SANTA ANA RIVER WATERMASTER

ORANGE COUNTY WATER DISTRICT v. CITY OF CHINO, et al.
CASE NO. 117628--COUNTY OF ORANGE

WATERMASTER
Halla Razak
Douglas D. Headrick
Roy L. Herndon
Michael R. Markus
Craig D. Miller

MAILING ADDRESS
c/o SBVMWD
380 East Vanderbilt Way
San Bernardino CA 92408-3593
Telephone (909) 387-9200
FAX (909) 387-9247

April 30, 2019

To: Clerk of Superior Court of Orange County and all Parties

Re: Watermaster Report for Water Year October 1, 2017 - September 30, 2018

Ladies and Gentlemen:

We have the honor of submitting herewith the Forty-Eighth Annual Report of the Santa Ana River Watermaster. The supporting Basic Data Appendices are bound separately.

The principal findings of the Watermaster for the Water Year 2017-18 are as follows:

At Prado

1	Measured Outflow at Prado	82,554	acre-feet
2	Base Flow at Prado	65,438	acre-feet
3	Annual Weighted TDS in Base and Storm Flows	625	mg/L
4	Annual Adjusted Base Flow	69,528	acre-feet
5	Cumulative Adjusted Base Flow	5,592,323	acre-feet
6	Other Credits (Debits)	0	acre-feet
7	Cumulative Entitlement of OCWD	2,016,000	acre-feet
8	Cumulative Credit	3,616,331	acre-feet
9	One-Third of Cumulative Debit	0	acre-feet
10	Minimum Required Base Flow in 2017-18	34,000	acre-feet

At Riverside Narrows

1	Base Flow at Riverside Narrows	28,378	acre-feet
2	Annual Weighted TDS in Base Flow	662	mg/L
3	Annual Adjusted Base Flow	28,378	acre-feet
4	Cumulative Adjusted Base Flow	2,081,891	acre-feet
5	Cumulative Entitlement of IEUA and WMWD	732,000	acre-feet
6	Cumulative Credit	1,349,891	acre-feet
7	One-Third of Cumulative Debit	0	acre-feet
8	Minimum Required Base Flow in 2017-18	12,420	acre-feet

Based on these findings, the Watermaster concludes that there was full compliance with the provisions of the Stipulated Judgment in 2017-18

At the end of the 2017-18 Water Year, Inland Empire Utilities Agency (formerly Chino Basin Municipal Water District) and Western Municipal Water District have a cumulative credit of 3,616,331 acre-feet to their Base Flow obligation at Prado Dam. San Bernardino Valley Municipal Water District has a cumulative credit of 1,349,891 acre-feet to its Base Flow obligation at Riverside Narrows.

The Watermaster continued to exercise surveillance over the many active and proposed projects within the watershed for their potential effect on Base Flow. As annual report was being completed, Watermaster Halla Razak had left IEUA and was unable to sign the report. IEUA is in the process of nominating a new Watermaster.

Sincerely yours,
Santa Ana River Watermaster

By:

Halla Razak*
*Unable to sign

Douglas D. Headrick

Roy L. Herndon

Michael R. Markus

Craig D. Miller

SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

v. CITY OF CHINO, et al.

CASE NO. 117628 - COUNTY OF ORANGE

FORTY- EIGHTH

ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 2017 - SEPTEMBER 30, 2018

APRIL 30, 2019

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The following appendices are bound separately and available for review at the office of the Secretary of the Santa Ana River Watermaster.

CHAPTER I

WATERMASTER ACTIVITIES AND WATER CONDITIONS

Introduction

This Forty-Eighth Annual Report of the Santa Ana River Watermaster covers Water Year 2017-18. The annual report is required by the Stipulated Judgment (Judgment) in the case of Orange County Water District v. City of Chino, et al., Case No. 117628-County of Orange, entered by the court on April 17, 1969. The Judgment became effective on October 1, 1970. It contains a declaration of rights of the water users and other entities in the Lower Area of the Santa Ana River Basin downstream of Prado Dam as against those in the Upper Area tributary to Prado Dam, and provides a physical solution to satisfy those rights. Chapter IV presents a history of the litigation and a summary of the Judgment.

The physical solution accomplishes, in general, a regional intrabasin allocation of the surface flow of the Santa Ana River System. The Judgment leaves to each of the major hydrologic units within the basin the determination and regulation of individual rights therein and the development and implementation of its own water management plan subject only to compliance with the physical solution.

The Judgment designates four public agencies to represent the interests of the Upper and Lower Areas and gives them the responsibility to fulfill the obligations set forth in the Judgment, including the implementation of the physical solution. The Lower Area is represented by Orange County Water District (OCWD). The Upper Area is represented by San Bernardino Valley Municipal Water District (SBVMWD), Western Municipal Water District of Riverside County (WMWD), and Inland Empire Utilities Agency (IEUA), formerly the Chino Basin Municipal Water District (CBMWD). The locations of the districts are shown on Plate 1, "Santa Ana River Watershed".

The court appoints a five-member Watermaster Committee (Watermaster) to administer the provisions of the Judgment. The duties of the Watermaster are to maintain a continuous accounting of each of the items listed in the letter of transmittal at the front of this report and to report thereon annually for each water year to the court and the parties. The water year begins October 1 and ends the following September 30. The time for submission of the annual report was amended by the court (dated December 24, 1981) to be seven months after the end of the water year (April 30).

The Watermaster Committee signing the Water Year 2017-18 Annual Report consisted of Douglas D. Headrick, Roy L. Herndon, Michael R. Markus, and Craig D. Miller. In December 2018, Watermaster Halla Razak left her position as general manager of IEUA and was unavailable to serve as IEUA's representative. Prior to the completion of the Forty-Eighth Annual Report, IEUA hired Mr. Deshmukh as its general manager and submitted his nomination to the court to replace Ms. Razak. At the January 28, 2019 meeting, Mr. Herndon was re-elected Chairman and Mr. Headrick was re-elected Secretary/Treasurer. The history of the Watermaster membership is presented in Chapter IV.

Compilation of Basic Data

The Watermaster annually compiles the basic hydrologic and water quality data necessary to determine compliance with the provisions of the Judgment. The data include records of stream discharge (flow) and quality for the Santa Ana River (River) at Prado Dam and at Riverside Narrows as well as discharges for most tributaries; flow and quality of nontributary water entering the River; rainfall records at locations in or adjacent to the Watershed; and other data that may be used to support the determinations of the Watermaster. For Water Year 2017-18 the United States Geological Survey (USGS) provided discharge and water quality data for the River at two gaging stations, "Santa Ana River Below Prado Dam" (Prado) and "Santa Ana River at Metropolitan Water District (MWD) Crossing" (Riverside Narrows). The discharge data at both stations consist of computed daily mean discharges, expressed in cubic feet per second (cfs), and are based on continuous recordings. At times the USGS must estimate daily mean discharges due to damaged or malfunctioning recording equipment.

The USGS also provided discharge data for other gaging stations for streams tributary to Prado, including, among others, the Santa Ana River at E Street in San Bernardino, Temescal Creek above Main Street in Corona, Cucamonga Creek near Mira Loma, Chino Creek at Schaefer Avenue, Lytle Creek at Colton, Warm Creek near San Bernardino, and San Timoteo Creek near Loma Linda (see Appendix A). Based on a determination by the Watermaster in Water Year 2011-12, the USGS was requested to establish a new gaging station at the spillway at Lee Lake. Expenses associated with the installation and measurements at this gage were added to the Watermaster costs paid by the Parties. Beginning in Water Year 2012-13, the new Temescal Creek at Corona Lake "Lee Lake" (near Corona) gage provided useful data (also included in Appendix A) to assist in the determination of the amount of water discharged from the San Jacinto Watershed that arrived at Prado.

The Water Year 2017-18 daily mean discharge records at Prado are rated "good" by the USGS. Daily mean discharges at the station are controlled at times by storage operations in the reservoir behind Prado Dam just upstream. The maximum and minimum daily mean discharge values during the water year were, respectively, 654 cfs on January 17, 2018 and 38.8 cfs on August 11, 2018. The Water Year 2017-18 daily mean discharge record at Riverside Narrows was rated "poor" by the USGS. The maximum and minimum daily mean discharge values during the year were 251 cfs on March 11, 2018 and 22.7 cfs on July 31, 2018.

The water quality data at Prado consist of daily maximum and minimum and median values for electrical conductivity (EC), measured as specific conductance and expressed in microsiemens per centimeter (μs/cm) based on a continuous recording, and 41 measured values (three to four per month) for EC and/or total dissolved solids (TDS) expressed in milligrams per liter (mg/L). The water quality data at Riverside Narrows consist of 24 values measured by the USGS (generally twice per month) and 54 values measured by the City of Riverside (generally one per week) for both EC and TDS. The maximum and minimum, daily, flow-weighted median EC values reported by the USGS for the River at Prado were 1,290 μs/cm on August 12, 2018 and 386 μs/cm on January 9, 2018, respectively. The

corresponding calculated TDS concentrations were 774 and 231 mg/L. At Riverside Narrows, the maximum and minimum EC values were 1,193 μs/cm on August 15, 2018, reported by the City of Riverside and 444 μs/cm on January 10, 2018, reported by the USGS. The corresponding measured TDS concentrations were 668 and 288 mg/L. Specific conductance records are affected by releases from Prado Dam. Interruptions in record occur at times due to malfunction of recording or sensing equipment. A portion of chemical data collected for the National Water-Quality Assessment (NAWQA) Program. There were interruptions in the Prado EC records on September 26 and 27, 2018 due to malfunction of recording or sensing equipment.

To assist in making its determinations each year the Watermaster refers to the records of many precipitation stations located in or near the Santa Ana River Watershed. The record for the former Perris Hill Station 163 in the Bunker Hill-San Timoteo area, operated by the San Bernardino County Flood Control District, was used to define the hydrologic base period for the physical solution in the Judgment. The record for San Bernardino County Department of Public Works (SBCDPW) Station 2146, which was located very near to Station 163 at the San Bernardino County Hospital, was used until Water Year 2000-01 in the Annual Reports of the Watermaster to provide a comparison with historical conditions.

During Water Year 2000-01 Station 2146 was destroyed when the hospital buildings were demolished. For several years, the Watermaster used estimated precipitation data based on the records for three nearby stations. The SBCDPW established a new station, Station 2146-A, near the location of the former Station 2146. During the preparation of the report for Water Year 2004-05, the precipitation total recorded at Station 2146-A was sufficiently close to the estimate prepared from the three nearby stations that the Watermaster used the record for Station 2146-A.

The USGS established a precipitation gage network during the Water Year 2003-04 to assist local flood control agencies with flood prediction in the area of the “Old Fire”, which burned a large portion of the northerly mountains of the Santa Ana River Watershed area during October and November 2003. When the flood control agencies declined to fund the ongoing operation of the precipitation gage network, the Parties to the Judgment agreed to add the precipitation gage program to the ongoing stream gage program. The Parties also added a gage designated as “Gilbert Street Precipitation Gage” (USGS No. 340742117161701) at the same location as SBCDPW Station 2146-A. The Gilbert Street Gage was placed into operation in October 2005.

The Watermaster has compared the record from the USGS Gilbert Street Gage to the record from the Station 2146-A gage and has found them to be virtually identical. The Watermaster has accepted the Gilbert Street Gage in this report as the most accurate and reliable of the two gages. Because of the Watermaster’s finding of suitability of the Gilbert Street Gage, in Water Year 2011-12 the Parties determined that funding of the other precipitation gages was no longer a necessary Watermaster expense.

For Water Year 2017-18, the total precipitation recorded at the Gilbert Street gage was 6.81 inches, or 38% of the average of 17.98 inches that occurred during the 26-year base

period (1934-35 through 1959-60) that was used in the formulation of the physical solution. Plate 3 graphically portrays the annual precipitation from 1934-35 through 2017-18.

Watermaster Determinations

Each year the Watermaster uses its long-established procedures to analyze the basic hydrologic and water quality data in order to determine, at Riverside Narrows and at Prado, the Base Flow, the Adjusted Base Flow, the Cumulative Credits or Debits to Upper Area parties, and the Minimum Required Base Flow for the following water year. The procedures include determining, for both locations, the amounts of Nontributary Flow or other non-storm flow to be excluded from Base Flow.

During Water Year 2017-18 there were no sources of Nontributary Flow in the River at Riverside Narrows or Prado Dam.

The determinations of the Watermaster for Water Year 2017-18 are explained in detail for Prado in Chapter II and for Riverside Narrows in Chapter III. A summary of the annual determinations by the Watermaster is presented in Table 1 for both locations for the period of 1970-71 through 2017-18. Note that the Base Flow obligations set forth in the Judgment at both Prado and Riverside Narrows have been met for the water year and cumulative credits have accrued to the upper respective Districts.

TABLE 1

SUMMARY OF FINDINGS AT PRADO

Water Year	Rainfall (in)[1]	USGS Measured Flow (ac-ft)	Total Flow (ac-ft)[2]	Base Flow (ac-ft)[3]	Weighted TDS (mg/L)[4]	Adjusted Base Flow (ac-ft)	Cumulative Credit (ac-ft)[5]
1971-72	9.62	51,743	51,743	40,416	707	40,416	-5,182
1972-73	18.46	76,848	77,484	48,999	638	51,531	4,349
1973-74	12.72	128,436	62,511	43,106	633	45,513	7,862
1974-75	13.49	93,397	61,855	50,176	694	51,263	17,125
1975-76	15.86	120,590	59,209	45,627	635	48,098	23,223
1976-77	11.95	72,278	62,953	48,387	660	50,000	31,223
1977-78	30.47	255,043	252,850	58,501	383	73,955	63,178
1978-79	17.51	145,198	134,506	71,863	580	79,049	100,227
1979-80	30.93	536,174	527,760	82,509	351	106,505	164,732
1980-81	10.45	118,300	117,888	74,875	728	74,875	205,652
1981-82	18.34	143,702	143,367	81,548	584	89,431	253,083
1982-83	32.36	426,273	426,750	111,692	411	138,591	353,036
1983-84	10.81	178,730	177,606	109,231	627	115,876	431,514
1984-85	12.86	163,247	162,912	125,023	617	133,670	523,184
1985-86	17.86	196,900	197,373	127,215	567	141,315	622,499
1986-87	8.08	140,872	143,191	119,848	622	127,638	708,137
1987-88	13.78	176,292	166,818	124,104	582	136,308	802,445
1988-89	12.64	159,659	152,743	119,572	583	131,230	891,675
1989-90	8.53	144,817	143,463	119,149	611	127,986	977,661
1990-91	15.48	195,186	186,426	111,151	514	128,379	1,064,040
1991-92	16.54	198,280	189,677	106,948	499	124,862	1,146,902
1992-93	30.92	571,138	566,630	128,067	368	163,499	1,268,401
1993-94	11.62	159,560	152,808	111,186	611	119,432	1,345,833
1994-95	25.14	429,270	422,816	123,468	415	152,792	1,458,387
1995-96	11.92	217,160	190,553	131,861	514	152,299	1,568,686
1996-97	18.64	249,685	198,459	136,676	514	157,861	1,684,547
1997-98[6]	33.41	462,646	456,316	155,711	392	195,677	1,838,224
1998-99	8.02	184,998	182,310	158,637	581	174,369	1,970,593
1999-00	11.09	207,850	188,538	148,269	527	169,644	2,098,237
2000-01	16.13	222,559	208,535	153,914	525	176,360	2,232,597
2001-02	5.08	174,968	156,596	145,981	587	159,728	2,350,325
2002-03	16.22	256,157	245,947	146,113	463	174,970	2,484,182
2003-04[7]	10.80	214,102	201,967	143,510	502	167,190	2,609,619
2004-05	29.89	638,513	637,568	154,307	348	199,570	2,769,555
2005-06	13.23	247,593	246,101	147,736	517	170,266	2,901,383
2006-07	4.61	156,147	153,823	129,830	604	140,216	3,005,130
2007-08	13.70	199,690	194,309	116,483	495	136,382	3,103,677
2008-09	10.14	162,698	161,026	102,711	527	117,519	3,181,385
2009-10	17.79	243,776	243,690	103,099	443	125,179	3,266,053
2010-11[7]	23.50	324,892	313,018	102,031	522	117,166	3,342,412
2011-12	9.01	121,123	121,123	93,068	597	101,056	3,401,833
2012-13	9.53	100,003	99,735	81,452	621	86,814	3,446,890
2013-14	12.42	86,486	86,486	63,536	582	69,784	3,474,674
2014-15	11.09	107,600	107,600	64,048	522	73,548	3,506,222
2015-16	8.84	115,023	102,610	71,225	560	79,535	3,543,757
2016-17	21.57	191,539	191,539	70,010	408	87,046	3,588,803
2017-18	6.81	82,554	82,554	65,438	625	69,528	3,616,331

TABLE 1 (Continued)

SUMMARY OF FINDINGS AT RIVERSIDE NARROWS

Water Year	Rainfall (in)[1]	USGS Measured Flow (ac-ft)	Total Flow (ac-ft)[2]	Base Flow (ac-ft)[3]	Weighted TDS (mg/L)[4]	Adjusted Base Flow (ac-ft)	Cumulative Credit (ac-ft)[5]
1971-72	9.62	41,257	22,253	16,157	712	16,017	2,529
1972-73	18.46	33,048	32,571	17,105	700	17,105	4,384
1973-74	12.72	25,494	24,494	16,203	700	16,203	5,337
1974-75	13.49	20,970	19,644	15,445	731	15,100	5,187
1975-76	15.86	27,627	26,540	17,263	723	16,977	6,914
1976-77	11.95	24,871	23,978	18,581	722	18,286	9,950
1977-78	30.47	182,500	181,760	22,360	726	21,941	16,641
1978-79	17.51	47,916	47,298	26,590	707	26,456	27,847
1979-80	30.93	254,333	253,817	25,549	676	25,549	38,146
1980-81	10.45	34,698	34,278	19,764	715	19,550	42,446
1981-82	18.34	83,050	82,708	32,778	678	32,778	59,974
1982-83	32.36	279,987	279,645	57,128	610	57,128	101,852
1983-84	10.81	83,087	82,745	56,948	647	56,948	143,550
1984-85	12.86	79,113	78,771	69,772	633	69,772	198,072
1985-86	17.86	99,600	99,258	68,220	624	68,220	251,042
1986-87	8.08	78,093	77,752	59,808	649	59,808	295,600
1987-88	13.78	80,047	79,706	55,324	620	55,324	335,674
1988-89	12.64	62,717	62,376	52,259	607	52,259	372,683
1989-90	8.53	58,500	58,159	53,199	590	53,583	411,016
1990-91	15.48	74,525	73,790	45,041	616	45,041	440,807
1991-92	16.54	71,768	71,427	40,306	620	40,306	465,863
1992-93	30.92	267,384	267,043	41,434	634	41,434	492,047
1993-94	11.62	45,477	45,006	31,278	677	31,278	508,075
1994-95	25.14	245,617	243,411	45,562	646	45,562	538,387
1995-96	11.92	83,256	81,786	54,548	625	54,548	577,685
1996-97	18.64	107,280	104,518	62,618	624	62,618	625,053
1997-98	33.41	214,375	213,033	65,013	601	65,013	674,816
1998-99	8.02	76,294	76,294	73,094	603	73,094	732,660
1999-00	11.09	75,572	75,572	63,499	602	63,499	780,909
2000-01	16.13	78,091	75,331	61,872	603	61,872	827,531
2001-02	5.08	68,844	59,434	58,705	606	58,705	870,986
2002-03	16.22	92,166	88,502	57,747	617	57,747	913,483
2003-04	10.80	77,336	75,799	54,788	634	54,788	953,021
2004-05	29.89	355,503	355,503	65,760	616	65,760	1,003,531
2005-06	13.23	111,840	111,113	67,161	608	67,161	1,055,442
2006-07	4.61	57,868	56,022	56,123	635	56,123	1,096,315
2007-08[8]	13.70	78,619	74,554	46,776	674	46,776	1,127,841
2008-09	10.14	69,027	67,567	43,902	663	43,902	1,156,493
2009-10	17.79	112,631	112,631	45,887	643	45,887	1,187,130
2010-11	23.50	174,075	174,075	49,753	654	49,753	1,221,633
2011-12	9.01	45,049	45,049	42,641	664	42,641	1,249,024
2012-13	9.53	41,337	41,337	36,407	662	36,407	1,270,181
2013-14	12.42	42,766	42,766	32,313	646	32,313	1,287,244
2014-15	11.09	41,958	41,958	28,302	630	28,302	1,300,296
2015-16	8.84	41,007	41,007	30,877	635	30,877	1,315,923
2016-17	21.57	83,601	83,601	36,090	650	36,090	1,336,763
2017-18	6.81	34,792	34,792	28,378	662	28,378	1,349,891

TABLE 1 (Continued)

(1) Measured at San Bernardino County Department of Public Works (SBCDPW) Station 2146 (former San Bernardino County Hospital) until Water Year 2000-01. Estimated for that location for Water Years 2000-01 through 2003-04. Measured at SBCDPW Station 2146-A for Water Year 2004-05. Measured at USGS Gilbert Street Precipitation Gage at San Bernardino for Water Year 2005-06. For 2006-07, measured at SBCDPW 2146 from Oct. 1 to Dec. 21 and at USGS Gilbert Street Precipitation Gage for the remainder of the year. Measured at USGS Gilbert Street Precipitation Gage at San Bernardino since Water Year 2007-08.

(2) As determined by the Watermaster, Total Flow based on Computed Inflow at Prado or measured flow at Riverside Narrows in any year may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows and, at Prado, may include discharges from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River.

(3) As determined by the Watermaster: (a) Base Flow at Prado in any year is exclusive of Storm Flow and may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows as well as any discharges from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River; (b) Base Flow at Riverside Narrows in any year is exclusive of Storm Flow and may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows and, beginning in 1979-80, includes wastewater from Rubidoux CSD that is treated at the Riverside Regional WWTP.

