	12	0	0	0	39	3.3	32	8.0
1988	0	0	0	0	0	0	1	20	19	0	1	0	41	3.4	40	10.0
1989	0	0	0	0	0	0	16	26	23	0	1	0	66	5.5	50	12.5
1990	0	0	0	0	0	0	0	6	8	0	0	0	14	1.2	14	3.5
1991	0	0	0	0	0	0	0	13	29	8	0	0	50	4.2	50	12.5
1992	0	0	0	0	0	0	5	27	6	0	0	0	38	3.2	33	8.3
1994	0	0	0	0	0	0	4	18	15	0	0	0	37	3.1	33	8.3
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.1	4.6	18.6	16.0	1.1	0.3	0.0	SUM	285		252

^a The boatable flow range is between 250 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

Appendix E. Table REC 3 E-3. Number of Flow Days Exceeding Boating Range under Existing Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002.^{a,b,c}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0		0	

^a The boatable flow range is between 250 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows did not exceed the boatable range during Above Normal, Dry or Critically Dry WYs.

Appendix E. Table REC 3 E-4. Number of Flow Days Exceeding Boating Range under Unimpaired Hydrology by Water-year Type per Month for the Upper Mono Creek Run, Mono Creek between 1983 and 2002.^{a,b,c}

Wet Water-years	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Water-year (Oct-Sept)		Boating Season (May-Aug)		
													Total/year	Average/Month	Total/year	Average/Month	
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1986	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.1	1	0.3
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
1996	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0.2	2	0.5
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
Number of Boating Oppor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0
AVERAGE/Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	3		3	

^a The boatable flow range is between 250 and 2,000 cfs.

^b Below Normal WYs did not occur during the period of record.

^c Flows did not exceed the boatable range during Above Normal, Dry or Critically Dry WYs.

APPENDIX F

Summary Tables (Chawanakee Gorge Run Flow Events Occurrence)

Appendix F. Table REC-3-F-1. Summary of Occurrences of Flows within the Boatable Range¹ for a period of four hours or more on the Chawanakee Gorge Run, San Joaquin River, based on 15-minute Data.²

Flow Entering the Boatable Range					Flow Exiting the Boatable Range							
Initial Date	Initial Time (hrs)	Initial Discharge SJR and Stevenson Combined (cfs)	Initial Discharge SJR (cfs)	Initial Discharge Stevenson (cfs)	End Date	End Time (hrs)	Hours Elapsed	End Discharge SJR and Stevenson Combined (cfs)	End Discharge SJR (cfs)	End Discharge Stevenson (cfs)	Observed BODs	Hydrograph Type ³
3/31/1996	0:30	282	282		4/1	21:15	44.75	1013	1013		2	Ascending Limb
4/2/1996	16:30	1196	1196		4/3	6:00	13.5	338	338		0	Descending Limb
4/17/1996	2:15	318	318		4/18	0:45	21.5	1013	1013		1	Ascending Limb
4/18/1996	9:45	1005	1005		5/5	3:45	402	236	236		17	Descending Limb
5/7/1996	14:15	292	292		5/8	14:45	24.5	1075	1075		1	Ascending Limb
5/25/1996	13:45	1036	1036		5/25	23:15	9.5	137	137		0	Descending Limb
6/25/1996	10:00	1037	1037		6/25	23:00	13	346	346		1	Descending Limb
6/27/1996	7:45	1328	1328		6/27	12:15	4.5	319	319		1	Descending Limb
7/4/1996	7:00	1066	1066		7/4	13:15	6.25	156	156		1	Descending Limb
3/31/1997	5:15	280	16	265	4/3	7:30	74.25	1239	968	271	4	Ascending Limb
6/25/1997	10:30	1184	895	290	6/26	3:30	17	345	341	4	1	Descending Limb
4/2/1998	8:30	345	225	119	4/3	6:30	22	1354	1184	170	1	Ascending Limb
4/3/1998	7:00	1170	1000	170	4/5	0:45	40.75	264	96	169	2	Descending Limb
4/23/1998	23:30	1555	1551	4	4/25	2:30	27	37	33	4	1	Descending Limb
5/3/1998	10:30	231	87	144	5/3	21:30	11	1621	1477	144	1	Ascending Limb
5/4/1998	13:00	1000	855	146	5/4	23:00	10	299	156	143	0	Descending Limb
8/1/1998	14:15	1007	775	232	8/1	21:45	7.5	282	47	235	0	Descending Limb
8/6/1998	5:00	1234	1230	5	8/6	13:30	8.5	149	145	5	1	Descending Limb
8/14/1998	10:15	1144	1140	4	8/14	15:30	5.25	345	341	4	1	Descending Limb
5/20/1999	9:15	13	9	4	5/21	7:45	22.5	1937	1934	4	1	Ascending Limb
6/3/1999	4:45	1017	1013	4	6/4	4:45	24	345	341	4	1	Descending Limb
6/21/1999	17:00	1016	1013	4	6/22	2:45	9.75	104	100	4	0	Descending Limb
6/22/1999	13:30	1032	1029	4	6/23	0:15	10.75	252	249	4	0	Descending Limb
6/25/1999	9:00	137	133	4	6/25	14:15	5.25	1095	1091	4	1	Ascending Limb
6/25/1999	15:00	1002	998	4	6/26	0:15	9.25	269	265	4	0	Descending Limb
5/9/2000	10:30	294	290	4	5/9	20:45	10.25	1216	1211	4	1	Ascending Limb
5/12/2000	5:45	350	346	4	5/12	16:15	10.5	1001	997	4	1	Ascending Limb
5/14/2000	9:00	216	212	4	5/14	16:30	7.5	1001	997	4	1	Ascending Limb
5/15/2000	4:00	236	232	4	5/15	13:15	9.25	1080	1076	4	1	Ascending Limb
5/22/2000	8:00	1024	1020	4	5/22	12:00	4	183	179	4	1	Descending Limb
6/10/2000	10:00	1027	797	231	6/11	16:30	30.5	344	111	233	2	Descending Limb
6/12/2000	13:45	1022	789	233	6/12	21:45	8	324	91	233	0	Descending Limb
6/13/2000	3:15	315	82	233	6/13	11:00	7.75	1067	719	349	0	Ascending Limb
6/21/2000	14:00	1009	1005	4	6/21	23:15	9.25	313	309	4	0	Descending Limb
6/22/2000	12:00	1072	1068	4	6/22	21:30	9.5	317	313	4	1	Descending Limb
5/6/2003	0:00	324	320	4	5/6	18:30	18.5	1001	997	4	1	Ascending Limb
5/8/2003	13:45	1055	1051	4	5/9	0:15	10.5	43	39	4	0	Descending Limb
5/14/2003	19:00	1001	997	4	5/15	18:15	23.25	202	198	4	1	Descending Limb
6/18/2003	13:00	1116	1113	4	6/18	21:00	8	344	341	4	0	Descending Limb

¹ Boatable Flow Range for Chawanakee Gorge is between 350cfs and 1000cfs.

² Flows included within the boatable range that occurred between 8 and 4pm between April and October and lasted at least 4 hours.

³ Hydrograph type describes the flow pattern as it passes through the boating range.

Appendix F. Table REC 3 F-2. Summary of Occurrences of Flows within the Boatable Range¹ for a period of four hours or more on the Chawanakee Gorge Run, San Joaquin River, based on 15-minute Data.²