(4) For Base and Storm Flow at Prado and Base Flow only at Riverside Narrows.

(5) As determined by the Watermaster, Cumulative Credit at Prado in any year may include credit for a portion of any water discharged from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River.

(6) The Base Flow and Adjusted Base flow for Water Year 1997-98 were returned to their originally published values to correct an error in the adjustment to account for San Jacinto Watershed flows arriving at Prado. This correction is also reflected in the Cumulative Credit for this and subsequent years.

(7) A correction was made for Water Years 2003-04 and 2010-11 in the calculation of Weighted TDS based on an adjustment to account for OC-59 water that arrived at Prado. This correction is reflected in the Weighted TDS and Adjusted Base Flow for these years. This correction is also reflected in the Cumulative Credit for these and subsequent years.

(8) The Base Flow amount for Water Year 2007-08 at Riverside Narrows was published as 47,760 acre-feet in the Thirty-Eighth Annual Report. The correct amount is 46,776 acre-feet.

Notable Watershed Programs and Activities

Each year when the Watermaster is compiling and analyzing the information it needs to prepare its report to the court, it also takes notice of programs and activities in the Watershed that, while they do not directly enter into the determinations of the Watermaster, do have significant potential to affect River flow or quality. The following are brief descriptions of such items.

Upper Area Treated Wastewater Discharges

Data on treated wastewater discharged in the Upper Area are compiled annually because wastewater is a major contributor to Base Flow in the River. The historical data on treated wastewater discharged are summarized in Table 2. The locations of wastewater treatment plants are shown on Plate 2.

Salt Exports from the Upper Area

High salinity water, mostly from groundwater desalters, is exported from the Upper Area to the ocean through Santa Ana Watershed Project Authority's Santa Ana Regional Interceptor (SARI) in Orange County and Inland Empire Brine Line (IEBL) in San Bernardino and Riverside Counties and IEUA's Non-Reclaimable Wastewater System (NRWS). This salt export helps to protect River water quality and, therefore, helps the Upper Area parties comply with the Judgment. The available historical data on salt export are summarized in Table 3. The SARI/IEBL first went into service in Water Year 1985-86. The NRWS went into service prior to 1970, but records of NRWS flow data are only available beginning with Water Year 1981-82. The locations of the SARI/IEBL and NRWS pipelines are shown on Plate 2.

Arundo donax Eradication

Arundo donax is a non-native species of reed that has invaded many waterways in California. It displaces native vegetation, resulting in undesirable habitat for animals. *Arundo* also consumes water at the rate of about 5.6 acre-feet per acre per year compared to only about 1.9 for native plants, a net water loss of about 3.7 acre-feet per year per acre of *Arundo*. By the early 1990s there were about 10,000 acres of *Arundo* in the Santa Ana River Watershed. In 1997 a consortium of local, state and federal agencies launched a long-term eradication program in the watershed for reasons of both habitat restoration and water savings. *Arundo* spreads quickly downstream as roots and rhizomes break off during high stream flows. Therefore, the eradication program began at the farthest upstream locations and is working toward the River mouth. Each location requires multiyear retreatment. To date the consortium has eradicated 6,000 acres of *Arundo* in the watershed.

TABLE 2
TREATED WASTEWATER EFFLUENT DISCHARGED ABOVE PRADO
(acre-feet)

Water Year	Wastewater discharges upstream from Colton that generally do not flow continuously to Santa Ana River above E Street				Wastewater discharges to Santa Ana River and its tributaries that have hydraulic continuity to the Santa Ana River above Riverside Narrows					Wastewater discharges to the Santa Ana River between Riverside Narrows and Prado Dam								Wastewater discharges to Temescal Creek or its tributaries which have hydraulic continuity to the Santa Ana River					Total Discharge to surface flow of the Santa Ana River	Total Waste Water Discharged in the Watershed
																			Est. EMWD Temescal Elsinore						
	Redlands	Beaumont	Yucaipa	Subtotal (A)	San Bernardino[7]	Colton	Rialto	RIX[1]	Subtotal (B)	Riverside	Corona[2]	IEUA RP 1[3]	IEUA RP 2	IEUA RP 5	IEUA CCWRF[4]	WRCRW[5]	Subtotal (C)	EMWD Discharge (1)	Arriving at Prado (2)	Valley[6] WRP (3)	Valley MWD (4)	Subtotal (D) (2+3+4)	(B+C+D)	(A+B+C+D+1-2)
1970-71	2,650	no record	-	2,650	17,860	2,520	2,270	-	22,650	18,620	3,190	-	-	-	-	-	21,810	-	-	-	-	-	44,460	47,110
1971-72	2,830	no record	-	2,830	16,020	2,230	2,400	-	20,650	19,010	3,230	6,740	-	-	-	-	28,980	-	-	-	-	-	49,630	52,460
1972-73	2,810	450	-	3,260	18,670	2,530	2,260	-	23,460	19,060	3,340	10,380	-	-	-	-	32,780	-	-	-	-	-	56,240	59,500
1973-74	2,770	600	-	3,370	17,680	2,530	2,320	-	22,530	19,560	3,510	11,440	2,320	-	-	-	36,830	-	-	-	-	-	59,360	62,730
1974-75	2,540	570	-	3,110	16,750	1,980	2,320	-	21,050	19,340	4,020	14,960	2,280	-	-	-	40,600	-	-	-	-	-	61,650	64,760
1975-76	2,450	620	-	3,070	17,250	2,540	2,240	-	22,030	19,580	4,700	15,450	2,950	-	-	-	42,680	-	-	-	-	-	64,710	67,780
1976-77	3,170	580	-	3,750	17,650	3,260	2,330	-	23,240	18,770	5,010	14,640	3,380	-	-	-	41,800	-	-	-	-	-	65,040	68,790
1977-78	3,280	620	-	3,900	18,590	3,810	2,380	-	24,780	20,310	5,200	14,650	4,060	-	-	-	44,220	-	-	-	-	-	69,000	72,900
1978-79	3,740	670	-	4,410	19,040	3,850	3,050	-	25,940	21,070	5,390	15,040	5,070	-	-	-	46,570	-	-	-	-	-	72,510	76,920
1979-80	4,190	690	-	4,880	20,360	4,190	2,990	-	27,540	22,910	5,360	14,410	5,520	-	-	-	48,200	-	-	-	-	-	75,740	80,620
1980-81	4,410	690	-	5,100	20,550	3,930	3,370	-	27,850	24,180	5,590	17,270	5,260	-	-	-	52,300	-	-	-	-	-	80,150	85,250
1981-82	4,420	700	-	5,120	23,340	3,780	3,470	-	30,590	25,640	5,410	19,580	5,360	-	-	-	55,990	-	-	-	-	-	86,580	91,700
1982-83	4,530	710	-	5,240	24,160	3,600	3,620	-	31,380	25,020	5,860	20,790	4,290	-	-	-	55,960	-	-	-	-	-	87,340	92,580
1983-84	5,150	800	-	5,950	22,080	3,700	3,830	-	29,610	26,090	6,200	20,950	3,950	-	-	-	57,190	-	-	-	-	-	86,800	92,750
1984-85	4,990	840	-	5,830	23,270	3,830	4,070	-	31,170	27,750	6,250	25,160	4,280	-	-	-	63,440	-	-	-	-	-	94,610	100,440
1985-86	5,200	820	-	6,020	24,720	4,010	4,720	-	33,450	28,820	5,900	28,240	2,660	-	-	-	65,620	-	-	-	-	-	99,070	105,090
1986-87	5,780	880	800	7,460	26,810	4,170	5,350	-	36,330	30,340	6,170	27,160	5,000	-	-	-	68,670	-	-	-	-	-	105,000	112,460
1987-88	6,060	940	1,850	8,850	27,880	5,240	6,040	-	39,160	34,660	6,050	31,290	5,500	-	-	-	77,500	-	-	-	-	-	116,660	125,510
1988-89	5,250	1,030	2,260	8,540	27,640	5,550	6,280	-	39,470	35,490	8,080	35,510	6,180	-	-	-	85,260	-	-	-	-	-	124,730	133,270
1989-90	6,360	1,100	2,370	9,830	28,350	5,810	6,260	-	40,420	33,210	9,140	34,760	5,730	-	-	-	82,840	-	-	-	-	-	123,260	133,090
1990-91	6,690	1,120	2,490	10,300	27,570	5,670	6,290	-	39,530	32,180	9,110	36,840	6,100	-	-	-	84,230	-	-	-	-	-	123,760	134,060
1991-92	6,230	1,150	2,580	9,960	25,060	5,660	6,360	-	37,080	32,660	9,010	40,360	5,780	-	1,550	-	89,360	-	-	-	-	-	126,440	136,400
1992-93	6,880	1,180	2,580	10,640	25,550	6,210	6,460	-	38,220	34,100	9,600	41,510	5,640	-	4,720	-	95,570	-	-	-	-	-	133,790	144,430
1993-94	6,440	1,150	2,710	10,300	23,800	5,830	6,540	-	36,170	32,640	7,790	37,310	5,430	-	7,010	-	90,180	-	-	-	-	-	126,350	136,650
1994-95	6,720	1,180	2,560	10,460	26,330	5,500	6,820	-	38,650	33,950	7,340	39,680	5,360	-	8,690	-	95,020	-	-	-	-	-	133,670	144,130
1995-96	6,550	1,260	2,640	10,450	13,240	2,770	6,890	20,760	43,660	33,960	7,850	39,590	4,810	-	9,060	-	95,270	-	-	-	-	-	138,930	149,380
1996-97	6,510	1,280	2,780	10,570	-	-	7,160	42,800	49,960	34,240	5,040	39,940	4,790	-	9,750	-	93,760	-	-	-	-	-	143,720	154,290
1997-98	7,022	1,356	3,116	11,494	-	-	7,063	49,683	56,746	35,422	8,718	44,940	4,969	-	9,264	1,461	104,774	1,779	1690	-	-	1,690	163,210	174,793
1998-99	7,379	1,367	3,128	11,874	-	-	6,524	47,587	54,111	34,844	11,629	43,354	5,345	-	9,534	4,594	109,300	-	-	-	3,049	3,049	166,460	178,334
1999-00	7,670	1,373	3,284	12,327	-	-	7,392	45,012	52,404	35,399	13,152	42,967	4,378	-	9,954	2,371	108,221	-	-	-	4,159	4,159	164,784	177,111
2000-01	7,379	1,377	3,345	12,101	-	-	8,346	49,407	57,753	35,663	13,100	43,863	4,401	-	11,615	2,210	110,852	-	-	-	4,245	4,245	172,850	184,951
2001-02	7,395	1,434	3,285	12,114	-	-	7,952	44,513	52,465	35,586	12,378	40,377	4,056	-	10,677	2,380	105,454	-	-	352	4,477	4,829	162,748	174,862
2002-03	7,499	1,593	3,480	12,572	217	4	8,042	45,570	53,833	36,298	12,027	45,838	4,343	-	10,837	2,409	111,752	2,312	2,024	444	5,012	7,480	173,065	185,925
2003-04	6,625	1,793	3,898	12,316	124	0	8,158	44,526	52,808	36,664	11,394	39,734	2,307	4,821	9,113	2,818	106,851	4,345	1,140	549	5,037	6,726	166,386	181,907
2004-05	7,632	2,051	3,899	13,583	4,406	183	7,815	42,025	54,428	38,123	12,558	40,644	-	8,777	8,637	3,521	112,260	15,195	13,746	653	7,025	21,424	188,112	203,144
2005-06	5,789	2,246	3,945	11,981	1,184	101	7,883	45,259	54,427	37,358	13,021	35,486	-	9,036	8,389	3,311	106,601	14,669	12,631	701	6,259	19,591	180,618	194,637
2006-07	4,991	2,555	4,056	11,601	10	-	7,654	44,011	51,676	36,355	11,727	31,829	-	12,534	6,851	4,376	103,672	13,105	11,092	691	4,792	16,575	171,922	185,537
2007-08	3,665	2,856	4,055	10,576	518	0	7,258	42,476	50,252	35,703	9,408	26,001	-	12,200	8,029	5,952	97,293	10,808	8,930	811	1,553	11,294	158,839	171,293
2008-09	2,386	2,894	3,993	9,273	263	0	6,724	40,311	47,299	33,636	9,062	23,854	-	9,711	8,920	6,374	91,557	6,669	4,653	948	518	6,119	144,975	156,264
2009-10	2,876	2,956	4,105	9,937	298	-	6,658	40,672	47,628	33,731	8,808	21,983	-	8,046	7,258	6,153	85,978	4,961	4,814	934	876	6,624	140,231	150,315
2010-11	3,271	3,050	4,196	10,516	1,292	-	6,710	39,333	47,335	33,487	9,275	18,177	-	7,279	5,987	6,486	80,690	5,680	5,418	622	4,464	10,504	138,529	149,308
2011-12	3,503	3,054	4,112	10,669	76	-	6,703	37,966	44,745	31,622	9,249	14,563	-	7,184	5,137	6,409	74,164	1,225	735	507	786	2,027	120,936	132,096
2012-13	3,652	3,139	4,191	10,982	13	-	6,611	35,390	42,014	31,996	9,406	10,647	-	5,388	5,015	6,994	69,446	2,727	502	502	650	1,654	113,113	126,321
2013-14	3,549	3,345	4,133	11,028	175	-	6,527	33,271	39,973	30,302	8,662	9,898	-	3,188	3,606	6,402	62,058	-	-	533	623	1,156	103,187	114,215
2014-15	3,149	3,428	2,920	9,497	-	-	6,285	31,668	37,954	29,673	9,611	11,589	-	3,957	4,124	6,690	65,644	-	-	605	626	1,231	104,828	114,325
2015-16	3,274	3,372	3,765	10,411	15	-	6,420	32,343	38,778	29,074	10,425	12,531	-	2,910	3,368	7,097	65,405	-	-	174	644	818	105,001	115,411
2016-17	3,084	3,645	3,976	10,705	327	-	6,755	35,306	42,387	30,030	8,445	12,390	-	3,324	3,813	6,882	64,884	-	-	894	589	1,482	108,754	119,458
2017-18	1,891	3,749	3,706	9,346	0	-	6,210	32,493	38,703	28,922	8,574	12,564	-	3,854	1,627	7,610	63,151	-	-	1154	626	1,780	103,634	112,980

1. RIX = Rapid Infiltration and Extraction Facility for San Bernadino and Colton, including over-extraction of groundwater
2. A portion of the Corona discharge goes to ponds, which are considered tributary to the Santa Ana River.
3. Beginning in 1997-98, includes IEUA Plant #4 flows. In 2016-17 RP1 effluent includes flows into Prado Regional Park Lake.
4. CCWRF = Carbon Canyon Water Reclamation Facility
5. WRCRW = Western Riverside County Regional Wastewater Treatment Plant
6. Lee Lake WTP name changed to Temescal Valley WRP in WY 2014-15
7. Discharge numbers were updated during the 2016-17 reporting cycle.

The amounts shown in this table were determined from data provided by the agencies.

TABLE 3

HIGH SALINITY WATER EXPORTED
FROM THE SANTA ANA RIVER WATERSHED

Water Year	Inland Empire Utility Agency Non-Reclaimable Wastewater North System (acre-feet)	Santa Ana Watershed Project Authority Santa Ana Regional Interceptor (SARI)[1] SARI Flow[2] (acre-feet)	Average TDS (mg/L)	Total Flow (acre-feet)
1970-71	NA	---	---	---
1971-72	NA	---	---	---
1972-73	NA	---	---	---
1973-74	NA	---	---	---
1974-75	NA	---	---	---
1975-76	NA	---	---	---
1976-77	NA	---	---	---
1977-78	NA	---	---	---
1978-79	NA	---	---	---
1979-80	NA	---	---	---
1980-81	NA	---	---	---
1981-82	4,236	---	---	4,236
1982-83	4,651	---	---	4,651
1983-84	4,142	---	---	4,142
1984-85	2,346	---	---	2,346
1985-86	2,995	2,791 [3]	NA	5,786 [3]
1986-87	4,943	2,869 [3]	NA	7,813 [3]
1987-88	5,177	2,948 [3]	NA	8,125 [3]
1988-89	5,949	3,622 [3]	NA	9,572 [3]
1989-90	5,240	7,393	1,649	12,633
1990-91	2,847	7,340	1,906	10,187
1991-92	3,421	6,457	2,346	9,878
1992-93	3,774	5,277	2,516	9,051
1993-94	3,764	7,860	2,302	11,624
1994-95	4,131	8,656	1,903	12,787
1995-96	3,863	9,597	2,175	13,460
1996-97	4,191	10,225	2,292	14,417
1997-98	4,575	8,210	2,456	12,785
1998-99	3,666	4,305	2,611	7,971
1999-00	4,272	7,711	2,154	11,983
2000-01	5,075	8,205	2,504	13,280
2001-02	4,297	8,385	3,289	12,682
2002-03	3,926	9,331	3,482	13,257
2003-04	3,950	10,505	3,798	14,455
2004-05	4,220	10,971	3,460	15,191
2005-06	5,085	12,847	4,118	17,932
2006-07	4,609	13,168	4,120	17,777
2007-08	4,658	12,123	4,986	16,781
2008-09	4,284	12,993	5,037	17,277
2009-10	3,865	13,325	5,003	17,190
2010-11	3,443	13,282	5,066	16,725
2011-12	3,668	13,471	5,884	17,139
2012-13	3,862	12,061	5,626	15,923
2013-14	4,190	12,185	5,350	16,375
2014-15	4,063	12,056	5,460	16,119
2015-16	4,110	11,396	5,364	15,506
2016-17	4,324	11,957	5,361	16,281
2017-18	4,410	11,520	5,626	15,930

1. Santa Ana Regional Interceptor began operation in 1985-86.
2. IEUA Non-Reclaimable Wastewater from the South System goes into the SARI and is included in SARI Flow.
3. SARI flow and Total Flow for 1985-86 through 1988-89 is partial flow.

NA = Data Not Available

Chino Groundwater Basin Hydraulic Control

During most of the twentieth century much of the land overlying the Chino Basin was devoted to irrigated agriculture that obtained its water supply directly from the basin. In more recent times the agriculture is being replaced by urban development, but the agricultural water use left behind a legacy of high concentrations of nitrates and other salts in the groundwater, making it unsuitable for urban use unless treated. As agricultural pumping of groundwater in the lower part of the Basin was cut back, the California Regional Water Quality Control Board, Santa Ana Region ("RWQCB"), and OCWD both became concerned about the outlook for increased amounts of poor quality water rising in the Santa Ana River above Prado Dam.

Under historic anti-degradation water quality standards, the recharge of recycled water in the Chino Basin was impossible because the Basin lacked assimilative capacity. In order to allow for the use and recharge of recycled water, the RWQCB amended the Basin Plan for the Santa Ana Watershed to allow for the use of special "maximum benefit" standards. As a condition of approval of the use of the maximum benefit standards, the RWQCB's Water Quality Control Plan requires that the Chino Basin entities develop and implement a Hydraulic Control Program with the dual objectives of minimizing the loss of groundwater to the River and protecting the River against the salts by increasing pumping from wells low in the Basin. Much of the pumped groundwater is treated in desalination facilities, with the product water being served to municipalities and the brine stream being exported to the ocean via the SARI/IEBL.

The Chino Basin Watermaster files an annual report with RWQCB on the program, water chemistry, hydrologic balance, piezometric groundwater surface elevations, and groundwater modeling. In February 2016, Chino Basin Watermaster announced that hydraulic control had been achieved.

Watermaster Service Expenses

In accordance with Paragraph 7(d) of the Judgment, the fees and expenses of each of the members of the Watermaster are borne by the parties by whom they were nominated. All other Watermaster service expenses are shared by the parties with OCWD paying 40% of the cost and WMWD, SBVMWD, and IEUA each paying 20% of the cost.

The Watermaster annually adopts a budget for the costs of services other than those provided by the USGS. Table 4 shows the budget and actual expenses incurred for such services during the 2017-18 fiscal year as well as the budget adopted for the 2018-19 fiscal year. A financial review was performed by OCWD and is reported in Appendix C.

TABLE 4

WATERMASTER SERVICE BUDGET AND EXPENSES

Budget Item	July 1, 2017 to June 30, 2018 Budget	July 1, 2017 to June 30, 2018 Expenses	July 1, 2018 to June 30, 2019 Budget
Support Services	$7,500.00	$7,900.00	$9,000.00
Reproduction of Annual Report	1,000.00	$742.71	1,000.00
TOTAL	$8,500.00	$8,642.71	$10,000.00

Stream flow measurements and water quality data required by the Watermaster are, for the most part, furnished by the USGS through a cooperative monitoring program which also includes some precipitation data to supplement data provided by the USGS and other agencies. The costs of the cooperative monitoring program for Water Year 2017-18, and each party's share of the costs, are set forth in Table 5.

TABLE 5

COSTS TO THE PARTIES AND USGS FOR MEASUREMENTS WHICH PROVIDE DATA USED BY THE SANTA ANA RIVER WATERMASTER

October 1, 2017 to September 30, 2018

	Total Cost	U.S.G.S. Share	Parties' Share
USGS PRECIPITATION GAGING STATIONS			
Gilbert Street Precipitation Gage at San Bernardino	$8,950	$0	$8,950
Middle Fork Lytle Creek Precipitation	$5,350	$5,350	$0
USGS FLOW AND WATER QUALITY GAGING			
Santa Ana River at MWD Crossing (Riverside Narrows)			
Surface Water Gage	$32,400	$10,850	$21,550
Water Quality Monitoring TDS Sampling	$13,450	$4,500	$8,950
Santa Ana River below Prado Dam			
Surface Water Gage	$25,550	$25,550	$0
Extra Measurements in WY18	$16,008	$0	$16,008
Water Quality Monitoring	$18,450	$6,200	$12,250
Water Quality Monitoring TDS Sampling	$12,350	$4,150	$8,200
Water Quality Conductance Program	$2,850	$0	$2,850
Temescal Creek above Main St., near Corona	$23,000	$7,700	$15,300
Chino Creek at Schaefer Avenue	$23,000	$7,700	$15,300
Cucamonga Creek near Mira Loma	$23,000	$7,700	$15,300
Temescal Creek at Corona Lake near Corona	$17,150	$0	$17,150
TOTAL COST AND SHARES	$221,508	$79,700	$141,808
COST DISTRIBUTION AMONG PARTIES			
Inland Empire Utilities Agency	20%		$28,362
Orange County Water District	40%		$56,723
San Bernardino Valley Municipal Water District	20%		$28,362
Western Municipal Water district	20%		$28,362

CHAPTER II

BASE FLOW AT PRADO

This chapter deals with determinations of 1) the components of flow at Prado, which include Nontributary Flow, water discharged from San Jacinto Watershed, Storm Flow, and Base Flow and 2) the Adjusted Base Flow at Prado credited to IEUA and WMWD.

Flow at Prado

During Water Year 2017-18, the flow of the River as measured at the USGS gaging station below Prado Dam amounted to 82,554 acre-feet. There was 1 acre-foot of water in storage at the beginning of the Water Year, and 1 acre-foot of water remained in storage at the end of the Water Year. Inflow to the reservoir included 65,438 acre-feet of Base Flow and 17,116 acre-feet of Storm Flow. There were no Nontributary Flows to Prado. There was no San Jacinto Watershed water that reached Prado. The monthly components of flow of the River at Prado Dam for Water Year 2017-18 are listed in Table 6 and are shown graphically on Plate 4. Historical Base and Storm Flows of the River below Prado during Water Years 1934-35 through 2017-18 are presented on Plate 5.

Nontributary Flow

Nontributary Flow includes water that originated outside the watershed and other water that the Watermaster has determined should be excluded from Base Flow. During Water Year 2017-18, there were no Nontributary Flows that were determined to have reached Prado. In the past, Nontributary Flows have included, and may include in the future, other water discharged to the River pursuant to water exchange or other such programs.

Releases to San Antonio Creek

Since May 1973, OCWD has from time to time purchased State Water Project water for the replenishment of the groundwater basin in Orange County. The water has been released at two locations: Santa Ana River above Riverside Narrows (1972-72 only) and San Antonio Creek near the City of Upland. The general procedure used by the Watermaster to account for Nontributary Flows released to San Antonio Creek via OC-59 is fully described in the Twelfth (1981-82) Annual Report. During Water Year 2017-18, there was no water discharged to San Antonio Creek for OCWD via OC-59.

TABLE 6

COMPONENTS OF FLOW AT PRADO DAM
WATER YEAR 2017-18
(acre-feet)

	USGS Measured Outflow	Storage Change (1)	Computed Inflow	San Jacinto Watershed Flow at Prado (2)	San Antonio Creek (3)	Storm Flow	Base Flow
2017							
October	4,800	3	4,803	0	0	0	4,803
November	6,039	(1)	6,038	0	0	0	6,038
December	5,561	1	5,562	0	0	0	5,562
2018							
January	16,607	2	16,609	0	0	9,153	7,456
February	6,958	424	7,382	0	0	509	6,873
March	14,692	(424)	14,268	0	0	6,826	7,442
April	6,487	(4)	6,483	0	0	430	6,053
May	5,663	0	5,663	0	0	183	5,480
June	4,653	(2)	4,651	0	0	0	4,651
July	3,650	0	3,650	0	0	15	3,635
August	3,334	0	3,334	0	0	0	3,334
September	4,110	1	4,111	0	0	0	4,111
Total	82,554	0	82,554	0	0	17,116	65,438

(1) The monthly change in storage is included in the monthly components of flow.

(2) Discharge due to overflow of Lake Elsinore and/or discharge of wastewater by EMWD from the San Jacinto Watershed.

(3) State Water Project water released into San Antonio Creek from turnout OC-59 for OCWD and calculated to have reached Prado this Water Year.

San Jacinto Watershed Discharge

Prior to Water Year 1997-98, discharges from the San Jacinto Watershed reaching Prado Reservoir were due to discharges from Lake Elsinore, and had been accounted for as "Lake Elsinore Discharge." In 1998, Eastern Municipal Water District (EMWD) completed its Reach 4 discharge pipeline to Wasson Canyon, which is tributary to Temescal Wash. The pipeline discharges tertiary-treated wastewater to Temescal Wash above Lee Lake when flows exceed EMWD's storage facility capacity. The collective discharges from Lake Elsinore and EMWD to Temescal Wash are referred to herein as San Jacinto Watershed discharges. During Water Year 2017-18, there was no water discharged to Temescal Wash by EMWD.

Storm Flow

Portions of storm flows are retained behind Prado Dam for flow regulation and for water conservation purposes. The United States Army Corps of Engineers (USACE) owns and operates the Dam according to a flow release schedule which allows for water to be captured and subsequently released at rates which can be captured and recharged by OCWD. The Dam has a spillway elevation of 543 feet above mean sea level. On April 12, 1995, the USACE, the United States Fish and Wildlife Service (USFWS), and OCWD reached an agreement to increase the seasonal water conservation pool from elevation 494 to elevation 505 feet after March 1 of each year in exchange for a $1 million contribution by OCWD to the USFWS to be used to develop least Bell's vireo habitat by the removal of a non-native plant, *Arundo donax*. In 2006 the USACE and OCWD signed an agreement to increase the winter conservation pool elevation from elevation 494 to 498 in exchange for a $930,000 contribution from OCWD to habitat restoration in the watershed. Monthly and annual quantities of Storm Flow are shown in Table 6.

During Water Year 2017-18, the maximum volume of water stored in Prado Reservoir reached 5,584 acre-feet on January 11, 2018. The maximum daily mean flow released from Prado Dam to the River during the Water Year was 654 cfs on January 17, 2018.

Base Flow

The Base Flow is that portion of the total flow remaining after subtracting Storm Flow, Nontributary Flow and certain other flows determined by the Watermaster. Flows affecting the determination of Base Flow in Water Year 2017-18 did not include discharges from the San Jacinto Watershed. The general procedure used by the Watermaster to separate the Water Year 2017-18 flow components was the same as used for previous years and is fully described in the Fifth (1974-75) Annual Report. Table 6 shows the monthly and annual quantities of Base Flow.

Water Quality Adjustments

The flow-weighted average TDS for the total flow passing Prado Dam was found to be 625 mg/L. This determination was based on records from a continuous monitoring device operated by the USGS for EC of the River flow below Prado Dam. This record was supplemented by forty-one (41) grab samples for EC collected by the USGS and analyzed for TDS. The TDS and EC data collected on March 14, 2018 (566 mg/L and 1,340 μs/cm) were excluded from the correlation of TDS and EC as they were deemed to be anomalous. Seven other grab samples were analyzed for TDS and not EC.

For Water Year 2017-18 a correlation between TDS and EC yields the following best fit equation:

$$TDS = EC \times 0.6040$$

(where the units of TDS and EC are mg/L and μs/cm, respectively)

Using the daily EC data, flow-weighted average daily concentrations for TDS were calculated using the above equation. The plot of TDS on Plate 6 shows the average daily TDS concentration of the River flow passing Prado Dam. A summary of daily TDS and EC of the River below Prado Dam is contained in Appendix F. At Prado Dam, the flow-weighted average annual TDS concentration of 625 mg/L represents the quality of the total flow including releases to San Antonio Creek and discharges from San Jacinto Watershed, if any. The Judgment requires that Base Flow shall be subject to adjustment based on the TDS of Base Flow and Storm Flow only. Hence, a determination of the TDS of Base Flow plus Storm Flow only is detailed in the following paragraphs.

Adjustment for State Water Project Flow to San Antonio Creek

No State Water Project flows discharged to San Antonio Creek reached Prado Dam.

Adjustment for San Jacinto Watershed Discharge

There was no discharge from the San Jacinto Watershed during Water Year 2017-18 reaching Prado Reservoir. Therefore, no water quality adjustment was necessary.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow X Average TDS
1. Measured Outflow	82,554	625	51,596,250
2. Less Nontributary Flow San Antonio Creek	0	---	---
3. Less San Jacinto Watershed Discharge	0	---	---
4. Measured Outflow less lines 2 and 3	82,554		51,596,250
Average TDS in Total Base and Storm Flow	51,596,250 ÷ 82,554 = 625 mg/L		

As shown above, the flow-weighted average annual TDS of Storm Flow and Base Flow for Water Year 2017-18 is 625 mg/L.

Adjusted Base Flow at Prado

The Judgment provides that the amount of Base Flow at Prado received during any year shall be subject to adjustment based on flow-weighted average annual TDS of the Base Flow and Storm Flow at Prado as follows:

If the Weighted Average TDS in Base Flow and Storm Flow at Prado is:	Then the Adjusted Base Flow shall be determined by the formula:
Greater than 800 mg/L	$Q - \frac{35}{42,000} Q(TDS-800)$
700 mg/L to 800 mg/L	Q
Less than 700 mg/L	$Q + \frac{35}{42,000} Q(700-TDS)$

where Q = Base Flow actually received.

The flow-weighted average annual TDS of 625 mg/L is less than 700 mg/L. Therefore, the Base Flow of 65,438 acre-feet must be adjusted by the above equation for TDS less than 700 mg/L. Thus, the Adjusted Base Flow is as follows:

$$(65,438 \text{ acre-feet}) + \frac{35}{42,000} \times (65,438 \text{ acre-feet}) \times (700 - 625) = 69,528 \text{ acre-feet}$$

Entitlement and Credit or Debit

Paragraph 5(c) of the Judgment states that "CBMWD (now IEUA) and WMWD shall be responsible for an average annual Adjusted Base Flow of 42,000 acre-feet at Prado. CBMWD (IEUA) and WMWD each year shall be responsible for not less than 37,000 acre-feet of Base Flow at Prado, plus one-third of any cumulative debit; provided, however, that for any year commencing on or after October 1, 1986, when there is no cumulative debit, or for any year prior to 1986 whenever the cumulative credit exceeds 30,000 acre-feet, said minimum shall be 34,000 acre-feet."

The Watermaster agreed that San Jacinto Watershed outflows were not envisioned during the formulation of the Judgment and because of the periodic occurrence of San Jacinto Watershed flows at Prado, the Watermaster decided, as in previous years, to credit one-half of any such outflows recharging the groundwater basin in Orange County to IEUA and WMWD.

The findings of the Watermaster concerning flow at Prado for Water Year 2017-18 required under the Judgment are as follows:

1.	Measured Outflow at Prado	82,554 acre-feet
2.	Base Flow at Prado	65,438 acre-feet
3.	Annual Weighted TDS of Base and Storm Flow	625 mg/L
4.	Annual Adjusted Base Flow	69,528 acre-feet
5.	Cumulative Adjusted Base Flow	5,592,323 acre-feet
6.	Other Credits (Debits) [1]	0 acre-feet
7.	Cumulative Entitlement of OCWD	2,016,000 acre-feet
8.	Cumulative Credit	3,616,331 acre-feet
9.	One-Third of Cumulative Debit	0 acre-feet
10.	Minimum Required Base Flow in 2017-18	34,000 acre-feet

1. Other Credits (Debits) are comprised of San Jacinto Watershed outflow.
2. Cumulative Credit includes 40,008 acre-feet of San Jacinto Watershed cumulative outflow.

TABLE 7
HISTORICAL WATERMASTER FINDINGS AT PRADO DAM
(acre-feet)

Water Year	Base Flow	Annual Adjusted Base Flow	Cumulative Adjusted Base Flow	Other Credits (Debits)[1]	Cumulative Entitlement of OCWD	Cumulative Credit[2]
1970-71	38,402	38,402	38,402	0	42,000	-3,598
1971-72	40,416	40,416	78,818	0	84,000	-5,182
1972-73	48,999	51,531	130,349	0	126,000	4,349
1973-74	43,106	45,513	175,862	0	168,000	7,862
1974-75	50,176	51,263	227,125	0	210,000	17,125
1975-76	45,627	48,098	275,223	0	252,000	23,223
1976-77	48,387	50,000	325,223	0	294,000	31,223
1977-78	58,501	73,955	399,178	0	336,000	63,178
1978-79	71,863	79,049	478,227	0	378,000	100,227
1979-80	82,509	106,505	584,732	0	420,000	164,732
1980-81	74,875	74,875	659,607	8,045	462,000	205,652
1981-82	81,548	89,431	749,038	0	504,000	253,083
1982-83	111,692	138,591	887,629	3,362	546,000	353,036
1983-84	109,231	115,876	1,003,505	4,602	588,000	431,514
1984-85	125,023	133,670	1,137,175	0	630,000	523,184
1985-86	127,215	141,315	1,278,490	0	672,000	622,499
1986-87	119,848	127,638	1,406,128	0	714,000	708,137
1987-88	124,104	136,308	1,542,436	0	756,000	802,445
1988-89	119,572	131,230	1,673,666	0	798,000	891,675
1989-90	119,149	127,986	1,801,652	0	840,000	977,661
1990-91	111,515	128,379	1,930,031	0	882,000	1,064,040
1991-92	106,948	124,862	2,054,893	0	924,000	1,146,902
1992-93	128,067	163,499	2,218,392	0	966,000	1,268,401
1993-94	111,186	119,432	2,337,824	0	1,008,000	1,345,833
1994-95	123,468	152,792	2,490,616	1,762	1,050,000	1,458,387
1995-96	131,861	152,299	2,642,915	0	1,092,000	1,568,686
1996-97	136,676	157,861	2,800,776	0	1,134,000	1,684,547
1997-98[3]	155,711	195,677	2,996,453	0	1,176,000	1,838,224
1998-99	158,637	174,369	3,170,822	0	1,218,000	1,970,593
1999-00	148,269	169,644	3,340,466	0	1,260,000	2,098,237
2000-01	153,914	176,360	3,516,826	0	1,302,000	2,232,597
2001-02	145,981	159,728	3,676,554	0	1,344,000	2,350,325
2002-03	146,113	174,970	3,851,524	887	1,386,000	2,484,182
2003-04[4]	143,510	167,190	4,018,714	247	1,428,000	2,609,619
2004-05	154,307	199,570	4,218,284	2,366	1,470,000	2,769,555
2005-06	147,736	170,266	4,388,550	3,562	1,512,000	2,901,383
2006-07	129,830	140,216	4,528,766	5,531	1,554,000	3,005,130
2007-08	116,483	136,382	4,665,148	4,165	1,596,000	3,103,677
2008-09	102,711	117,519	4,782,667	2,189	1,638,000	3,181,385
2009-10	103,099	125,179	4,907,846	1,489	1,680,000	3,266,053
2010-11[4]	102,031	117,166	5,025,012	1,193	1,722,000	3,342,412
2011-12	93,068	101,056	5,126,068	365	1,764,000	3,401,833
2012-13	81,452	86,814	5,212,882	243	1,806,000	3,446,890
2013-14	63,536	69,784	5,282,666	0	1,848,000	3,474,674
2014-15	64,048	73,548	5,356,214	0	1,890,000	3,506,222
2015-16	71,225	79,535	5,435,749	0	1,932,000	3,543,757
2016-17	70,010	87,046	5,522,795	0	1,974,000	3,588,803
2017-18	65,438	69,528	5,592,323	0	2,016,000	3,616,331

TABLE 7 (Continued)

(1) Other Credits (Debits) are comprised of San Jacinto Watershed outflow which is the sum of discharge from Lake Elsinore and wastewater discharged by EMWD.

(2) Cumulative Credit includes 40,008 acre-feet of San Jacinto Watershed cumulative outflow.

(3) The Base Flow and Adjusted Base Flow for Water Year 1997-98 were returned to their originally published values to correct an error in the adjustment to account for San Jacinto Watershed flow arriving at Prado. This correction is also reflected in the Cumulative Credit for this and subsequent years.

(4) A correction was made for Water Years 2003-04 and 2010-11 in the calculation of Weighted TDS based on an adjustment to account for OC-59 water that arrived at Prado. This correction is reflected in the Weighted TDS and Adjusted Base Flow for these years. This correction is also reflected in the Cumulative Credit for these and subsequent years.

CHAPTER III

BASE FLOW AT RIVERSIDE NARROWS

This chapter deals with determinations of 1) the components of flow at Riverside Narrows, which include Storm Flow and Base Flow and 2) the Adjusted Base Flow at Riverside Narrows credited to SBVMWD.

Flow at Riverside Narrows

The flow of the River at Riverside Narrows was to 34,792 acre-feet, measured at the USGS gaging station near the MWD Crossing. Separated into its components, Base Flow was 28,378 acre-feet and Storm Flow was 8,590 acre-feet. Included in Base Flow is 2,176 acre-feet of treated wastewater from Rubidoux Community Services District that now bypasses the USGS gaging station. The Storm and Base Flow components of the flow of the River at Riverside Narrows for each month in the Water Year 2017-18 are listed in Table 8 and shown graphically on Plate 7. The components of flow of the River at Riverside Narrows during the period 1934-35 through 2017-18 are presented on Plate 8.

Nontributary Flow

Nontributary Flow includes water that originated outside the watershed, as well as other water that the Watermaster has determined should be excluded from Base Flow. During Water Year 2017-18, no Nontributary Flow was delivered to the River upstream of Riverside Narrows and Prado Dam. In the past, Nontributary Flows have included, and may include in the future, other water discharged to the River pursuant to water exchange or other such programs.

Base Flow

Based on the hydrograph shown on Plate 7 a separation was made between Storm Flow and the sum of Base Flow and Nontributary Flow utilizing in general the procedures reflected in the Work Papers of the engineers (as referenced in Paragraph 2 of the Engineering Appendix of the Judgment).

In April 1980, Rubidoux Community Services District made the first delivery of treated wastewater to the regional treatment plant at Riverside. Prior to that time, Rubidoux had discharged to the River upstream of the Riverside Narrows gaging station. Treated wastewater from Rubidoux during Water Year 2017-18, in the amount of 2,176 acre-feet, has been added to the Base Flow as measured at the gaging station. A summary of Rubidoux discharges is contained in Appendix G.

TABLE 8

COMPONENTS OF FLOW AT RIVERSIDE NARROWS
WATER YEAR 2017-18
(acre-feet)

	Month	USGS Measured Flow	Storm Flow	Rubidoux Waste-water	Base Flow [1]
2017	October	1,849	0	187	2,036
	November	2,164	0	180	2,344
	December	2,318	0	181	2,499
2018	January	8,450	6,042	184	2,592
	February	2,591	135	166	2,622
	March	5,111	2,175	182	3,118
	April	2,596	54	176	2,718
	May	2,364	184	181	2,361
	June	1,871	0	180	2,051
	July	1,845	0	187	2,032
	August	1,825	0	192	2,017
	September	1,808	0	180	1,988
Total		34,792	8,590	2,176	28,378

(1) Base Flow equals USGS measured flow, minus storm flow, minus transferred water (when applicable), plus Rubidoux Wastewater.

Water Quality Adjustments

The determination of water quality at the Riverside Narrows Gaging Station was made using periodic grab samples taken and analyzed for TDS by the USGS and the City of Riverside. A summary of TDS and EC data of the River at Riverside Narrows is contained in Appendix H.

In October 2013, the City of Riverside changed the TDS and EC location for sampling. The new sampling location was further upstream and was not representative of stream flow at the Riverside Narrows. Beginning October 2016, the City of Riverside changed its sampling location and its TDS and EC data are again representative of stream flow at the Riverside Narrows. The City data are thus used in the water quality adjustments for Water Year 2017-18.

Adjustment for Nontributary Flow

During Water Year 2017-18, there was no Nontributary Flow. Therefore, no water quality adjustment was required.

Adjustment for Treated Wastewater Discharges from the Rubidoux Community Services District

The flow-weighted quality of treated wastewater from Rubidoux was 922 mg/L. A monthly summary of discharges and quality is contained in Appendix G.

The Base Flow quality adjustments resulting from exclusion of the Nontributary Flow and inclusion of the Rubidoux treated wastewater are shown in the following table, and resulted in a Base Flow TDS of 662 mg/L.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS
1. Base Flow plus Nontributary Flow	26,202	640	16,769,280
2. Less Nontributary Flow	0	---	---
3. Plus Rubidoux Treated Wastewater	2,176	922	2,006,272
4. Base Flow (line 1 less line 2 plus line 3)	28,378		18,775,552
Average TDS of Base Flow		18,775,552 ÷ 28,378= 662 mg/L	

Adjusted Base Flow at Riverside Narrows

The Judgment provides that the amount of Base Flow at Riverside Narrows credited during any year shall be subject to adjustment based on weighted average annual TDS in the Base Flow as follows:

If the Weighted Average TDS in Base Flow at Riverside Narrows is:	Then the Adjusted Base Flow shall be determined by the formula:
Greater than 700 mg/L	$Q - \frac{11}{15,250} Q(TDS-700)$
600 mg/L to 700 mg/L	Q
Less than 600 mg/L	$Q + \frac{11}{15,250} Q(600-TDS)$

where Q = Base Flow actually received.

From the previous subsection, the weighted average annual TDS in the Base Flow at Riverside Narrows for Water Year 2017-18 was 662 mg/L. Therefore, no adjustment is necessary, and the Adjusted Base Flow for Water Year 2017-18 is 28,378 acre-feet.