Flow Entering the Boatable Range			Flow Exiting the Boatable Range				Observed BODs	Hydrograph Type ³
Initial Date	Initial Time (hrs)	Initial Discharge SJR (cfs)	End Date	End Time (hrs)	End Discharge SJR (cfs)	Hours Elapsed		
2/5/1996	10:30	1005.03	2/5/1996	16:45	271.91	6.25	1	Descending Limb
2/25/1996	2:30	340.73	2/25/1996	6:30	1198.04	4.00	0	Ascending Limb
3/14/1996	22:45	1099.04	3/15/1996	6:45	288.25	8.00	0	Descending Limb
3/15/1996	20:15	263.39	3/20/1996	12:45	1001.73	112.50	5	Ascending Limb
3/20/1996	16:00	1220.29	3/23/1996	7:45	225.29	63.75	2	Descending Limb
3/31/1996	0:30	281.94	4/1/1996	21:15	1012.5	44.75	2	Ascending Limb
4/2/1996	16:30	1196.26	4/3/1996	6:00	338.39	13.50	0	Descending Limb
4/17/1996	2:15	317.71	4/18/1996	0:45	1012.67	21.50	1	Ascending Limb
4/18/1996	9:45	1004.99	5/5/1996	3:45	235.98	402.00	17	Descending Limb
5/7/1996	14:15	291.73	5/8/1996	14:45	1074.64	24.50	1	Ascending Limb
5/25/1996	13:45	1036.29	5/25/1996	23:15	136.8	9.50	0	Descending Limb
6/25/1996	10:00	1036.66	6/25/1996	23:00	346.46	13.00	1	Descending Limb
6/26/1996	20:45	335.05	6/27/1996	6:15	1318.86	9.50	0	Ascending Limb
6/27/1996	7:45	1327.74	6/27/1996	12:15	319.33	4.50	1	Descending Limb
7/3/1996	0:00	181.72	7/3/1996	8:00	1059.67	8.00	0	Ascending Limb
7/4/1996	7:00	1066.16	7/4/1996	13:15	156	6.25	1	Descending Limb
12/29/1996	12:15	340.73	12/29/1996	23:00	996.87	10.75	0	Ascending Limb
1/6/1997	17:30	1342.7	1/7/1997	17:45	346.54	24.25	1	Descending Limb
1/9/1997	1:30	396.1	1/9/1997	7:00	340.73	5.50	0	Ascending Spike
1/17/1997	13:15	1005.0	1/20/1997	14:45	1005.03	73.50	3	Descending Spike
1/20/1997	15:45	1005.0	1/22/1997	14:15	1012.5	46.50	2	Descending Spike
1/23/1997	23:0	1005.0	1/25/1997	3:30	1013.28	28.50	1	Descending Spike
1/28/1997	9:00	1005.0	1/28/1997	16:00	1290.63	7.00	1	Descending Spike
1/29/1997	16:30	1414.4	1/30/1997	5:15	187.53	12.75	0	Descending Limb
1/30/1997	23:15	75.8	2/3/1997	8:15	346.46	81.00	3	Ascending Spike
2/5/1997	19:00	9.0	2/25/1997	19:15	1837.92	480.25	20	Ascending Limb
2/27/1997	9:15	246.8	2/28/1997	5:30	79.98	20.25	1	Ascending Spike
2/28/1997	6:45	314.0	2/28/1997	15:45	333.26	9.00	1	Ascending Spike
3/12/1997	14:45	1093.1	3/19/1997	19:45	346.46	173.00	7	Descending Limb
3/26/1997	7:00	234.1	3/28/1997	7:30	1465.23	48.50	2	Ascending Limb
3/31/1997	5:15	15.6	4/3/1997	8:30	271.24	75.25	3	Ascending Spike
5/25/1997	17:00	1005.0	5/28/1997	0:30	1005.03	55.50	2	Descending Spike
6/11/1997	21:00	1004.5	6/12/1997	2:15	1004.52	5.25	0	Descending Spike
6/12/1997	20:30	1004.5	6/13/1997	7:00	67.68	10.50	0	Descending Limb
6/13/1997	7:15	290.8	6/17/1997	6:45	1004.52	95.50	4	Ascending Limb
6/17/1997	17:30	1004.5	6/17/1997	23:45	1004.52	6.25	0	Descending Spike
6/24/1997	6:00	1020.6	6/24/1997	17:0	1091.64	11.00	1	Descending Spike
6/25/1997	10:15	1051.7	6/26/1997	3:30	340.93	17.25	1	Descending Limb
6/28/1997	21:15	267.9	6/29/1997	9:00	320.51	11.75	0	Ascending Spike
3/24/1998	13:30	334.9	3/24/1998	19:45	1075.8	6.25	0	Ascending Limb
3/25/1998	19:00	1005.0	3/26/1998	14:15	173.2	19.25	1	Descending Limb
3/26/1998	16:45	291.7	3/29/1998	2:45	346.5	58.00	2	Ascending Spike
4/3/1998	15:15	340.7	4/4/1998	1:30	346.5	10.25	0	Ascending Spike
4/4/1998	12:30	329.2	4/5/1998	0:30	337.4	12.00	0	Ascending Spike
4/20/1998	14:00	215.2	4/21/1998	2:15	274.8	12.25	0	Ascending Spike
4/23/1998	23:30	1550.5	4/25/1998	2:30	32.6	27.00	1	Descending Limb
5/1/1998	16:45	329.2	5/1/1998	23:15	1524.4	6.50	0	Ascending Limb
5/2/1998	7:30	1266.0	5/2/1998	16:30	1214.2	9.00	1	Descending Spike