Entitlement and Credit or Debit

Paragraph 5(b) of the Judgment states that "SBVMWD shall be responsible for an average annual Adjusted Base Flow of 15,250 acre-feet at Riverside Narrows. SBVMWD each year shall be responsible for not less than 13,420 acre-feet of Base Flow plus one-third of any cumulative debit, provided, however, that for any year commencing on or after October 1, 1986, when there is no cumulative debit, or for any year prior to 1986 whenever the cumulative credit exceeds 10,000 acre-feet, said minimum shall be 12,420 acre-feet."

Findings of the Watermaster concerning flow at Riverside Narrows for Water Year 2017-18 required under the Judgment are as follows:

1.	Base Flow at Riverside Narrows	28,378 acre-feet
2.	Annual Weighted TDS of Base Flow	662 mg/L
3.	Annual Adjusted Base Flow	28,378 acre-feet
4.	Cumulative Adjusted Base Flow	2,081,891 acre-feet
5.	Cumulative Entitlement of IEUA and WMWD	732,000 acre-feet
6.	Cumulative Credit	1,349,891 acre-feet
7.	One-Third of Cumulative Debit	0 acre-feet
8.	Minimum Required Base Flow in 2017-18	12,420 acre-feet

CHAPTER IV

HISTORY AND SUMMARY OF THE JUDGMENT in the case of Orange County Water District v. City of Chino, et al. (Case No. 117628-County of Orange)

History of Litigation

The complaint in the case was filed by Orange County Water District on October 18, 1963, seeking an adjudication of water rights against substantially all water users in the area tributary to Prado Dam within the Santa Ana River Watershed, but excluding the area tributary to Lake Elsinore. Thirteen cross-complaints were filed in 1968, extending the adjudication to include substantially all water users in the area downstream from Prado Dam. With some 4,000 parties involved in the case (2,500 from the Upper Area and 1,500 from the Lower Area), it became obvious that every effort should be made to arrive at a settlement and physical solution in order to avoid enormous and unwieldy litigation.

Efforts to arrive at a settlement and physical solution were pursued by public officials, individuals, attorneys, and engineers. Attorneys for the parties organized in order to facilitate settlement discussions and, among other things, provided guidance for the formation and activities of an engineering committee to provide information on the physical facts.

An initial meeting of the engineers representing the parties was held on January 10, 1964. Agreement was reached that it would be beneficial to undertake jointly the compilation of basic data. Liaison was established with the Department of Water Resources, State of California, to expedite the acquisition of data. Engineers representing the parties were divided into subcommittees which were given the responsibility of investigating such things as the boundary of the Santa Ana River Watershed and its subareas, standardization of the terminology, the location and description of wells and diversion facilities, waste disposal and transfer of water between subareas.

In response to a request from the attorneys' committee at a meeting held April 17, 1964, on April 30, 1964, the joint engineering committee prepared a list of preliminary engineering studies directed toward settlement of the Santa Ana River water rights litigation. Special assignments were made to individual engineers on selected items requested by the attorneys' committee.

The attorneys and engineers for the defendants then commenced a series of meetings separate from the representatives of the plaintiffs in order to consolidate their positions and to determine a course of action. On October 7, 1964, engineers for the defendants presented the results of the studies made by the joint engineering committee. The defendants' attorneys requested that additional information be provided on the methods of measuring flow at Prado Dam, the historical supply and disposal of water passing Prado Dam, segregation of flow into components, and determination of the amount of supply which was usable by the downstream area. On December 11, 1964, the supplemental information was presented to the defendants' attorneys.

During 1965, engineers and attorneys for the defendants held numerous conferences and conducted additional studies in an attempt to determine their respective positions in the case. Early in 1966, the plaintiff and defendants exchanged drafts of possible principles for settlement. Commencing March 22 and ending April 13, 1966, four meetings were held by the engineers to discuss the draft of principles for settlement.

On February 25, 1968, the defendants submitted a request to the Court that the Order of Reference be issued requesting the California Department of Water Resources to determine the physical facts. On May 9, 1968, the plaintiffs' attorney submitted motions opposing the Order of Reference and requested that a preliminary injunction be issued. In the meantime, every effort was being made to come to an agreement on the Judgment. Commencing on February 28, 1968 and extending until May 14, 1968, six meetings were held to determine the scope of physical facts on which agreement could be reached so that if an Order of Reference were to be approved by the Court, the work under the proposed reference would not repeat the extensive basic data collection and compilation which had already been completed and on which engineers for both plaintiffs and defendants had reached substantial agreement. Such basic data were compiled and published in two volumes under date of May 14, 1968, entitled "Appendix A, Basic Data."

On May 21, 1968, an outline of a proposal for settlement of the case was prepared and a committee of attorneys and engineers for the parties commenced preparation of the settlement documents. On June 16, 1968, the Court held a hearing on the motions it had received requesting a preliminary injunction and an Order of Reference. The parties requested that the Court delay the preliminary hearings on these motions in view of the efforts toward settlement that were underway. The plaintiff, however, was concerned regarding the necessity of bringing the case to trial within the statutory limitation and, accordingly, on July 15, 1968, submitted a motion to set the complaint in the case for trial. On October 15, 1968, the trial was commenced and was adjourned after one-half day of testimony on behalf of the plaintiff. Thereafter, the parties filed with the Court the necessary Settlement Documents including a Stipulation for Judgment. The Court entered the Judgment on April 17, 1969, along with Stipulations and Orders dismissing all defendants and cross-defendants except for the four major public water districts overlying, in aggregate, substantially all of the major areas of water use in the watershed. The districts, the locations of which are shown on Plate 1, "Santa Ana River Watershed", are as follows:

(1) Orange County Water District (OCWD), representing all lower basin entities located within Orange County downstream of Prado Dam.

(2) Western Municipal Water District (WMWD), representing middle basin entities located within Riverside County on both sides of the Santa Ana River primarily upstream from Prado Dam.

(3) Inland Empire Utilities Agency (IEUA), formerly Chino Basin Municipal Water District (CBMWD), located in the San Bernardino County Chino Basin area, representing middle basin entities within its boundaries and located primarily upstream from Prado Dam.

(4) San Bernardino Valley Municipal Water District (SBVMWD), representing all entities within its boundaries, and embraced within the upper portion of the Riverside Basin area, the Colton Basin area (being an upstream portion of the middle basin) and the San Bernardino Basin area, being essentially the upper basin.

Summary of Judgment

Declaration of Rights

The Judgment sets forth a declaration of rights. Briefly stated, the Judgment provides that the water users in the Lower Area have rights, as against the water users in the Upper Area, to receive certain average and minimum annual amounts of non-storm flow ("Base Flow") at Prado Dam, together with the right to all storm flow reaching Prado Dam. The amount of the Lower Area entitlement is variable based on the quality of the water received by the Lower Area. Water users in the Upper Area have the right as against the water users in the Lower Area to divert, pump, extract, conserve, store and use all surface and groundwater supplies originating within the Upper Area, so long as the Lower Area receives the water to which it is entitled under the Judgment and there is compliance with all of its provisions.

Physical Solution

The Judgment also sets forth a comprehensive "physical solution" for satisfying the rights of the Lower Area. To understand the physical solution, it is necessary to understand the following terms that are used in the Judgment:

Storm Flow – That portion of the total flow which originates from precipitation and runoff and which passes a point of measurement (either Riverside Narrows or Prado Dam) without having first percolated to groundwater storage in the zone of saturation, calculated in accordance with procedures referred to in the Judgment.

Base Flow - That portion of the total surface flow passing a point of measurement (either Riverside Narrows or Prado Dam) which remains after deduction of storm flow, nontributary flows, exchange water purchased by OCWD, and certain other flows as determined by the Watermaster.

Adjusted Base Flow - Actual Base Flow in each year adjusted for water quality pursuant to formulas specified in the Judgment. The adjustment of Base Flow for water quality is intended to provide an incentive to the Upper Area to maintain a better quality of water in the River. When the TDS is lower than a specified value at one of the measuring points, the water quantity obligation is lower. When the TDS is higher than a specified value, the water quantity obligation is higher. This is the first comprehensive adjudication in Southern California in which the quality of water is taken into consideration in the quantification of water rights.

Credits and Debits - Under the accounting procedures provided for in the Judgment, credits accrue to SBVMWD in any year when the Adjusted Base Flow exceeds 15,250

acre-feet at Riverside Narrows and jointly to IEUA and WMWD when the Adjusted Base Flow exceeds 42,000 acre-feet at Prado Dam. Debits accrue in any year when the Adjusted Base Flows falls below those levels. Credits or debits accumulate year to year.

Obligation at Riverside Narrows

SBVMWD has an obligation to assure an average annual Adjusted Base Flow of 15,250 acre-feet at Riverside Narrows, subject to the following:

(1) A minimum Base Flow of 13,420 acre-feet plus one-third of any cumulative debit.

(2) After October 1, 1986, if no cumulative debit exists, the minimum Base Flow shall be 12,420 acre-feet.

(3) Prior to 1986, if the cumulative credits exceed 10,000 acre-feet, the minimum Base Flow shall be 12,420 acre-feet.

(4) All cumulative debits shall be removed by the discharge of a sufficient Base Flow at Riverside Narrows at least once in any ten consecutive years following October 1, 1976. Any cumulative credits shall remain on the books of account until used to offset any subsequent debits or until otherwise disposed of by SBVMWD.

(5) The Base Flow at Riverside Narrows shall be adjusted using weighted average annual TDS in such Base Flow in accordance with the formula set forth in the Judgment.

Obligation at Prado Dam

IEUA and WMWD have a joint obligation to assure an average annual Adjusted Base Flow of 42,000 acre-feet at Prado Dam, subject to the following:

(1) Minimum Base Flow at Prado shall not be less than 37,000 acre-feet plus one-third of any cumulative debit.

(2) After October 1, 1986, if no cumulative debit exists, the minimum Base Flow quantity shall be 34,000 acre-feet.

(3) Prior to 1986, if the cumulative credit exceeds 30,000 acre-feet, the minimum Base Flow shall be 34,000 acre-feet.

(4) Sufficient quantities of Base Flow shall be provided at Prado to discharge completely any cumulative debits at least once in any ten consecutive years following October 1, 1976. Any cumulative credits shall remain on the books of account until used to offset any debits, or until otherwise disposed of by IEUA and WMWD.

(5) The Base Flow at Prado during any year shall be adjusted using the weighted average annual TDS in the total flow at Prado (Base Flow plus Storm Flow) in accordance with the formula set forth in the Judgment.

Other Provisions

SBVMWD, IEUA and WMWD are enjoined from exporting water from the Lower Area to the Upper Area, directly or indirectly. OCWD is enjoined from exporting or "directly or indirectly causing water to flow" from the Upper Area to the Lower Area. Any inter-basin acquisition of water rights will have no effect on Lower Area entitlements. OCWD is prohibited from enforcing two prior judgments so long as the Upper Area Districts are in compliance with the physical solution. The composition of the Watermaster and the nomination and appointment process for members are described along with a definition of the Watermaster's duties and a formula for sharing its costs. The court retains continuing jurisdiction over the case. There are provisions for appointment of successor parties and rules for dealing with future actions that might conflict with the physical solution.

History of the Watermaster Committee Membership

The Santa Ana River Watermaster is a committee composed of five members nominated by the parties and appointed by the court. SBVMWD, IEUA (formerly CBMWD), and WMWD nominate one member each and OCWD nominates two. The Watermaster members annually elect a Chairman, Secretary, and Treasurer.

The original five members were appointed at the time of entry of the Judgment. They prepared a *pro forma* annual report for the 1969-70 Water Year. The first annual report required by the Judgment was prepared for the 1970-71 Water Year, and reports have been prepared annually since then.

The membership of the Watermaster has changed over the years. The historical listing of members and officers shown in Table 9 reflects the signatories to each annual report.

TABLE 9
HISTORY OF THE WATERMASTER COMMITTEE MEMBERSHIP

Water Year	SBVMWD	IEUA	WMWD	OCWD	OCWD
1969-70	Clinton O. Henning	William J. Carroll	Albert A. Webb, Secretary	Max Bookman, Chairman	John M. Toups
1970-71 through 1973-74	James C. Hanson	William J. Carroll	Albert A. Webb, Secretary	Max Bookman, Chairman	John M. Toups
1974-75 through 1977-78	James C. Hanson	William J. Carroll	Donald L. Harriger	Max Bookman, Chairman	John M. Toups, Secretary
1978-79 through 1981-82	James C. Hanson	William J. Carroll	Donald L. Harriger	Max Bookman, Chairman	William R. Mills, Jr., Secretary
1982-83 through 1983-84	James C. Hanson	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr., Secretary
1984-85 through 1988-89	Robert L. Reiter	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr., Secretary
1989-90 through 1994-95	Robert L. Reiter, Secretary/Treasurer	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr.
1995-96	Robert L. Reiter, Secretary/Treasurer	William J. Carroll, Chairman	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr.
1996-97	Robert L. Reiter, Secretary/Treasurer	William J. Carroll	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman
1997-98	Robert L. Reiter, Secretary/Treasurer	Robb D. Quincey	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman
1998-99 through 2000-01	Robert L. Reiter, Secretary/Treasurer	Richard W. Atwater	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman
2001-02 through 2002-03	Robert L. Reiter, Secretary/Treasurer	Richard W. Atwater	Donald L. Harriger, Chairman	Bill B. Dendy	Virginia L. Grebbien
2003-04 through 2005-06	Robert L. Reiter, Chairman/Treasurer	Richard W. Atwater	John V. Rossi	Bill B. Dendy, Secretary	Virginia L. Grebbien
2006-07 through 2007-08	Samuel H. Fuller, Secretary/Treasurer	Richard W. Atwater	John V. Rossi	Bill B. Dendy, Chairman	Craig D. Miller
2008-09	Samuel H. Fuller, Secretary/Treasurer	Richard W. Atwater	John V. Rossi	Robert C. Wagner	Craig D. Miller, Chairman
2009-10	Samuel H. Fuller, Secretary/Treasurer	Thomas A. Love	John V. Rossi, Chairman	Michael R. Markus	Roy L. Herndon
2010-11	Samuel H. Fuller, Secretary/Treasurer	Thomas A. Love, Chairman	John V. Rossi	Michael R. Markus	Roy L. Herndon

TABLE 9 (Continued)
HISTORY OF THE WATERMASTER COMMITTEE MEMBERSHIP

Water Year	SBVMWD	IEUA	WMWD	OCWD	OCWD
2011-12	Samuel H. Fuller, Secretary/Treasurer	Thomas A. Love	John V. Rossi	Michael R. Markus	Roy L. Herndon, Chairman
2012-13 through 2015-16	Douglas D. Headrick, Secretary/Treasurer	P. Joseph Grindstaff	John V. Rossi	Michael R. Markus	Roy L. Herndon, Chairman
2016-17 through 2017-18	Douglas D. Headrick, Secretary/Treasurer	Halla Razak	Craig D. Miller	Michael R. Markus	Roy L. Herndon, Chairman

Santa Ana River Watershed

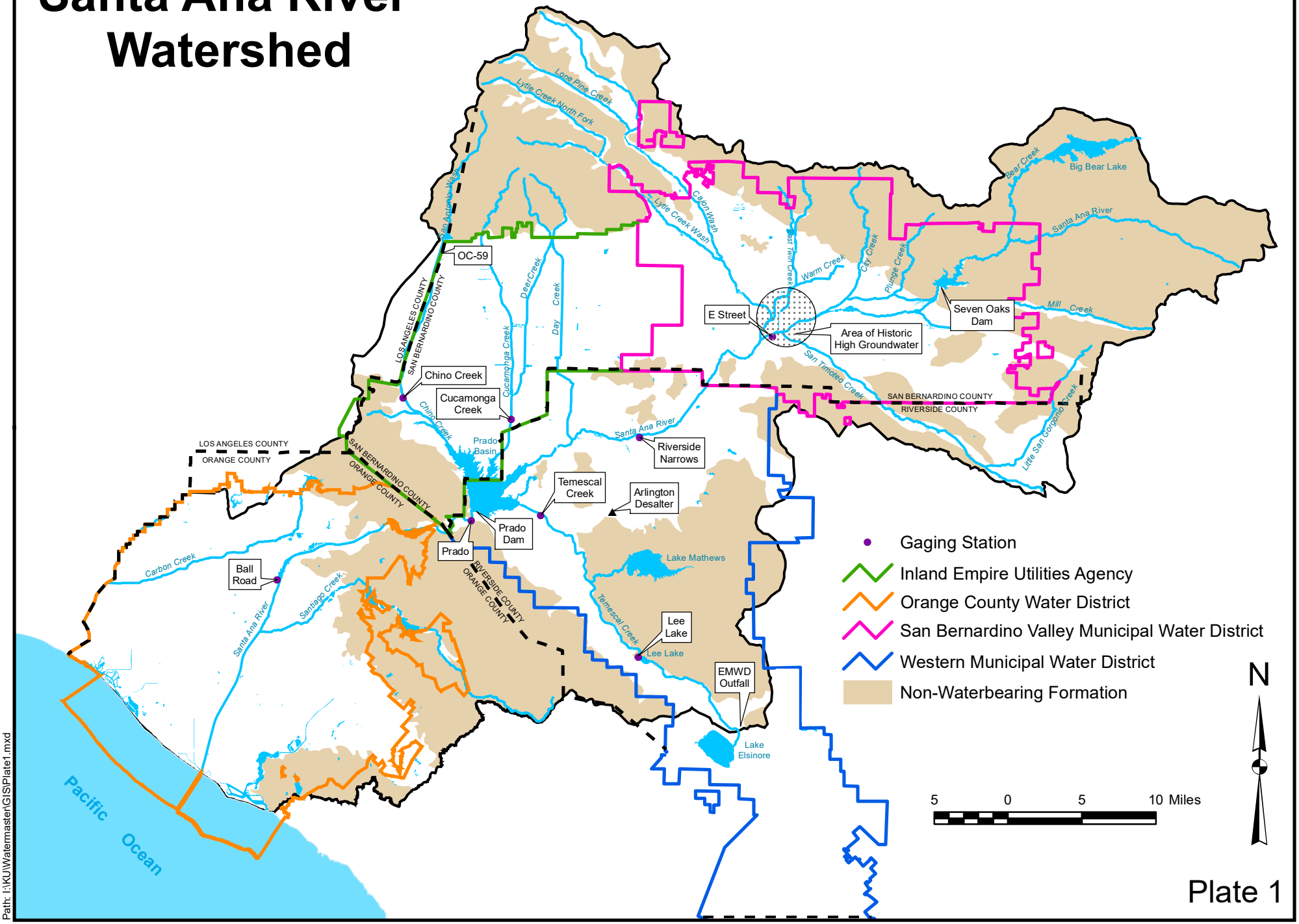

Plate 1

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Santa Ana River Watershed Wastewater Treatment Plants and Salt Export Pipelines

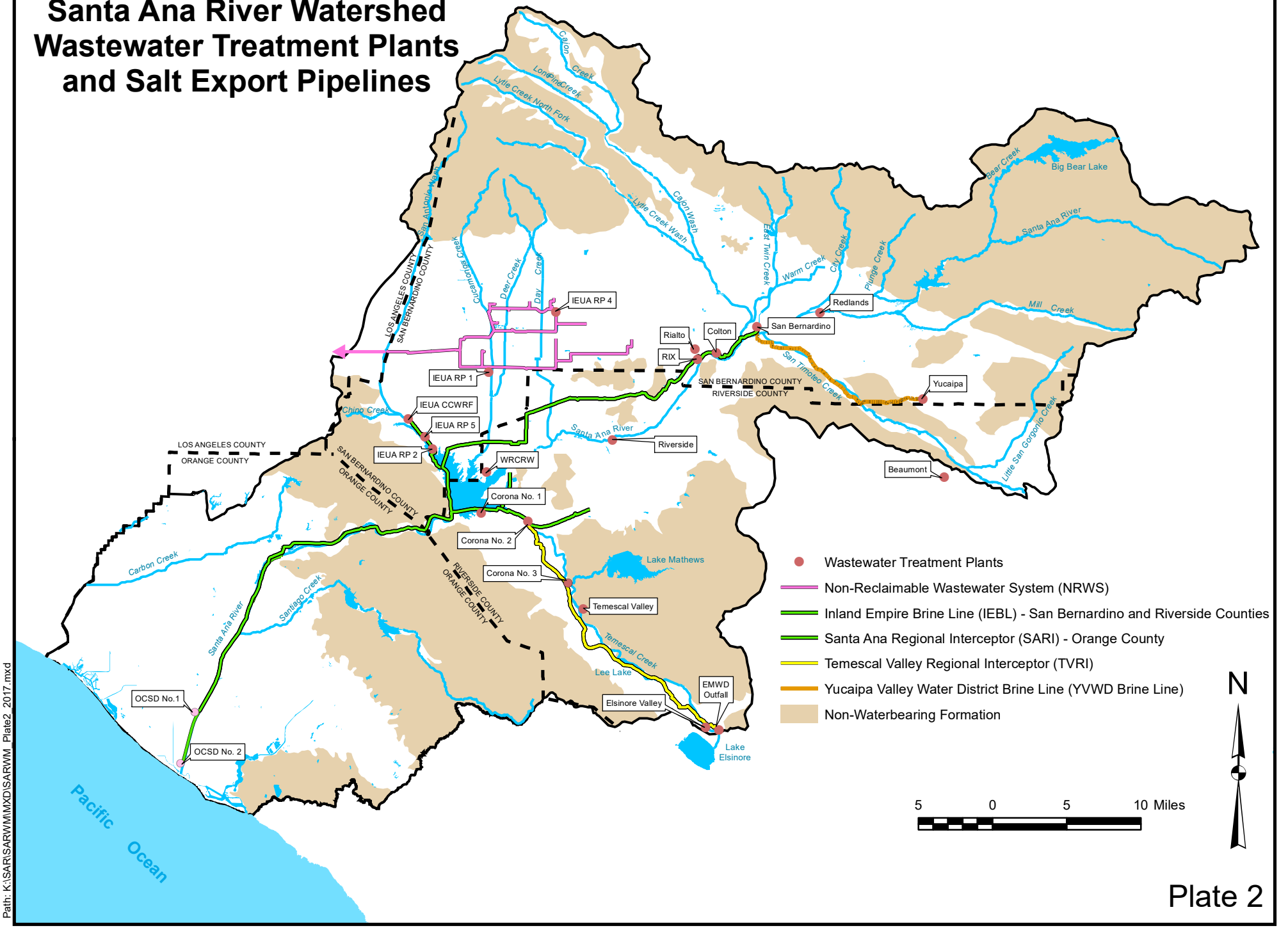

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Plate 2

PRECIPITATION AT SAN BERNARDINO STARTING WITH 1934-35

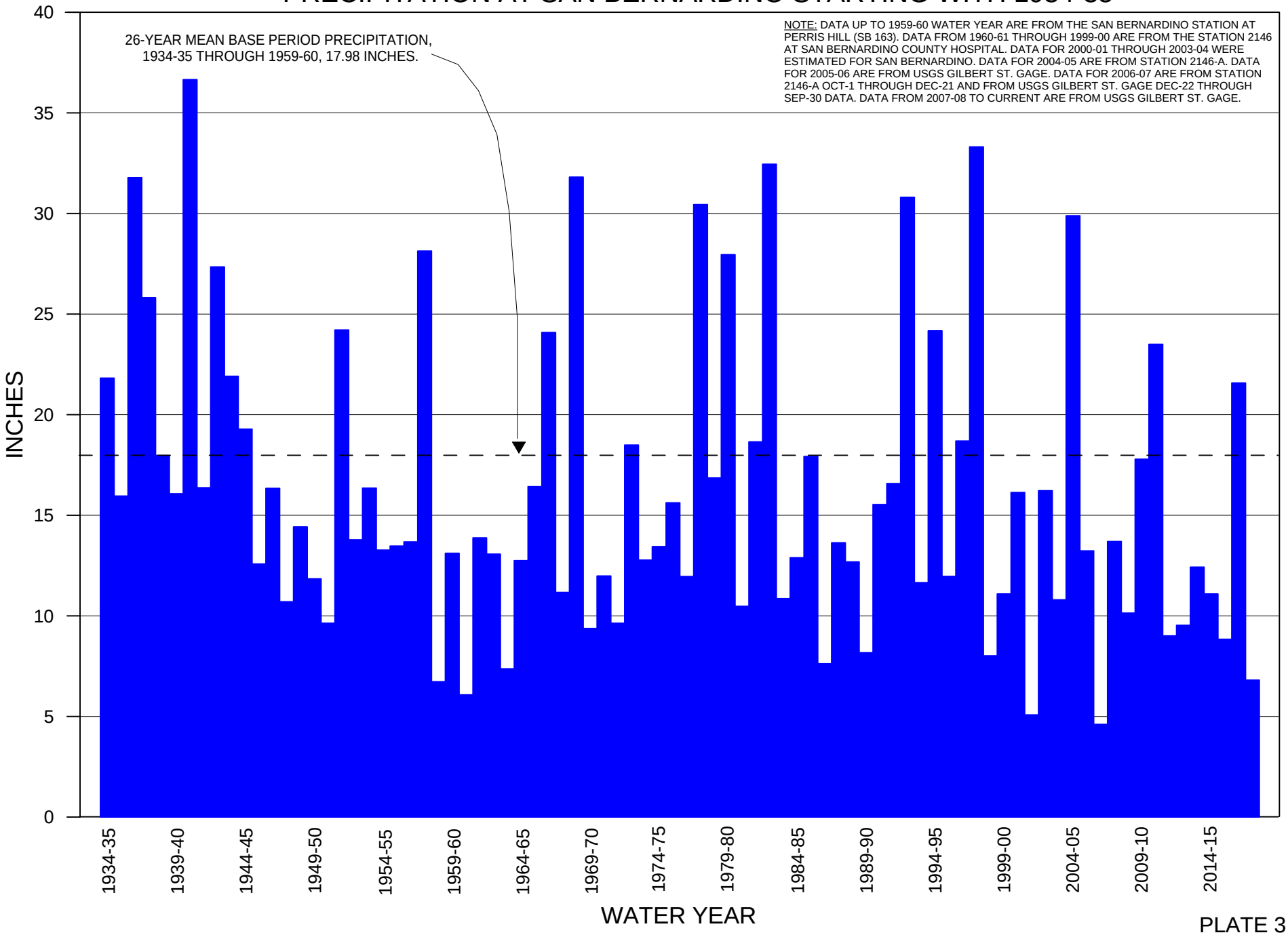


PLATE 3

2017-18 SAN BERNARDINO PRECIPITATION
USGS GILBERT STREET GAGE
TOTAL = 6.81"

INCHES

0.00" 0.01" 0.00" 2.68" 0.65" 2.88" 0.00" 0.58" 0.00" 0.01" 0.00" 0.00"

PERIODS OF WATER STORAGE GREATER THAN 100 ACRE-FEET BEHIND PRADO DAM

CUBIC FEET PER SECOND

STORM FLOW

INFLOW TO PRADO DAM LESS NONTRIBUTARY FLOWS REACHING PRADO

USGS MEASURED OUTFLOW

October November December January February March April May June July August September

DISCHARGE OF THE SANTA ANA RIVER AT PRADO DAM & SAN BERNARDINO PRECIPITATION
WATER YEAR 2017-18

Plate 4

DISCHARGE OF SANTA ANA RIVER AT PRADO STARTING WITH 1934-35

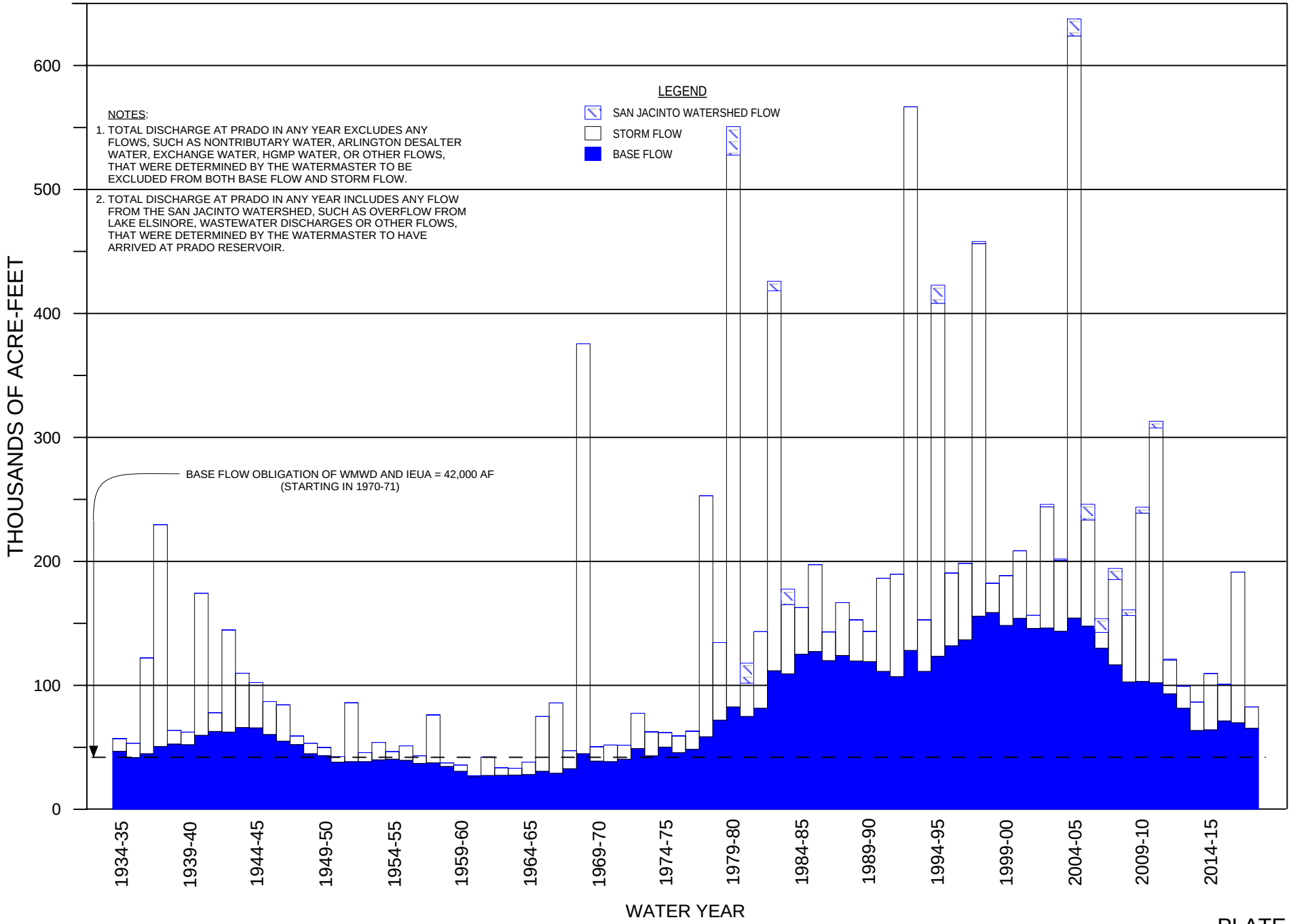
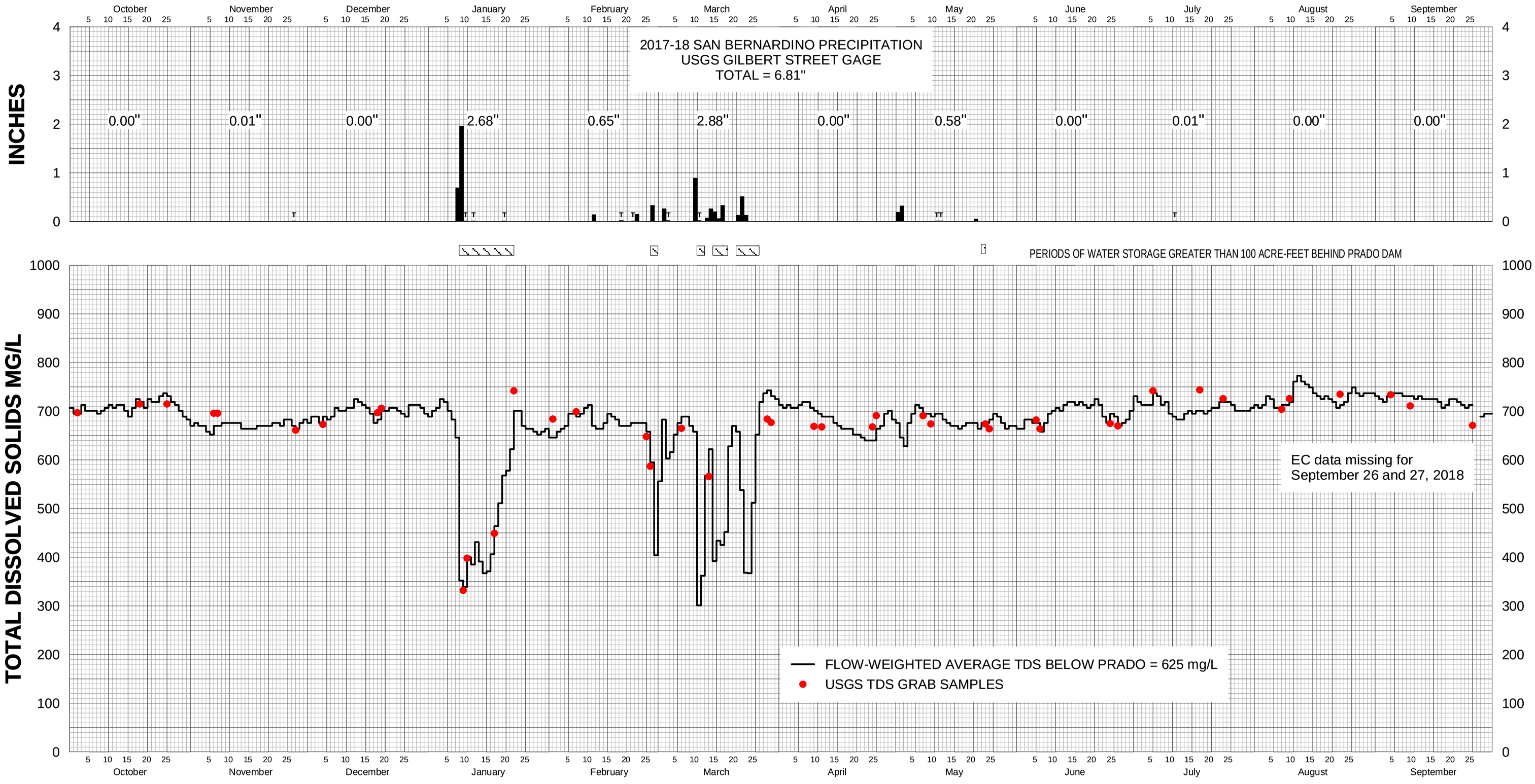
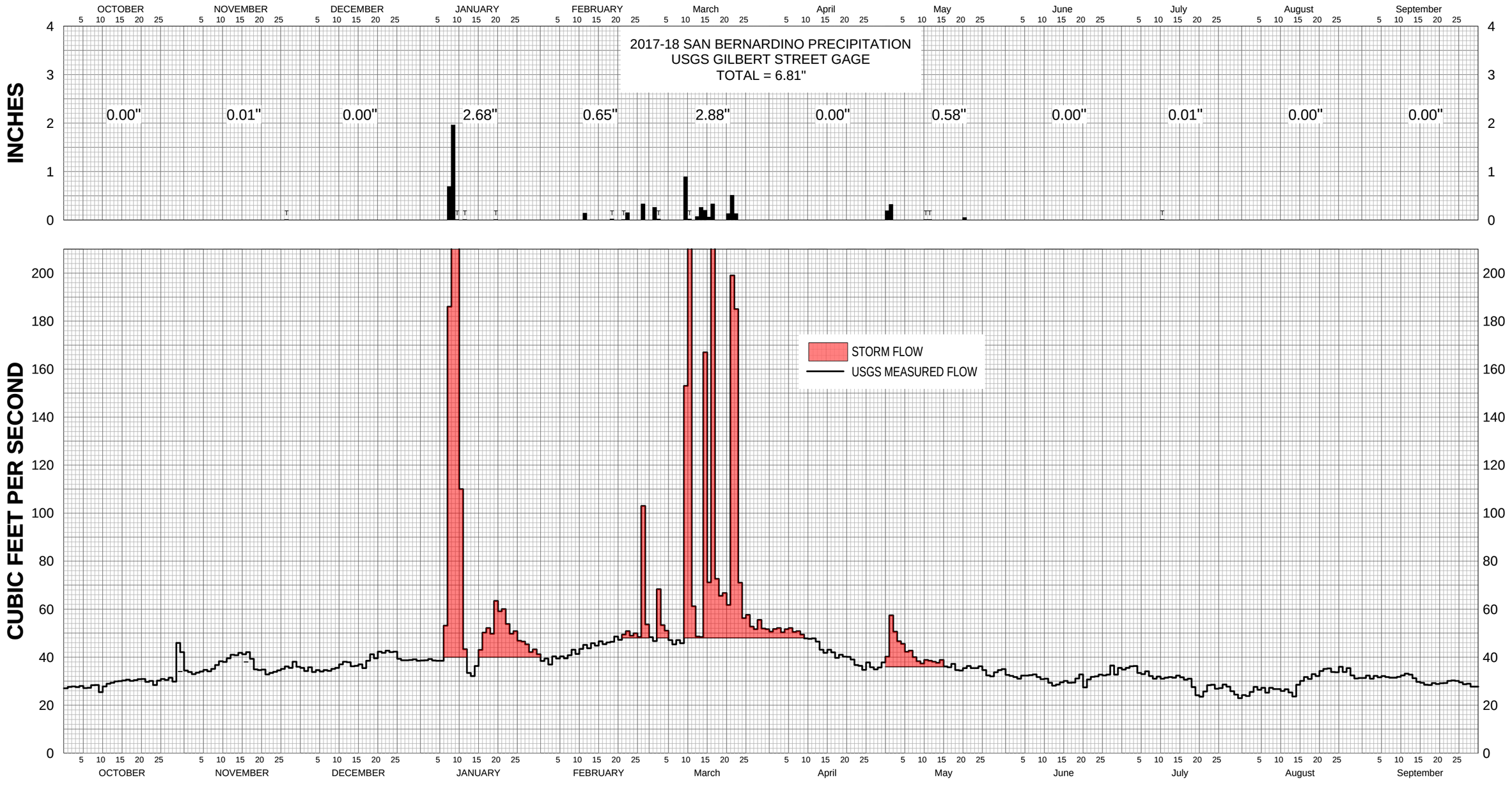


PLATE 5



DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM
WATER YEAR 2017-18

Plate 6



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION
WATER YEAR 2017-18

Plate 7

DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS STARTING WITH 1934-35

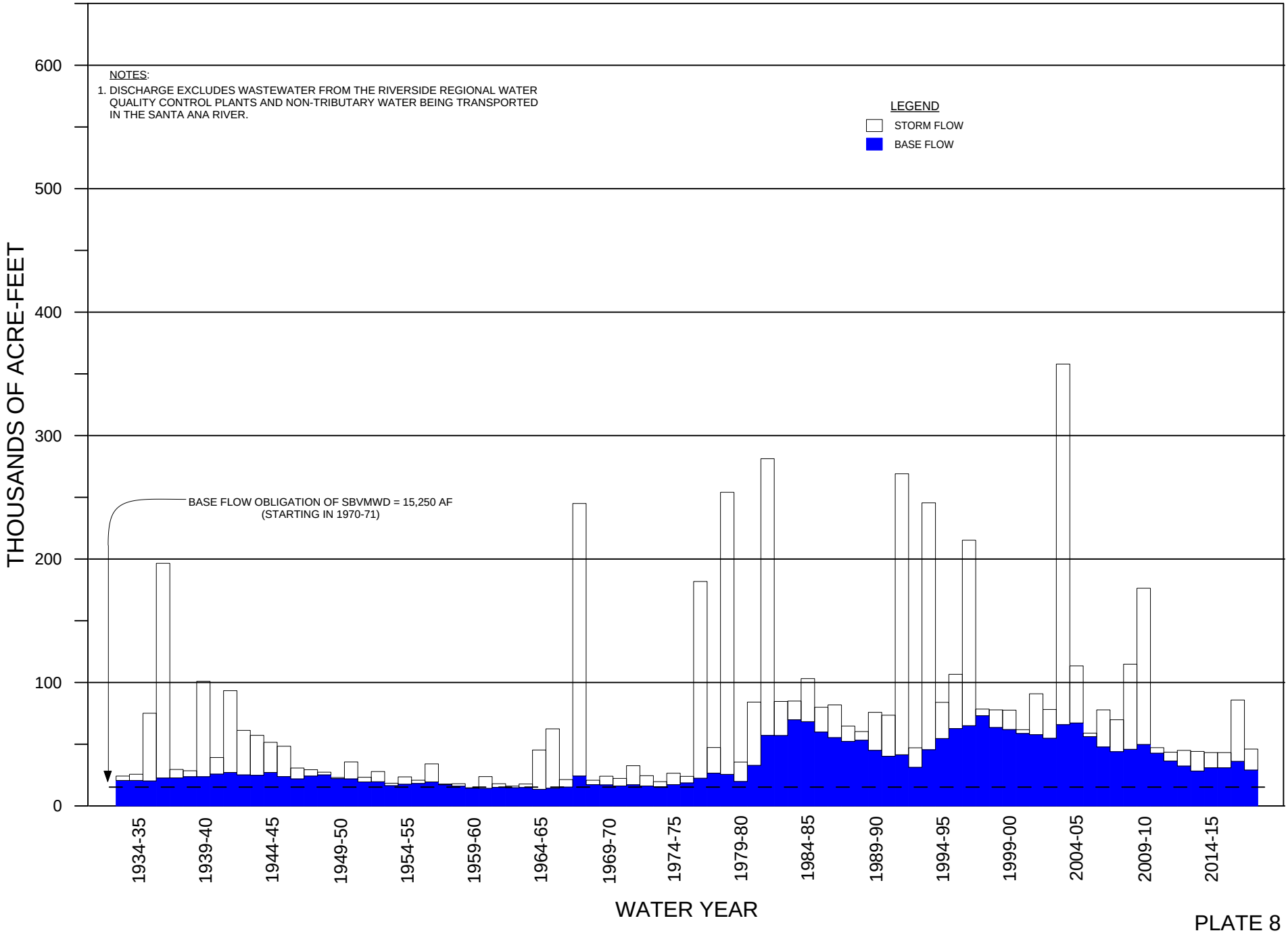


PLATE 8

SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

v. CITY OF CHINO et al.

CASE NO. 117628 - COUNTY OF ORANGE

BASIC DATA

FOR THE

FORTY- EIGHTH ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 2017 - SEPTEMBER 30, 2018

April 30, 2019

TABLE OF CONTENTS

APPENDICES

The following appendices are bound separately and available for review at the office of the Secretary of the Santa Ana River Watermaster.