Appendix F. Table REC 3 F-2 continued. Summary of Occurrences of Flows within the Boatable Range¹ for a period of four hours or more on the Chawanakee Gorge Run, San Joaquin River, based on 15-minute Data.²

Flow Entering the Boatable Range			Flow Exiting the Boatable Range				Observed BODs	Hydrograph Type ³
Initial Date	Initial Time (hrs)	Initial Discharge SJR (cfs)	End Date	End Time (hrs)	End Discharge SJR (cfs)	Hours Elapsed		
5/2/1998	18:00	1428.5	5/2/1998	22:30	1180.8	4.50	0	Descending Spike
5/3/1998	10:45	224.0	5/3/1998	21:30	1477.1	10.75	1	Ascending Limb
5/4/1998	11:30	1028.8	5/4/1998	23:00	156.0	11.50	1	Descending Limb
5/5/1998	5:45	1261.9	5/6/1998	2:15	1559.0	20.50	1	Descending Spike
5/6/1998	6:30	1045.9	5/6/1998	22:30	1792.3	16.00	1	Descending Spike
5/7/1998	10:15	1250.3	5/7/1998	21:30	1373.1	11.25	1	Descending Spike
5/8/1998	11:00	1005.9	5/8/1998	15:00	1388.9	4.00	1	Descending Spike
5/9/1998	18:30	320.3	5/9/1998	23:30	342.4	5.00	0	Ascending Spike
5/10/1998	9:00	253.2	5/10/1998	18:15	324.3	9.25	1	Ascending Spike
5/12/1998	11:15	323.1	5/12/1998	23:30	275.7	12.25	1	Ascending Spike
5/24/1998	21:30	346.5	5/25/1998	6:00	304.0	9.50	0	Ascending Spike
7/25/1998	8:45	1012.5	7/25/1998	18:00	334.9	9.25	1	Descending Limb
7/26/1998	16:45	4.0	7/27/1998	8:45	1572.8	16.00	0	Ascending Limb
8/1/1998	0:15	326.4	8/1/1998	7:45	286.4	7.50	0	Ascending Spike
8/1/1998	9:00	148.3	8/1/1998	21:30	161.2	12.50	1	Ascending Spike
8/2/1998	0:30	334.9	8/2/1998	7:00	1187.8	6.50	1	Ascending Limb
8/2/1998	12:30	1013.7	8/3/1998	4:45	1067.9	16.25	0	Descending Spike
8/3/1998	5:45	1575.8	8/3/1998	12:00	1020.3	6.25	1	Descending Spike
8/5/1998	0:45	1194.6	8/5/1998	7:00	1114.8	6.25	0	Descending Spike
8/6/1998	0:15	1012.5	8/6/1998	4:15	1196.0	4.00	0	Descending Spike
8/6/1998	5:00	1229.7	8/6/1998	13:30	144.6	8.50	1	Descending Limb
8/6/1998	14:30	344.2	8/6/1998	22:15	1004.5	7.75	0	Ascending Limb