APPENDIX A

USGS FLOW MEASUREMENTS OF THE SANTA ANA RIVER FLOWS BELOW PRADO, AT MWD CROSSING, AND WATER QUALITY RECORDS FOR THE SANTA ANA RIVER AT PRADO DAM AND AT MWD CROSSING; USGS FLOW MEASUREMENTS AT E STREET, OF TEMESCAL CREEK ABOVE MAIN STREET (AT CORONA), TEMESCAL CREEK AT CORONA LAKE “LEE LAKE” (NEAR CORONA), CUCAMONGA CREEK (NEAR MIRA LOMA), CHINO CREEK AT SCHAEFER AVENUE (NEAR CHINO),LYTLE CREEK, WARM CREEK, AND SAN TIMOTEO CREEK NEAR LOMA LINDA

WATER YEAR 2017-18

USGS Water-Year Summary 2018

11074000 Santa Ana River below Prado Dam, CA

LOCATION - Lat 33°53'00", long 117°38'40" referenced to North American Datum of 1927, Riverside County, CA, Hydrologic Unit 18070203, in La Sierra Grant, on left bank of outlet channel, 2,500 ft downstream from axis of Prado Dam, and 4.5 mi west of Corona.

DRAINAGE AREA - 2,258 mi² of which 768 mi² probably is noncontributing. above Lake Elsinore.

REVISIONS HISTORY - 12/06/2016: Unit and daily value water temperature and specific conductance from April 8, 2016 through Sept. 8, 2016 have been revised superseding those published at http://waterdata.usgs.gov site 11074000.

SURFACE-WATER RECORDS

PERIOD OF RECORD - May 1930 to November 1939 (irrigation seasons only), March 1940 to current year. Published as "at Santa Fe Railroad Bridge, near Prado" May 1930 to November 1931, as "at Atchison, Topeka, and Santa Fe Railroad Bridge, near Prado" May 1932 to November 1939, and as "below Prado Dam, near Prado" March 1940 to September 1950.

GAGE - Water-stage recorder and concrete control August 1944 through Apr. 25, 2005, and since Nov. 14, 2005. Datum of gage is approximately 449 ft above NGVD of 1929 (levels by U.S. Army Corps of Engineers). Prior to Mar. 18, 1940, at about same site at various datums. From Apr. 26, 2005, to Nov. 13, 2005, gage was located on right bank of a temporary bypass (diversion) channel, in use during the construction of an improved outlet channel from Prado Dam. Temporary gage was at a different datum. From Nov. 14, 2005 to Oct. 7, 2008, gage was located on right bank of reconstructed outlet channel. Since Oct. 7, 2008, gage is located on left bank of channel.

REMARKS - Records fair. Flow regulated since 1940 by Prado Flood-Control Reservoir, capacity, 196,200 acre-ft. Natural streamflow affected by extensive ground-water withdrawals, diversion for irrigation, discharges of treated effluent, and return flow from irrigated areas. Releases of imported water are made to the basin by the California Water Project at times in some years, via San Antonio Creek from Rialto Pipeline below San Antonio Dam. During the current year, 12,780 acre-ft was released. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES OUTSIDE PERIOD OF RECORD - Flood of Mar. 2, 1938, reached a discharge of 100,000 ft³/s, on basis of slope-area measurement of peak flow at site 2.5 mi downstream.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 13,200 ft³/s, Jan. 15, 2005, gage height, 8.73 ft, site and datum then in use, from rating curve extended above 11,600 ft³/s; minimum daily, 2.4 ft³/s, July 29 to Aug. 3, Sept. 20, 1978 (result of gate closure).

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8183&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11074000&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	78.7	116	109	106	130	387	144	96.0	85.7	69.6	53.0	55.8
2	86.3	108	92.0	109	130	195	142	124	85.5	66.1	56.2	59.2
3	86.0	102	96.5	98.8	121	211	136	118	88.9	65.3	51.7	64.2
4	78.3	107	104	101	131	194	135	97.6	91.4	63.1	54.5	60.0
5	74.5	107	88.7	106	133	168	131	89.6	83.8	59.0	58.7	61.4
6	74.3	109	70.3	111	124	146	126	87.7	86.0	59.7	61.1	60.5
7	67.0	95.7	98.5	118	125	136	121	91.9	90.3	59.2	56.8	61.5
8	72.0	101	86.1	139	129	140	124	89.5	80.5	65.8	54.9	59.3
9	71.1	88.9	90.0	218	119	150	125	89.7	74.4	60.8	61.8	60.6
10	66.5	87.7	90.2	260	108	164	118	88.9	76.1	58.3	51.3	62.5
11	69.3	88.8	97.2	390	109	322	113	87.6	78.2	59.0	38.8	66.0
12	73.8	95.7	89.9	482	131	394	110	91.1	78.5	61.4	42.9	66.9
13	70.6	102	80.9	473	139	383	102	94.0	75.0	60.9	50.2	65.4
14	76.7	107	81.5	466	136	250	98.7	94.0	73.7	58.6	51.4	69.6
15	78.9	108	79.9	464	116	313	103	89.3	70.7	62.1	52.4	64.9
16	79.6	110	80.6	578	110	327	105	86.2	69.4	62.2	52.3	65.0
17	78.4	110	85.6	654	112	326	104	82.1	73.6	59.9	61.0	70.7
18	76.2	104	90.9	595	119	329	99.4	81.2	76.6	57.0	60.9	70.4
19	75.5	102	84.5	386	126	248	92.0	86.9	75.7	52.4	54.5	67.0
20	77.2	101	86.1	372	125	176	100	85.6	72.1	51.4	56.1	65.7
21	75.4	98.4	82.0	357	126	167	106	93.1	70.5	53.0	53.0	68.3
22	77.7	99.0	87.1	353	126	181	102	72.9	72.8	63.3	53.3	71.6
23	76.9	99.5	86.9	300	124	278	98.8	56.7	76.1	66.9	51.4	73.0
24	72.0	101	93.6	166	117	353	89.7	134	78.6	60.7	52.3	85.7
25	69.5	92.5	97.0	152	122	334	95.8	104	81.5	56.7	51.0	87.2
26	72.4	94.3	97.7	150	110	301	88.6	87.8	80.1	54.9	54.4	88.1
27	76.7	103	90.2	142	e94.1	227	88.3	94.0	78.7	54.7	58.1	85.9
28	81.6	106	91.9	136	216	161	88.4	92.7	77.8	55.6	60.1	80.8
29	95.0	98.1	93.3	134		153	89.0	94.8	74.1	58.3	56.2	76.1
30	105	102	98.7	126		150	94.7	87.5	69.6	54.3	56.1	78.9
31	107		103	130		143		86.5		50.2	54.4	
Total	2,420	3,045	2,804	8,373	3,508	7,407	3,270	2,854	2,346	1,840	1,681	2,072
Mean	78.1	101	90.4	270	125	239	109	92.1	78.2	59.4	54.2	69.1
Max	107	116	109	654	216	394	144	134	91.4	69.6	61.8	88.1
Min	66.5	87.7	70.3	98.8	94.1	136	88.3	56.7	69.4	50.2	38.8	55.8
Ac-ft	4,800	6,039	5,561	16,610	6,958	14,690	6,487	5,663	4,653	3,650	3,333	4,110

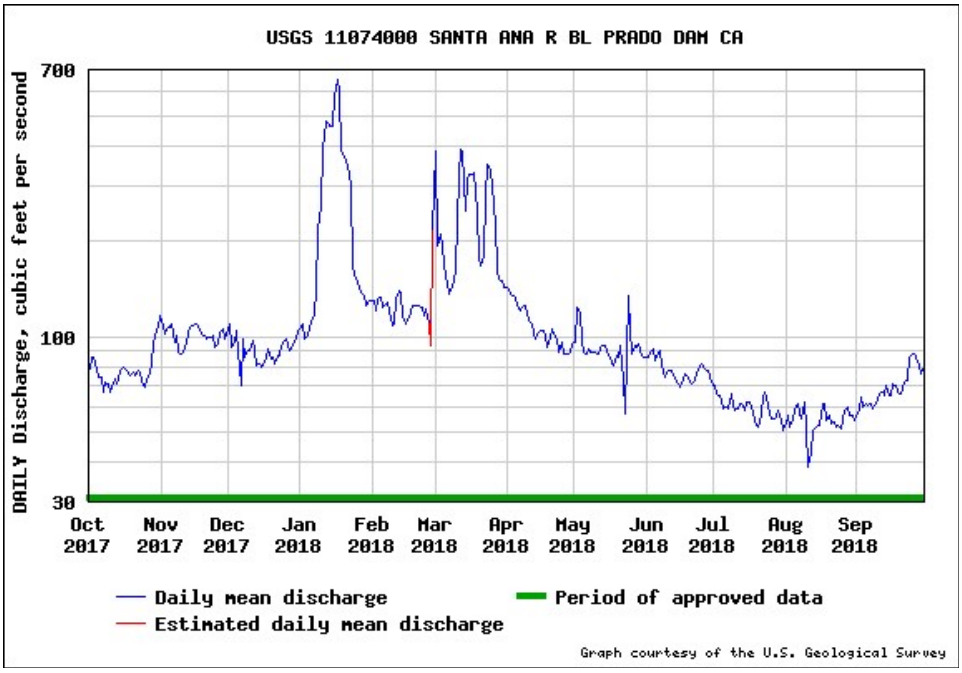
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	128	149	237	395	428	388	256	185	151	124	106	101
Max	910	322	1,300	3,543	2,733	2,556	1,101	915	736	446	403	372
(WY)	(2005)	(1997)	(2011)	(1993)	(1998)	(1980)	(1980)	(1998)	(1983)	(1998)	(2005)	(1997)
Min	22.4	33.5	39.5	49.2	49.8	54.3	43.3	35.2	29.0	17.7	14.8	16.2
(WY)	(1962)	(1963)	(1963)	(1963)	(1961)	(1961)	(1961)	(1961)	(1961)	(1960)	(1960)	(1960)

SUMMARY STATISTICS

	Water Year 2018		Water Years 1941 - 2018	
Annual total	41,620			
Annual mean	114.0		219.7	
Highest annual mean			882.0	2005
Lowest annual mean			36.4	1961
Highest daily mean	654.0	Jan 17	11,400	Jan 14, 2005
Lowest daily mean	38.8	Aug 11	2.40	Jul 29, 1978
Annual 7-day minimum	48.5	Aug 10	3.00	Sep 24, 1973
Maximum peak flow			13,200[a]	Jan 15, 2005
Maximum peak stage			8.73	Jan 15, 2005
Annual runoff (cfsm)	0.050		0.097	
Annual runoff (inches)	0.686		1.32	
10 percent exceeds	171.2		381.0	
50 percent exceeds	89.5		136.0	
90 percent exceeds	57.7		43.0	

[a] Discharge affected by Regulation or Diversion



USGS Water-Year Summary 2018

11074000 Santa Ana River below Prado Dam, CA

LOCATION - Lat 33°53'00", long 117°38'40" referenced to North American Datum of 1927, Riverside County, CA, Hydrologic Unit 18070203, in La Sierra Grant, on left bank of outlet channel, 2,500 ft downstream from axis of Prado Dam, and 4.5 mi west of Corona.

DRAINAGE AREA - 2,258 mi² of which 768 mi² probably is noncontributing. above Lake Elsinore.

REVISIONS HISTORY - 12/06/2016: Unit and daily value water temperature and specific conductance from April 8, 2016 through Sept. 8, 2016 have been revised superseding those published at http://waterdata.usgs.gov site 11074000.

WATER-QUALITY RECORDS

PERIOD OF RECORD - Water years 1967 to current year. CHEMICAL DATA: Water years 1967 to current year. BIOLOGICAL DATA: Water years 1975-81. SEDIMENT DATA: Water years 1974-94, 1999 to current year.

PERIOD OF DAILY RECORD - SPECIFIC CONDUCTANCE: February 1968 to current year. WATER TEMPERATURE: October 1969 to current year. CHLORIDE: October 1970 to September 1971. SUSPENDED-SEDIMENT DISCHARGE: October 1973 to June 1982.

INSTRUMENTATION - Water-quality monitor recording specific conductance and water temperature since October 1969. On October 26th 2016 (QM 3915) Continuous water quality equipment setup (YSI 600R)moved to ~30 ft down stream of the gage house.

REMARKS - Specific conductance and water temperature records are affected by releases from Prado Dam. Interruptions in record at times due to malfunction of recording or sensing equipment. Sediment data and a portion of chemical data collected for the National Water-Quality Assessment (NAWQA) Program.

U.S. Department of the Interior
U.S. Geological Survey

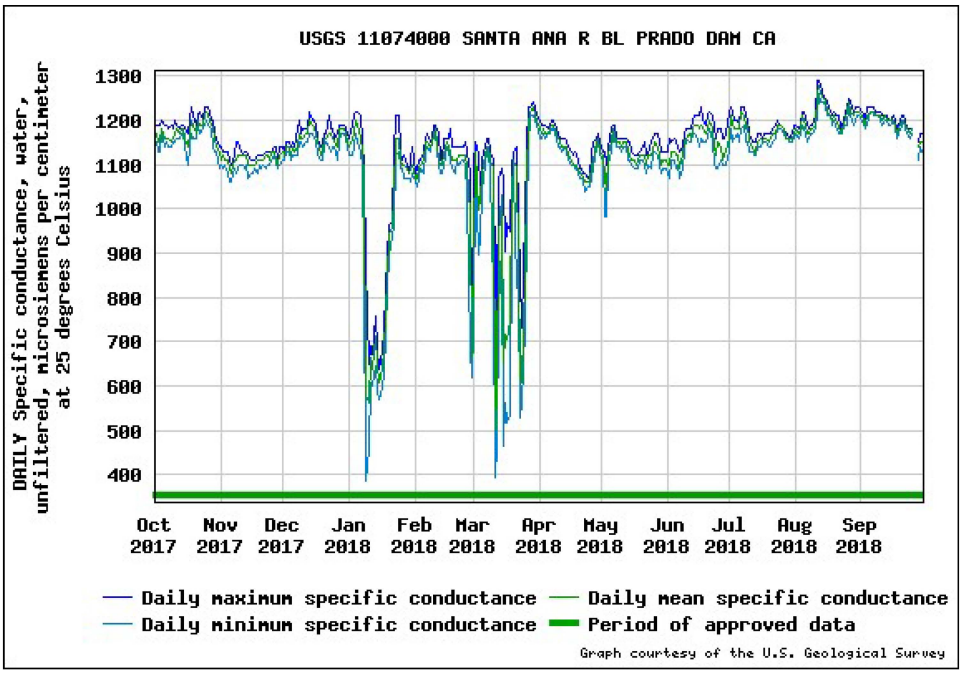
Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8184_8185_8186_8187&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11074000&agency_cd=USGS

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
YEAR 2017-10-01 to 2018-09-30
DAILY VALUES

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January			February		
1	1,190	1,150	1,170	1,140	1,100	1,110	1,130	1,110	1,120	1,160	1,120	1,140	1,080	1,060	1,070
2	1,190	1,130	1,150	1,130	1,090	1,120	1,150	1,130	1,140	1,190	1,120	1,160	1,090	1,050	1,070
3	1,190	1,130	1,150	1,130	1,100	1,110	1,150	1,130	1,140	1,210	1,140	1,170	1,110	1,070	1,090
4	1,200	1,170	1,180	1,130	1,080	1,110	1,140	1,110	1,120	1,220	1,170	1,200	1,110	1,090	1,100
5	1,190	1,140	1,160	1,110	1,060	1,090	1,150	1,120	1,140	1,220	1,150	1,190	1,130	1,080	1,110
6	1,190	1,150	1,160	1,100	1,060	1,080	1,140	1,120	1,130	1,210	1,130	1,160	1,160	1,130	1,150
7	1,180	1,140	1,160	1,120	1,090	1,110	1,180	1,120	1,140	1,150	1,090	1,130	1,170	1,140	1,150
8	1,190	1,140	1,150	1,150	1,080	1,110	1,200	1,150	1,170	1,090	870	1,070	1,150	1,130	1,140
9	1,180	1,150	1,160	1,150	1,090	1,120	1,170	1,150	1,160	870	386	582	1,160	1,150	1,150
10	1,200	1,150	1,170	1,140	1,100	1,120	1,180	1,140	1,160	649	457	561	1,190	1,160	1,170
11	1,190	1,160	1,180	1,120	1,100	1,120	1,180	1,150	1,170	690	608	663	1,190	1,170	1,180
12	1,180	1,160	1,170	1,130	1,090	1,120	1,180	1,150	1,170	671	598	637	1,170	1,100	1,110
13	1,190	1,170	1,180	1,130	1,100	1,120	1,220	1,170	1,200	756	645	714	1,110	1,080	1,100
14	1,190	1,170	1,180	1,120	1,070	1,100	1,200	1,170	1,190	688	586	648	1,110	1,080	1,100
15	1,180	1,140	1,160	1,110	1,080	1,100	1,200	1,160	1,180	639	571	608	1,160	1,100	1,120
16	1,170	1,100	1,140	1,110	1,080	1,100	1,190	1,150	1,170	654	578	614	1,160	1,140	1,150
17	1,200	1,140	1,170	1,110	1,090	1,100	1,160	1,120	1,150	719	625	673	1,160	1,130	1,140
18	1,230	1,170	1,200	1,120	1,080	1,110	1,140	1,110	1,120	818	719	768	1,180	1,110	1,130
19	1,210	1,160	1,190	1,120	1,100	1,110	1,150	1,110	1,130	894	817	846	1,140	1,090	1,110
20	1,190	1,160	1,170	1,120	1,090	1,110	1,170	1,140	1,160	965	894	941	1,140	1,080	1,110
21	1,210	1,190	1,200	1,120	1,100	1,110	1,170	1,150	1,160	972	941	957	1,140	1,110	1,110
22	1,220	1,170	1,190	1,130	1,090	1,120	1,210	1,140	1,170	1,120	957	1,030	1,140	1,100	1,120
23	1,200	1,180	1,190	1,130	1,100	1,120	1,180	1,130	1,170	1,210	1,120	1,160	1,140	1,110	1,120
24	1,230	1,190	1,210	1,130	1,100	1,110	1,180	1,140	1,160	1,210	1,130	1,160	1,140	1,110	1,120
25	1,230	1,200	1,220	1,130	1,110	1,130	1,160	1,140	1,150	1,130	1,090	1,110	1,150	1,100	1,120
26	1,230	1,190	1,210	1,140	1,120	1,130	1,170	1,110	1,140	1,110	1,090	1,100	1,130	1,030	1,090
27	1,200	1,180	1,190	1,140	1,100	1,110	1,190	1,150	1,180	1,120	1,070	1,100	1,080	677	985
28	1,200	1,140	1,180	1,110	1,090	1,100	1,190	1,170	1,180	1,100	1,070	1,090	725	617	669
29	1,170	1,130	1,160	1,140	1,100	1,120	1,190	1,170	1,180	1,080	1,070	1,080			
30	1,160	1,130	1,140	1,140	1,110	1,130	1,180	1,160	1,170	1,110	1,060	1,090			
31	1,140	1,090	1,130				1,170	1,140	1,150	1,140	1,080	1,100			
Max	1230	1200	1220	1150	1120	1130	1220	1170	1200	1220	1170	1200	1190	1170	1180
Min	1140	1090	1130	1100	1060	1080	1130	1110	1120	639	386	561	725	617	669

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	March			April			May			June			July		
1	1,100	725	921	1,200	1,160	1,180	1,130	1,110	1,120	1,130	1,080	1,100	1,230	1,180	1,210
2	1,150	1,100	1,130	1,190	1,160	1,170	1,130	982	1,070	1,160	1,070	1,100	1,220	1,150	1,190
3	1,120	898	999	1,190	1,170	1,180	1,100	982	1,040	1,150	1,110	1,130	1,200	1,160	1,180
4	1,050	934	1,020	1,190	1,160	1,170	1,140	1,100	1,120	1,160	1,110	1,130	1,200	1,170	1,180
5	1,110	1,040	1,080	1,180	1,170	1,170	1,180	1,130	1,150	1,150	1,090	1,120	1,190	1,150	1,180
6	1,140	1,100	1,120	1,190	1,170	1,180	1,190	1,170	1,180	1,140	1,100	1,120	1,230	1,180	1,220
7	1,160	1,130	1,140	1,200	1,180	1,190	1,190	1,160	1,170	1,130	1,070	1,090	1,230	1,190	1,210
8	1,160	1,130	1,140	1,200	1,180	1,190	1,160	1,140	1,150	1,140	1,090	1,120	1,210	1,150	1,180
9	1,130	1,080	1,110	1,180	1,160	1,170	1,160	1,140	1,150	1,170	1,130	1,150	1,200	1,150	1,190
10	1,110	810	1,090	1,170	1,140	1,160	1,160	1,130	1,140	1,180	1,160	1,160	1,170	1,130	1,150
11	810	392	498	1,160	1,140	1,150	1,160	1,140	1,150	1,180	1,150	1,170	1,150	1,130	1,140
12	772	461	599	1,160	1,130	1,140	1,160	1,140	1,150	1,180	1,150	1,160	1,150	1,120	1,130
13	1,070	772	938	1,160	1,140	1,140	1,150	1,110	1,130	1,200	1,170	1,180	1,150	1,120	1,130
14	1,090	920	1,030	1,150	1,130	1,140	1,150	1,110	1,120	1,210	1,170	1,190	1,170	1,140	1,150
15	1,060	466	649	1,140	1,110	1,120	1,130	1,100	1,110	1,210	1,160	1,190	1,170	1,140	1,160
16	902	561	718	1,130	1,100	1,110	1,120	1,090	1,110	1,210	1,140	1,180	1,160	1,150	1,150
17	969	518	704	1,120	1,100	1,100	1,120	1,090	1,100	1,230	1,160	1,190	1,170	1,150	1,160
18	947	533	748	1,130	1,090	1,100	1,120	1,090	1,110	1,200	1,150	1,180	1,170	1,150	1,160
19	1,090	947	1,040	1,120	1,090	1,100	1,130	1,110	1,120	1,190	1,150	1,170	1,170	1,140	1,150
20	1,130	1,080	1,110	1,090	1,070	1,080	1,140	1,110	1,120	1,210	1,160	1,180	1,170	1,140	1,160
21	1,140	821	1,090	1,090	1,070	1,080	1,150	1,100	1,120	1,220	1,180	1,200	1,180	1,150	1,170
22	975	825	891	1,080	1,060	1,070	1,120	1,080	1,100	1,210	1,150	1,180	1,190	1,160	1,170
23	843	528	610	1,080	1,040	1,060	1,120	1,100	1,120	1,180	1,100	1,140	1,200	1,180	1,190
24	731	557	608	1,070	1,050	1,060	1,150	1,090	1,120	1,160	1,090	1,120	1,190	1,180	1,190
25	985	731	848	1,080	1,050	1,060	1,160	1,120	1,130	1,180	1,090	1,150	1,190	1,180	1,190
26	1,140	981	1,080	1,120	1,070	1,100	1,170	1,130	1,150	1,180	1,110	1,140	1,180	1,170	1,180
27	1,230	1,140	1,190	1,150	1,090	1,110	1,170	1,120	1,140	1,160	1,100	1,110	1,170	1,160	1,160
28	1,230	1,210	1,220	1,160	1,140	1,150	1,150	1,100	1,120	1,160	1,100	1,120	1,170	1,160	1,160
29	1,240	1,210	1,230	1,170	1,150	1,160	1,130	1,080	1,100	1,170	1,100	1,130	1,160	1,150	1,160
30	1,230	1,200	1,210	1,150	1,120	1,130	1,130	1,090	1,110	1,220	1,130	1,160	1,170	1,150	1,160
31	1,210	1,190	1,200				1,130	1,090	1,110				1,190	1,160	1,170
Max	1240	1210	1230	1200	1180	1190	1190	1170	1180	1230	1180	1200	1230	1190	1220
Min	731	392	498	1070	1040	1060	1100	982	1040	1130	1070	1090	1150	1120	1130

Day	Max	Min	Mean	Max	Min	Mean
	August			September		
1	1,190	1,170	1,180	1,220	1,200	1,210
2	1,180	1,160	1,170	1,210	1,190	1,200
3	1,190	1,170	1,180	1,200	1,180	1,190
4	1,220	1,190	1,210	1,230	1,190	1,210
5	1,220	1,180	1,200	1,230	1,220	1,220
6	1,190	1,150	1,170	1,230	1,220	1,220
7	1,180	1,160	1,170	1,230	1,210	1,220
8	1,190	1,170	1,180	1,220	1,210	1,210
9	1,190	1,170	1,180	1,220	1,210	1,210
10	1,210	1,180	1,190	1,220	1,200	1,210
11	1,290	1,210	1,260	1,210	1,190	1,200
12	1,290	1,260	1,280	1,210	1,200	1,210
13	1,280	1,240	1,260	1,210	1,200	1,200
14	1,250	1,240	1,250	1,200	1,190	1,200
15	1,250	1,230	1,240	1,200	1,190	1,200
16	1,240	1,210	1,220	1,210	1,200	1,200
17	1,220	1,210	1,210	1,200	1,180	1,190
18	1,210	1,190	1,200	1,180	1,160	1,170
19	1,220	1,200	1,210	1,190	1,170	1,180
20	1,210	1,190	1,200	1,210	1,190	1,200
21	1,210	1,170	1,190	1,210	1,200	1,200
22	1,180	1,170	1,170	1,200	1,180	1,190
23	1,190	1,170	1,180	1,180	1,170	1,180
24	1,200	1,190	1,190	1,180	1,160	1,170
25	1,230	1,190	1,220	1,180	1,170	1,180
26	1,250	1,230	1,240	---	---	---
27	1,240	1,210	1,220	---	---	---
28	1,220	1,190	1,210	1,150	1,110	1,140
29	1,230	1,200	1,220	1,170	1,140	1,150
30	1,230	1,210	1,220	1,170	1,130	1,150
31	1,230	1,210	1,220			
Max	1290	1260	1280			
Min	1180	1150	1170			


USGS 11074000 SANTA ANA R BL PRADO DAM CA
DAILY Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius
1300
1200
1100
1000
900
800
700
600
500
400
Oct 2017
Nov 2017
Dec 2017
Jan 2018
Feb 2018
Mar 2018
Apr 2018
May 2018
Jun 2018
Jul 2018
Aug 2018
Sep 2018
Daily maximum specific conductance
Daily mean specific conductance
Daily minimum specific conductance
Period of approved data
Graph courtesy of the U.S. Geological Survey

USGS Water-Year Summary 2018

11066460 Santa Ana River at Metropolitan Water District Crossing, near Arlington, CA

LOCATION - Lat 33°58'07", long 117°26'51" referenced to North American Datum of 1927, in NE 1/4 SW 1/4 sec.30, T.2 S., R.5 W., Riverside County, CA, Hydrologic Unit 18070203, near center of Metropolitan Water District pipeline crossing, 0.8 mi downstream from Union Pacific Railroad Bridge, 1.1 mi upstream from bridge on Van Buren Boulevard, and 3.3 mi north of Arlington.

DRAINAGE AREA - 852 mi².

REVISIONS HISTORY - WDR CA-83-1: Drainage area.

SURFACE-WATER RECORDS

PERIOD OF RECORD - March 1970 to current year.

GAGE - Water-stage recorder and crest-stage gage. Elevation of gage is 685 ft above NGVD of 1929, from topographic map. Prior to Apr. 15, 1985, water-stage recorder at site 300 ft upstream on left bank at different datum. From Apr. 15 to Sept. 30, 1985, water-stage recorder near right bank (atop pier 9 of Metropolitan Water District pipeline crossing), at same site and datum. From Oct. 1, 1985, to June 16, 1993, water-stage recorder and crest-stage gage on right bank at same site and datum. From June 17, 1993, to Sept. 30, 2003, water-stage recorder and crest-stage gage on left bank at same site and datum. From Oct. 1, 2003 to Oct. 17, 2005, water-stage recorder in reach-in shelter on pipeline catwalk, near pier #13 at same site and datum. Since Oct. 18, 2005, water-stage recorder is situated in reach-in shelter on upper deck platform, near pier #13 at same site and datum.

REMARKS -

Flow partly regulated by Big Bear Lake (station 11049000) and, since November 1999, by Seven Oaks Flood-Control Reservoir, capacity, 145,600 acre-ft. Natural streamflow affected by ground-water withdrawals, diversions for irrigation, return flows from irrigated areas, and discharges of treated effluent. The records at this station are equivalent to those collected at "Santa Ana River at Riverside Narrows, near Arlington" minus the flow at "Riverside Water-Quality Control Plant at Riverside Narrows, near Arlington". See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES OUTSIDE PERIOD OF RECORD - Maximum discharge since at least 1927, 100,000 ft³/s, Mar. 2, 1938, on basis of slope-area measurement, at site 1.1 mi downstream. Flood of Jan. 22, 1862, 320,000 ft³/s, on basis of slope-conveyance study, at site 8.2 mi upstream. Stage at that site was 5 ft higher than that of Mar. 2, 1938.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 49,100 ft³/s, Dec. 21, 2010, gage height, 16.83 ft, from rating curve extended above 21,900 ft³/s on basis of area-velocity studies; maximum gage height, 20.23 ft, site and datum then in use, Mar. 4, 1978; minimum daily, 15 ft³/s, Sept. 7, 8, 1980.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8098&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11066460&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	27.0	34.4	35.5	e38.6	38.4	48.3	50.6	40.2	32.6	34.8	24.1	31.3
2	27.6	33.8	34.2	e38.7	39.4	46.7	51.7	57.4	32.2	35.5	23.7	32.3
3	27.8	32.9	35.8	e39.2	36.9	68.3	52.1	50.6	31.7	36.2	25.4	31.0
4	27.5	33.5	33.8	e38.6	40.3	53.3	50.3	46.6	31.0	36.3	27.5	32.2
5	28.0	34.0	34.6	e38.5	39.4	51.0	51.6	45.5	32.3	33.4	26.3	31.6
6	27.1	34.7	34.0	e38.5	40.3	47.1	52.1	42.2	32.3	32.9	27.1	32.1
7	27.2	34.1	34.6	e53.1	39.5	45.3	50.5	42.7	32.5	34.1	25.2	31.7
8	28.3	35.1	34.3	e186	40.8	47.1	e50.8	40.0	32.8	32.1	27.1	31.4
9	28.4	36.7	35.1	e2,270	43.1	45.8	e49.4	38.3	31.7	31.0	26.7	31.4
10	25.4	38.3	35.5	467	41.3	153	47.8	37.3	30.8	31.9	26.7	31.8
11	27.8	38.0	37.0	110	43.4	251	47.6	38.8	31.0	31.0	25.9	32.4
12	28.9	39.5	38.1	43.3	45.1	61.2	47.8	38.5	29.3	31.4	26.6	33.1
13	29.3	41.0	37.9	33.4	43.7	48.6	46.5	38.1	28.1	31.7	25.3	32.7
14	29.9	40.8	36.2	32.1	45.8	48.4	43.1	37.6	28.6	31.4	23.6	31.2
15	30.0	41.8	36.4	36.3	44.8	167	41.8	38.8	29.5	32.3	28.5	29.7
16	30.3	41.2	37.0	43.0	46.6	71.1	43.1	36.1	30.1	31.6	30.1	29.3
17	30.6	42.1	35.4	50.2	45.4	225	42.0	35.8	29.3	30.6	31.7	28.5
18	30.1	39.3	38.5	52.1	46.1	72.6	39.7	37.2	29.4	31.0	30.9	28.4
19	30.4	34.9	41.2	49.7	46.4	65.5	41.0	34.6	31.1	27.5	32.9	29.2
20	30.8	34.6	39.5	63.4	48.6	66.7	40.2	34.4	32.8	24.1	32.1	28.8
21	30.9	e34.8	42.3	59.1	47.2	61.7	40.1	35.4	27.4	23.5	34.2	29.1
22	29.7	e32.8	41.8	60.0	49.4	199	39.0	36.3	30.7	25.7	35.1	29.2
23	30.1	33.4	42.7	53.8	50.8	185	36.7	35.4	31.8	28.3	35.3	30.1
24	28.4	33.9	42.1	49.7	48.9	71.0	36.4	35.4	32.0	28.5	33.8	30.3
25	30.2	34.5	42.3	50.8	49.9	56.2	34.7	36.2	32.7	26.6	33.7	30.1
26	30.9	35.1	e39.3	46.8	48.4	57.6	37.8	34.6	32.4	26.8	36.0	29.5
27	30.5	36.1	e38.7	46.5	103	52.7	35.8	32.4	32.7	28.3	33.8	28.7
28	31.4	35.5	e38.7	45.3	53.6	51.6	34.9	32.0	36.5	27.5	35.4	28.9
29	29.8	38.1	e38.8	42.1		55.5	35.7	33.7	32.7	25.6	32.4	27.7
30	45.9	36.0	e39.1	43.2		51.9	37.8	34.6	35.5	24.3	31.1	27.7
31	42.1		e38.5	41.2		51.6		35.0		22.7	31.3	
Total	932	1,091	1,169	4,260	1,307	2,577	1,308	1,192	944	929	919	911
Mean	30.1	36.4	37.7	137	46.7	83.1	43.6	38.4	31.5	30.0	29.7	30.4
Max	45.9	42.1	42.7	2270	103	251	52.1	57.4	36.5	36.3	36.0	33.1
Min	25.4	32.8	33.8	32.1	36.9	45.3	34.7	32.0	27.4	22.7	23.6	27.7
Ac-ft	1,849	2,164	2,318	8,450	2,591	5,111	2,596	2,364	1,870	1,842	1,824	1,807

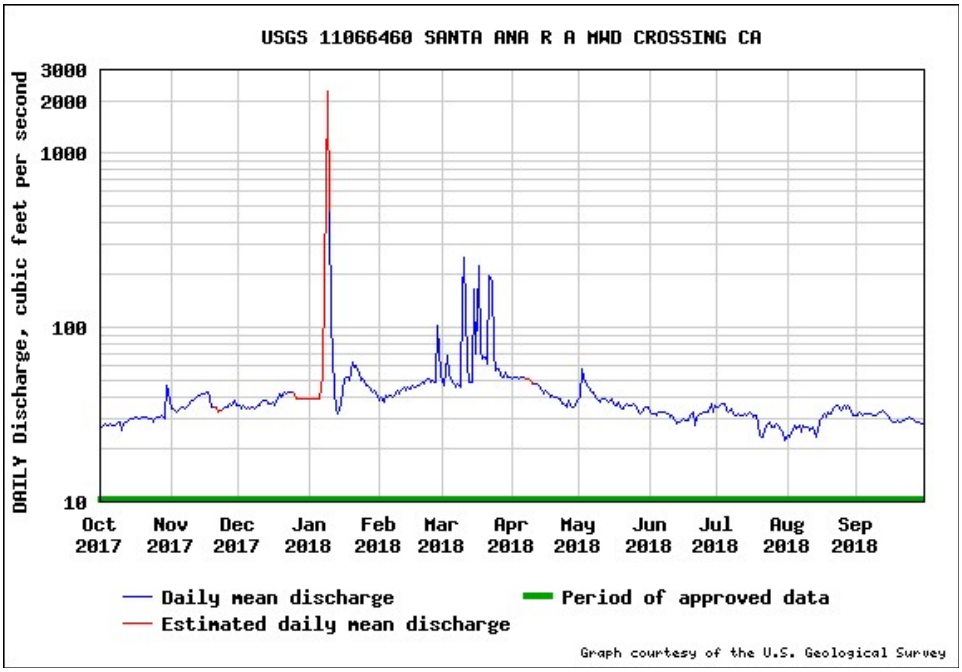
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2000 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	89.1	84.6	217	292	198	135	126	82.9	64.8	58.1	62.2	59.9
Max	498	141	1,729	2,350	756	498	501	314	192	137	201	97.6
(WY)	(2005)	(2003)	(2011)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2015)
Min	30.1	36.4	37.7	36.9	46.7	32.1	38.1	38.4	30.5	25.7	27.3	29.7
(WY)	(2018)	(2018)	(2018)	(2014)	(2018)	(2015)	(2015)	(2018)	(2017)	(2016)	(2016)	(2016)

SUMMARY STATISTICS

	Water Year 2018		Water Years 2000 - 2018	
Annual total	17,540			
Annual mean	48.1		122.2	
Highest annual mean			491.0	2005
Lowest annual mean			48.1	2018
Highest daily mean	2,270	Jan 09	22,000	Jan 11, 2005
Lowest daily mean	22.7	Jul 31	17.1	Dec 21, 2015
Annual 7-day minimum	24.8	Jul 28	23.3	Aug 22, 2013
Maximum peak flow			49,100[a,b]	Dec 21, 2010
Maximum peak stage			16.83	Dec 21, 2010
Annual runoff (cfsm)	0.056		0.143	
Annual runoff (inches)	0.766		1.95	
10 percent exceeds	51.6		120.0	
50 percent exceeds	35.4		69.4	
90 percent exceeds	28.1		34.8	

[a] Discharge affected to unknown degree by Regulation or Diversion
[b] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



SAR@MWDXing Water Quality				
	EC (um/cm)	TDS (mg/L)		TDS/EC Ratio
Date			**Source**	
10/3/2017	1050	636	USGS	0.61
10/26/2017	1030	619	USGS	0.60
11/8/2017	1020	641	USGS	0.63
11/28/2017	1040	645	USGS	0.62
12/5/2017	1040	648	USGS	0.62
12/19/2017	1050	615	USGS	0.59
1/10/2018	444	288	USGS	0.65
1/18/2018	1030	626	USGS	0.61
2/2/2018	1020	651	USGS	0.64
2/28/2018	952	582	USGS	0.61
3/7/2018	1000	604	USGS	0.60
3/29/2018	979	604	USGS	0.62
4/10/2018	1010	615	USGS	0.61
4/26/2018	1000	607	USGS	0.61
5/8/2018	986	599	USGS	0.61
5/24/2018	1020	611	USGS	0.60
6/7/2018	1140	628	USGS	0.55
6/25/2018	1140	634	USGS	0.56
7/6/2018	1020	623	USGS	0.61
7/24/2018	1040	622	USGS	0.60
8/10/2018	1040	640	USGS	0.62
8/23/2018	1050	636	USGS	0.61
9/10/2018	1010	620	USGS	0.61
9/26/2018	1010	635	USGS	0.63
Average	**1,005**	**610**		**0.61**

USGS Water-Year Summary 2018

11059300 Santa Ana River at E Street, near San Bernardino, CA

LOCATION - Lat 34°03'54", long 117°17'58" referenced to North American Datum of 1927, San Bernardino County, CA, Hydrologic Unit 18070203, in San Bernardino Grant, on left bank, 0.4 mi downstream from E Street Bridge, 0.4 mi upstream from Warm Creek, 1.2 mi downstream from San Timoteo Creek, 2.8 mi south of San Bernardino, and 26 mi downstream from Big Bear Lake.

DRAINAGE AREA - 541 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD - March 1939 to September 1954, October 1966 to current year.

GAGE - Water-stage recorder and crest-stage gage. Elevation of gage is 940 ft above NGVD of 1929, from topographic map. Prior to Nov. 10, 1950, on right bank 0.4 mi upstream at datum 24.50 ft higher. Nov. 11, 1950, to September 1954, on both banks 0.4 mi upstream at datum 24.50 ft higher. October 1966 to September 1976, on right bank 0.4 mi upstream at datum 14.50 ft higher. October 1976 to September 1977, gage was removed for channel construction. October 1977 to Jan. 28, 1981, on right bank, 0.5 mi upstream at elevation 10 ft higher.

REMARKS -

SBCFCD declared growth in channel 'semi-permanent' citing environmental regulation in 2016. Flow partly regulated by Big Bear Lake (station 11049000) and, since November 1999, by Seven Oaks Flood-Control Reservoir, capacity, 145,600 acre-ft. Natural flow of stream affected by ground-water withdrawals and diversion for domestic use and irrigation upstream from station. Effluent from sewage reclamation plant 1.0 mi upstream caused sustained flow past gage from 1967 to Mar. 21, 1996. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 35,700 ft³/s, Jan. 11, 2005, gage height, 9.04 ft, current site and datum, from rating curve extended above 5,930 ft³/s on basis of critical-depth computations; maximum gage height, 11.9 ft, Feb. 25, 1969, site and datum then in use; no flow for many days many years prior to 1967 and since Mar. 21, 1996.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8056&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11059300&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	e0.81	e0.74	1.40	0.70	4.83	0.97	0.28	0.18	e0.00	0.00	0.00	0.00
2	e0.68	e0.86	1.07	0.53	5.12	2.17	0.29	4.19	e0.00	0.00	0.00	0.00
3	e0.61	e0.98	1.35	0.26	3.04	18.0	0.27	e0.32	e0.00	0.00	0.00	0.00
4	e0.58	e0.88	1.22	0.27	2.68	4.23	0.26	e0.43	e0.00	0.00	0.00	0.00
5	e0.59	e0.81	0.83	0.06	1.76	1.37	0.22	e0.39	0.00	0.00	0.00	0.00
6	e0.49	e1.02	1.82	0.64	2.64	1.32	0.21	e0.36	0.00	0.00	0.00	0.00
7	e0.40	e1.57	1.69	0.78	2.66	0.21	0.19	e0.34	0.00	0.03	0.00	0.00
8	e0.33	e1.71	1.08	9.55	2.74	1.19	0.19	e0.32	e0.00	0.00	0.00	0.00
9	e0.32	e1.38	0.73	1,440	2.98	1.76	0.17	e0.30	e0.00	0.00	0.00	0.00
10	e0.30	e1.43	0.81	195	2.35	69.1	0.16	e0.28	e0.00	0.00	0.00	0.00
11	e0.29	e1.45	0.70	52.0	3.94	69.4	0.16	e0.26	e0.00	0.00	0.00	0.00
12	e0.31	e1.48	0.77	28.9	5.48	10.1	0.15	e0.23	0.00	0.02	0.00	0.00
13	e0.38	e1.57	0.77	23.8	2.45	3.09	0.15	e0.22	e0.00	0.01	0.00	0.00
14	e0.48	e1.21	0.71	22.6	2.29	3.49	0.16	e0.20	e0.00	0.00	0.00	0.00
15	e0.52	e1.36	0.73	e21.2	1.72	71.9	0.14	e0.18	e0.00	0.00	0.00	0.00
16	e0.47	e1.86	0.92	20.1	1.45	23.0	0.15	e0.16	e0.00	0.00	0.00	0.00
17	e0.27	e1.53	1.82	19.3	1.18	30.5	0.16	e0.14	e0.00	0.00	0.00	0.00
18	e0.23	e1.38	2.38	17.6	1.30	6.02	0.15	e0.13	e0.00	0.00	0.00	0.00
19	e0.25	e1.32	2.07	18.9	2.50	4.39	0.15	e0.11	e0.00	0.00	0.00	0.00
20	e0.31	e1.63	1.83	30.7	3.33	2.99	0.19	e0.09	0.00	0.00	0.00	0.00
21	e0.32	e1.80	0.70	19.2	3.03	3.08	0.16	e0.08	0.00	0.00	0.00	0.00
22	e0.37	e1.90	0.81	15.7	3.04	62.7	0.16	e0.06	0.00	0.00	0.00	0.00
23	e0.39	e2.08	0.58	13.0	2.82	44.5	0.16	e0.05	0.00	0.00	0.00	0.00
24	e0.33	e2.19	0.62	12.1	2.35	2.32	0.15	e0.04	0.00	0.00	0.00	0.00
25	e0.31	e1.97	0.50	12.3	4.47	0.26	0.15	e0.04	0.00	0.00	0.00	0.00
26	e0.29	e1.94	0.33	10.9	2.31	0.26	0.16	e0.02	0.00	0.00	0.00	0.00
27	e0.22	e1.97	0.24	9.54	31.3	0.26	0.16	e0.01	0.00	0.00	0.00	0.00
28	e0.19	e2.52	0.40	9.20	1.89	0.30	0.17	e0.00	0.00	0.00	0.00	0.00
29	e0.19	2.34	0.45	9.13		0.32	0.18	e0.00	0.00	0.00	0.00	0.00
30	e0.27	2.18	0.43	e9.55		0.31	0.19	e0.00	0.00	0.00	0.00	0.00
31	e0.48		0.56	e7.20		0.30		e0.00		0.00	0.00	
Total	12.0	47.1	30.3	2,031	108	440	5.44	9.13	.000	.060	.000	.000
Mean	.39	1.57	.98	65.5	3.84	14.2	.18	.29	.000	.002	.000	.000
Max	0.81	2.52	2.38	1440	31.3	71.9	0.29	4.19	0.00	0.03	0.00	0.00
Min	0.19	0.74	0.24	0.06	1.18	0.21	0.14	0.00	0.00	0.00	0.00	0.00
Ac-ft	23.8	93.3	60.1	4,028	214	872	10.8	18.1	.000	.12	.000	.000