8/6/1998	23:45	1075.3	8/7/1998	6:45	211.5	7.00	0	Descending Limb
8/7/1998	11:45	318.0	8/7/1998	18:30	335.0	6.75	1	Ascending Spike
8/7/1998	22:00	301.7	8/8/1998	2:00	346.2	4.00	0	Ascending Spike
8/9/1998	21:30	252.5	8/10/1998	1:45	1027.6	4.25	0	Ascending Limb
8/10/1998	6:45	1006.2	8/10/1998	19:15	346.5	12.50	1	Descending Limb
8/14/1998	22:45	32.6	8/15/1998	2:45	1337.7	4.00	0	Ascending Limb
5/20/1999	9:15	8.98	5/21/1999	7:45	1933.61	22.50	1	Ascending Limb
6/3/1999	4:45	1012.5	6/4/1999	4:45	340.73	24.00	1	Descending Limb
6/8/1999	1:00	1075.43	6/8/1999	5:15	291.16	4.25	0	Ascending Limb
6/12/1999	1:30	148.91	6/12/1999	6:30	997.16	5.00	0	Ascending Limb
6/20/1999	20:30	1004.66	6/21/1999	0:30	334.94	4.00	0	Descending Limb
6/21/1999	0:30	334.94	6/21/1999	7:30	1049.36	7.00	0	Ascending Limb
6/21/1999	17:00	1012.5	6/22/1999	2:45	100.25	9.75	0	Descending Limb
6/22/1999	13:30	1028.78	6/23/1999	0:15	248.85	10.75	0	Descending Limb
6/25/1999	9:00	133.31	6/25/1999	14:15	1090.97	5.25	1	Ascending Limb
6/25/1999	15:00	997.87	6/26/1999	0:15	264.99	9.25	0	Descending Limb
4/5/2000	23:15	334.9	4/6/2000	17:45	323.7	18.50	1	Ascending Spike
4/7/2000	8:15	346.5	4/7/2000	18:30	233.8	10.25	1	Ascending Spike
4/7/2000	20:15	346.8	4/8/2000	1:30	242.9	5.25	0	Ascending Spike
4/8/2000	8:45	346.9	4/8/2000	13:00	346.5	4.25	1	Ascending Spike
4/8/2000	15:45	346.5	4/8/2000	21:00	269.3	5.25	0	Ascending Spike
4/9/2000	11:30	317.6	4/9/2000	21:30	259.3	10.00	1	Ascending Spike
4/14/2000	22:30	329.0	4/15/2000	3:30	346.9	5.00	0	Ascending Spike
4/19/2000	18:30	306.5	4/19/2000	23:30	330.4	5.00	0	Ascending Spike
4/24/2000	13:45	227.3	4/24/2000	22:15	310.0	8.50	0	Ascending Spike
4/26/2000	13:45	201.0	4/26/2000	18:00	346.9	4.25	0	Ascending Spike
5/1/2000	11:45	297.3	5/1/2000	21:15	318.0	9.50	1	Ascending Spike
5/2/2000	11:00	346.5	5/2/2000	17:00	256.0	6.00	1	Ascending Spike

Appendix F. Table REC 3 F-2 continued. Summary of Occurrences of Flows within the Boatable Range¹ for a period of four hours or more on the Chawanakee Gorge Run, San Joaquin River, based on 15-minute Data.²

Flow Entering the Boatable Range			Flow Exiting the Boatable Range				Observed BODs	Hydrograph Type ³
Initial Date	Initial Time (hrs)	Initial Discharge SJR (cfs)	End Date	End Time (hrs)	End Discharge SJR (cfs)	Hours Elapsed		
5/3/2000	14:30	284.0	5/3/2000	18:30	158.0	4.00	0	Ascending Spike
5/6/2000	10:45	346.5	5/6/2000	15:45	323.4	5.00	1	Ascending Spike
5/6/2000	16:30	323.7	5/7/2000	0:15	222.2	7.75	0	Ascending Spike
5/8/2000	4:30	270.2	5/8/2000	23:00	203.0	18.50	1	Ascending Spike
5/9/2000	10:45	346.9	5/9/2000	20:45	1211.5	10.00	1	Ascending Limb
5/11/2000	17:15	1012.5	5/11/2000	22:15	1005.0	5.00	0	Descending Spike
5/11/2000	23:00	1012.5	5/12/2000	5:30	284.4	6.50	0	Descending Limb
5/12/2000	5:45	346.0	5/12/2000	16:30	1005.0	10.75	1	Ascending Limb
5/13/2000	11:30	312.7	5/14/2000	0:30	1012.5	13.00	1	Ascending Limb
5/14/2000	2:15	226.6	5/14/2000	8:00	326.7	5.75	0	Ascending Spike
5/14/2000	9:00	212.3	5/14/2000	16:45	1005.0	7.75	1	Ascending Limb
5/14/2000	23:00	1005.0	5/15/2000	3:15	287.0	4.25	0	Descending Limb
5/15/2000	4:00	232.2	5/15/2000	13:15	1076.4	9.25	1	Ascending Limb
5/17/2000	23:45	1035.3	5/18/2000	8:00	300.2	8.25	0	Descending Limb
5/22/2000	6:30	73.2	5/22/2000	12:00	179.2	5.50	1	Ascending Spike
6/9/2000	15:30	1012.5	6/10/2000	1:15	248.1	9.75	0	Descending Limb
6/10/2000	2:00	329.5	6/11/2000	2:30	346.5	24.50	1	Ascending Spike
6/11/2000	4:30	323.7	6/11/2000	9:45	340.7	5.25	0	Ascending Spike
6/12/2000	10:45	267.8	6/12/2000	21:00	335.0	10.25	1	Ascending Spike
6/13/2000	5:15	289.0	6/13/2000	15:15	1013.8	10.00	1	Ascending Limb
6/13/2000	19:00	1004.9	6/14/2000	0:00	1028.1	5.00	0	Descending Spike
6/20/2000	22:45	1012.5	6/21/2000	7:00	1004.7	8.25	0	Descending Spike
6/21/2000	14:00	1005.0	6/21/2000	23:15	309.2	9.25	0	Descending Limb
6/22/2000	3:15	256.3	6/22/2000	9:30	1005.0	6.25	0	Ascending Limb
6/22/2000	10:00	1020.0	6/22/2000	21:30	313.3	11.50	1	Descending Limb
6/23/2000	20:00	1004.7	6/24/2000	4:45	330.4	8.75	0	Descending Limb
6/24/2000	12:15	206.9	6/24/2000	18:00	335.5	5.75	0	Ascending Spike
6/26/2000	15:30	335.0	6/26/2000	21:00	334.9	5.50	0	Ascending Spike
6/27/2000	17:15	1146.2	6/28/2000	0:00	283.8	6.75	0	Descending Limb
6/28/2000	1:45	307.4	6/28/2000	5:45	341.0	4.00	0	Ascending Spike
6/28/2000	9:45	285.1	6/28/2000	21:15	312.1	11.50	1	Ascending Spike
6/29/2000	13:00	334.9	6/29/2000	21:30	221.8	8.50	0	Ascending Spike
7/1/2000	15:15	346.5	7/1/2000	20:15	248.7	5.00	0	Ascending Spike
7/2/2000	14:00	340.7	7/3/2000	0:15	324.1	10.25	0	Ascending Spike
8/11/2000	15:45	272.6	8/11/2000	20:00	301.6	4.25	0	Ascending Spike
8/12/2000	15:00	237.3	8/12/2000	20:30	252.0	5.50	0	Ascending Spike
8/14/2000	14:15	338.3	8/14/2000	19:00	210.0	4.75	0	Ascending Spike
8/15/2000	13:45	340.9	8/15/2000	18:00	249.4	4.25	0	Ascending Spike
8/16/2000	15:00	284.4	8/16/2000	20:45	137.3	5.75	0	Ascending Spike
8/23/2000	12:15	212.7	8/23/2000	18:15	306.0	6.00	0	Ascending Spike
9/20/2000	14:00	259.3	9/20/2000	18:45	154.3	4.75	0	Ascending Spike
5/6/2003	0:00	320.47	5/6/2003	18:30	996.78	18.50	1	Ascending Limb
5/6/2003	19:15	1020.22	5/6/2003	23:30	300.97	4.25	0	Descending Limb
5/8/2003	13:45	1051.38	5/9/2003	0:15	38.66	10.50	0	Descending Limb
5/14/2003	19:00	997.24	5/15/2003	18:15	198.49	23.25	1	Descending Limb
6/18/2003	13:00	1112.59	6/18/2003	21:00	340.73	8.00	0	Descending Limb

¹ Boatable Flow Range for Chawanakee Gorge is between 350cfs and 1000cfs.

² Flows included within the boatable range that occurred between 8 and 4pm between April and October and lasted at least 4 hours.

³ Hydrograph type describes the flow pattern as it passes through the boating range.