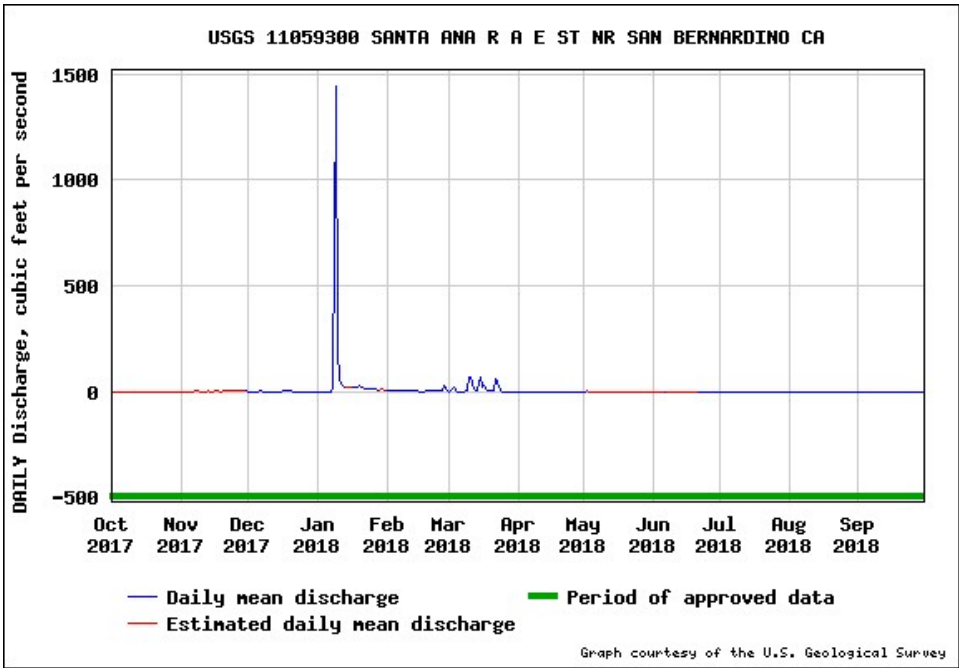
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2000 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	14.6	12.6	73.5	114	75.1	53.3	48.6	21.5	6.21	5.45	7.11	4.10
Max	200	47.1	764	1,185	376	398	351	247	112	52.9	102	40.6
(WY)	(2005)	(2014)	(2011)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)
Min	.000	.67	.98	.000	.82	4.11	.041	.000	.000	.000	.000	.000
(WY)	(2003)	(2001)	(2018)	(2003)	(2002)	(2008)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)

SUMMARY STATISTICS

	Water Year 2018		Water Years 2000 - 2018	
Annual total	2,682			
Annual mean	7.35		36.3	
Highest annual mean			264.8	2005
Lowest annual mean			1.70	2002
Highest daily mean	1,440	Jan 09	12,500	Jan 11, 2005
Lowest daily mean	0.0	May 28	0.0	May 14, 2000
Annual 7-day minimum	0.0	May 28	0.0	Sep 11, 2000
Maximum peak flow			35,700[a,b]	Jan 11, 2005
Maximum peak stage			9.04	Jan 11, 2005
Annual runoff (cfsm)	0.014		0.067	
Annual runoff (inches)	0.184		0.911	
10 percent exceeds	5.26		36.0	
50 percent exceeds	0.260		0.900	
90 percent exceeds	0.0		0.0	

[a] Discharge affected by Regulation or Diversion
[b] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11072100 Temescal Creek above Main Street, at Corona, CA

LOCATION - Lat 33°53'21", long 117°33'43" referenced to North American Datum of 1927, Riverside County, CA, Hydrologic Unit 18070203, in La Sierra Grant, on right bank, 500 ft upstream from Main Street Bridge in Corona, and 1.5 mi upstream from topographic boundary of Prado Flood-Control Basin.

DRAINAGE AREA - 224 mi². excludes 768 mi² above Lake Elsinore.

REVISIONS HISTORY - On January 23, 2015, discharge records were revised for the period of September 10, 2013 to October 5, 2014.

SURFACE-WATER RECORDS

PERIOD OF RECORD - October 1980 to July 1983, February 1984 to current year.

GAGE - Water-stage recorder and concrete-lined flood-control channel. Elevation of gage is 600 ft above NGVD of 1929, from topographic map. December 1967 to September 1974, water-stage recorder at site 1.2 mi downstream at different datum (published as station 11072200, "Temescal Creek at Corona"). October 1980 to July 1983 at site 500 ft downstream at different datum.

REMARKS -

Flow regulated by several small storage reservoirs. Many diversions upstream from station for irrigation. Water discharged to channel from Arlington Desalter at times since September 1990; records for water years 1981 to 1990 and 1991 to current year are not equivalent. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES OUTSIDE PERIOD OF RECORD - Maximum discharge, 8,850 ft³/s, Feb. 25, 1969, gage height, 8.17 ft, from floodmark, at old site (station 11072200) 1.2 mi downstream on basis of slope-area measurement of peak flow.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 5,290 ft³/s, Dec. 22, 2010, gage height, 7.27 ft, from rating curve extended above 305 ft³/s, on basis of step-backwater analysis; minimum daily, zero flow,on Oct. 31, 2017.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8161&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11072100&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	0.99	2.86	2.35	3.23	1.34	2.02	1.25	4.20	3.24	6.46	1.50	1.32
2	1.20	3.19	2.35	1.48	1.37	4.34	1.25	3.37	1.50	7.18	1.54	1.18
3	1.66	2.97	2.02	1.74	1.34	7.96	1.29	0.88	1.60	7.41	1.46	1.73
4	1.45	3.26	2.45	1.92	1.47	3.83	1.57	0.86	1.97	10.4	1.67	1.51
5	1.43	4.04	1.74	1.81	1.72	1.46	1.64	0.78	1.97	11.9	1.85	1.42
6	2.04	4.18	1.94	1.52	1.57	1.73	1.74	0.77	2.25	10.4	1.81	1.66
7	2.07	4.07	1.62	1.48	1.64	1.78	1.31	0.81	2.09	6.57	2.04	1.73
8	2.28	3.74	1.66	30.5	1.35	1.84	1.10	0.85	1.23	5.51	1.85	1.05
9	3.25	4.29	1.86	285	2.00	2.02	1.18	0.95	1.19	6.12	1.95	1.40
10	3.30	4.09	1.78	6.16	1.83	70.0	1.35	1.05	1.18	6.01	2.11	1.30
11	3.48	3.75	1.23	1.65	1.21	28.6	1.06	0.82	0.51	2.82	1.71	1.10
12	3.54	4.96	1.14	1.27	1.78	1.68	1.07	1.10	0.61	2.70	1.74	1.16
13	4.27	6.36	1.55	1.14	1.98	1.56	0.97	1.05	0.86	2.23	1.67	1.12
14	3.88	6.54	1.45	1.60	1.61	2.35	1.06	0.95	1.09	1.79	2.25	1.12
15	2.60	6.76	1.60	1.42	1.45	48.3	1.14	0.95	1.12	1.68	1.92	1.05
16	3.26	6.53	1.34	1.53	1.40	1.40	0.96	1.02	1.55	2.17	2.56	1.36
17	3.36	6.95	1.20	1.38	1.79	16.4	1.04	1.26	1.58	1.82	2.43	1.32
18	3.62	6.43	1.66	1.35	1.91	1.88	1.06	0.94	1.75	1.89	2.11	1.03
19	4.12	6.57	1.46	2.32	2.02	1.38	1.44	1.14	6.54	1.97	2.40	1.14
20	3.83	6.83	1.61	3.41	1.53	1.52	1.21	1.25	10.6	1.64	2.61	1.13
21	3.75	10.6	1.53	1.00	1.46	1.24	1.05	1.52	9.88	1.68	3.43	1.57
22	3.94	14.4	1.37	1.04	1.60	35.7	1.34	1.33	10.1	2.03	3.04	1.50
23	3.97	11.3	1.39	1.03	1.28	4.35	0.94	1.48	11.4	1.94	2.51	1.00
24	3.87	10.4	1.39	1.31	1.35	1.51	0.88	1.79	11.5	1.67	2.60	1.41
25	3.08	8.36	1.29	1.08	1.71	1.21	0.88	2.09	11.1	1.84	3.19	0.93
26	3.02	5.29	1.14	1.02	1.44	1.15	1.00	1.83	10.3	1.66	1.48	0.98
27	2.80	4.84	1.31	1.12	88.5	1.07	0.88	1.94	4.65	1.54	1.64	1.10
28	3.74	2.40	1.20	1.06	4.18	1.05	1.09	2.06	5.45	1.73	1.63	1.16
29	3.44	2.24	1.66	1.21		1.11	0.77	1.76	5.85	1.57	1.50	0.97
30	2.85	2.66	1.98	1.32		1.16	0.97	1.86	6.41	1.75	1.98	0.97
31	2.58		1.15	1.23		1.48		1.75		1.49	1.26	
Total	92.7	171	49.4	364	134	253	34.5	44.4	131	118	63.4	37.4
Mean	2.99	5.70	1.59	11.8	4.78	8.16	1.15	1.43	4.37	3.79	2.05	1.25
Max	4.27	14.4	2.45	285	88.5	70.0	1.74	4.20	11.5	11.9	3.43	1.73
Min	0.99	2.24	1.14	1.00	1.21	1.05	0.77	0.77	0.51	1.49	1.26	0.93
Ac-ft	184	339	98.0	723	265	502	68.4	88.1	260	233	126	74.2

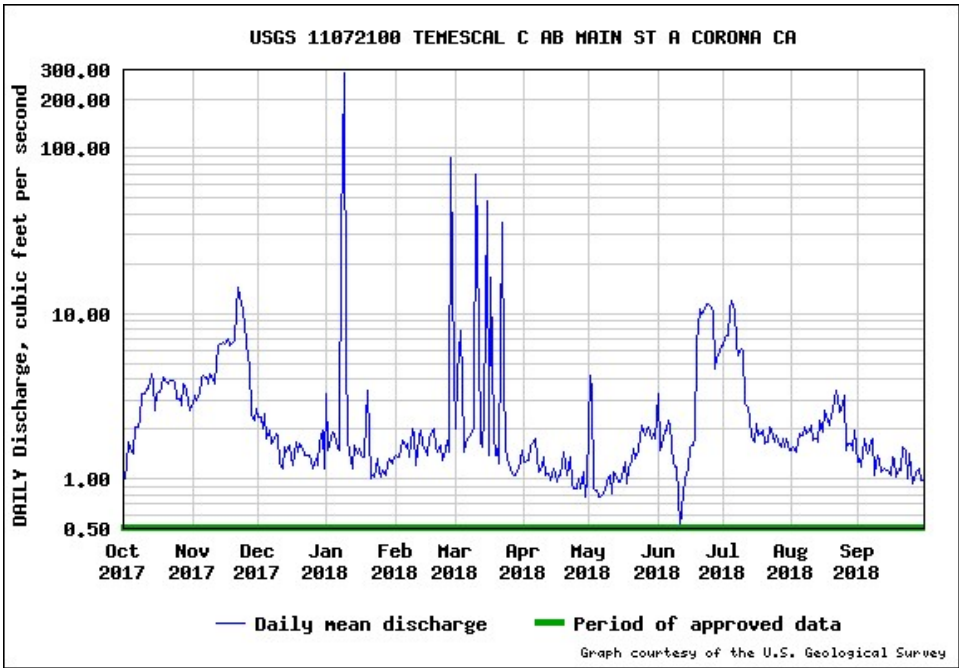
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	12.0	14.7	26.2	51.5	75.2	50.4	29.3	16.2	9.90	8.91	8.28	9.05
Max	52.6	58.3	222	335	400	349	190	100	34.3	24.9	20.7	30.4
(WY)	(2005)	(2006)	(2011)	(2005)	(2005)	(1995)	(1995)	(1995)	(1995)	(1993)	(2005)	(2005)
Min	1.95	1.76	1.59	2.51	3.24	1.75	1.15	.79	1.38	1.70	1.58	1.25
(WY)	(2015)	(2016)	(2018)	(2014)	(2016)	(2015)	(2018)	(2016)	(2016)	(2016)	(2015)	(2018)

SUMMARY STATISTICS

	Water Year 2018		Water Years 1991 - 2018	
Annual total	1,493			
Annual mean	4.09		25.7	
Highest annual mean			104.4	2005
Lowest annual mean			4.10	2018
Highest daily mean	285.0	Jan 09	2,870	Dec 22, 2010
Lowest daily mean	0.510	Jun 11	0.340	Jul 03, 1992
Annual 7-day minimum	0.843	May 03	0.513	May 08, 2013
Maximum peak flow			5,290[a,b]	Dec 22, 2010
Maximum peak stage			7.27	Dec 22, 2010
Annual runoff (cfsm)	0.018		0.115	
Annual runoff (inches)	0.248		1.56	
10 percent exceeds	6.42		52.0	
50 percent exceeds	1.66		9.99	
90 percent exceeds	1.05		1.70	

[a] Discharge affected by Regulation or Diversion
[b] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11071900 Temescal Creek at Corona Lake, near Corona, CA

LOCATION - Lat 33°45'01", long 117°26'45" referenced to North American Datum of 1983, in SE 1/4 NW 1/4 sec.07, T.5 S., R.5 W., Riverside County, CA, Hydrologic Unit 18070203, on left bank, 10 ft upstream from Corona Lake Weir Control into Temescal Creek, 9.3 mi downstream of Lake Elsinore, and 12.3 mi south of Corona.

DRAINAGE AREA - 57.9 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD - November 5, 2012 to current year.

GAGE - Water-stage recorder and concrete spillway control. Elevation of gage is 1,190 ft above NGVD of 1929, from a topographic map.

REMARKS - Records fair except for estimated daily discharges which are considered poor. No flow for water year 2014, 2015 and 2016. Gage established for the purpose of monitoring discharges from concrete weir on spill way of Corona Lake flowing into Temescal Creek.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 302 ft^3/s, Jan. 23, 2017, gage height, 38.32 ft; minimum discharge, 0.00 ft^3/s, on many days, gage height, 18.28 ft. on Oct. 23, 2016.

U.S. Department of the Interior
U.S. Geological Survey

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES

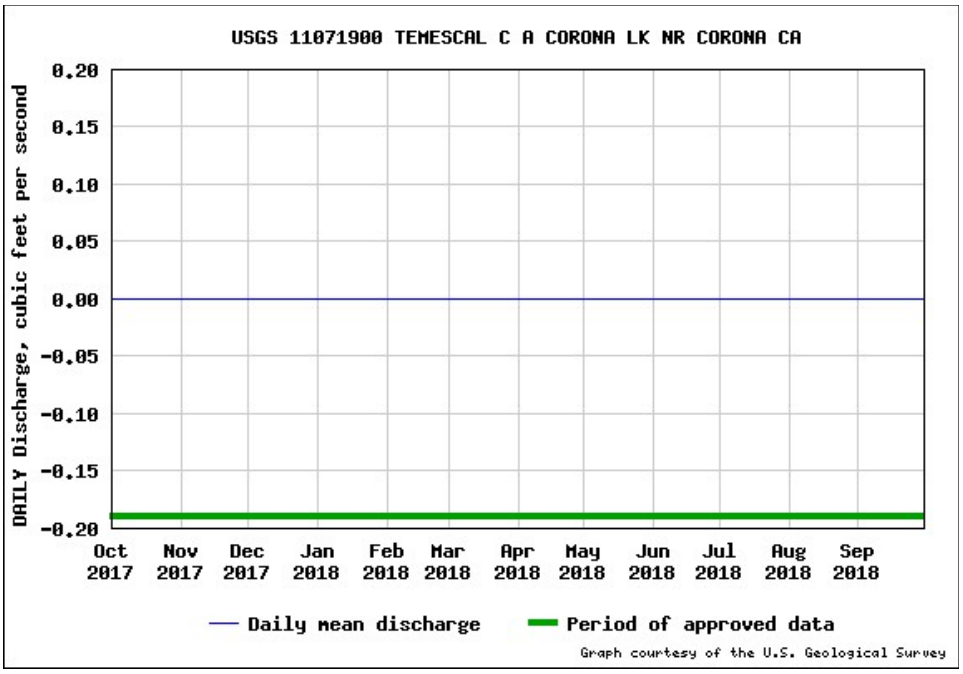
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
Total	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Mean	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ac-ft	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2013 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	.000	.000	.000	1.58	6.28	2.05	.000	.000	.000	.000	.000	.000
Max	.000	.000	.000	7.61	24.7	10.4	.000	.000	.000	.000	.000	.000
(WY)	(2014)	(2014)	(2013)	(2017)	(2017)	(2017)	(2013)	(2013)	(2013)	(2013)	(2013)	(2013)
Min	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	(2014)	(2014)	(2013)	(2014)	(2014)	(2014)	(2013)	(2013)	(2013)	(2013)	(2013)	(2013)

SUMMARY STATISTICS

	Water Year 2018		Water Years 2013 - 2018	
Annual total	0.0			
Annual mean	0.0		0.684	
Highest annual mean			3.42	2017
Lowest annual mean			0.0	2014
Highest daily mean	0.0	Oct 01	138.0	Jan 23, 2017
Lowest daily mean	0.0	Oct 01	-0.010	Feb 02, 2017
Annual 7-day minimum	0.0	Oct 01	-0.001	Jan 30, 2017
Maximum peak flow			302	Jan 23, 2017
Maximum peak stage			38.32	Jan 23, 2017
Annual runoff (cfsm)	0.0		0.014	
Annual runoff (inches)	0.0		0.188	
10 percent exceeds	0.0		0.0	
50 percent exceeds	0.0		0.0	
90 percent exceeds	0.0		0.0	



USGS Water-Year Summary 2018

11073495 Cucamonga Creek near Mira Loma, CA

LOCATION - Lat 33°58'58", long 117°35'55" referenced to North American Datum of 1927, in SW 1/4 NE 1/4 sec.22, T.2 S., R.7 W., San Bernardino County, CA, Hydrologic Unit 18070203, on right bank, 300 ft upstream from Merrill Avenue Bridge, and 4.6 mi west of Mira Loma.

DRAINAGE AREA - 75.8 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD - January 1968 to July 1977, December 1978 to current year. CHEMICAL DATA: Water years 1999-2000. SPECIFIC CONDUCTANCE: Water years 1999-2000. WATER TEMPERATURE: Water years 1999-2000. SEDIMENT DATA: Water years 1999-2000.

GAGE - Water-stage recorder, crest-stage gage, and concrete-lined flood-control channel. Elevation of gage is 660 ft above NGVD of 1929, from topographic map. Prior to July 1977 at site 100 ft downstream at different datum.

REMARKS - Channel is a trapezoidal concrete floodway; records for low and medium flows prior to July 31, 1977, are not equivalent (channel concrete lined since July 31, 1977). Inland Empire Utilities Agency Tertiary Plant No. 1 began discharging effluent 3.3 mi upstream from station on May 8, 1985. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 17,300 ft³/s, Oct. 20, 2004, gage height, 6.58 ft, from rating curve extended above 617 ft³/s on basis of step-backwater computations; maximum gage height, 7.85 ft, Feb. 27, 1983. Prior to operation of Plant No. 1, no flow for most of some years. Minimum daily since 1985, 0.04 ft³/s, October 1, 2017.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8174&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11073495&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	6.34	16.2	9.07	26.4	29.9	50.7	7.33	21.6	21.8	2.76	2.36	8.21
2	3.82	19.0	9.44	26.8	29.0	62.4	5.63	26.5	16.8	2.26	1.08	15.4
3	4.46	16.5	11.9	21.9	18.6	56.6	11.4	3.71	22.5	1.60	0.72	10.7
4	6.62	24.9	15.6	28.3	24.0	47.7	8.83	1.63	19.5	2.03	2.51	9.13
5	6.85	27.3	15.0	40.9	22.2	32.4	7.62	4.14	11.2	1.41	3.95	5.07
6	8.30	9.15	8.07	53.8	17.8	13.0	5.34	10.6	15.1	1.65	1.17	8.40
7	15.0	12.8	6.22	83.1	20.8	9.04	9.03	9.27	9.85	4.16	0.38	11.0
8	15.2	14.5	12.9	98.2	16.4	26.0	12.1	5.21	0.62	2.61	1.02	10.4
9	11.3	16.1	14.0	670	7.11	39.9	9.15	3.06	1.14	1.59	0.48	13.2
10	8.44	21.3	20.4	57.9	10.5	105	4.12	2.76	2.50	1.63	0.25	11.8
11	8.14	23.9	12.9	44.3	42.3	64.2	1.83	5.54	1.57	2.15	1.39	8.10
12	7.63	20.9	8.68	42.3	49.5	27.9	1.81	14.2	2.64	2.05	2.46	12.1
13	6.03	21.0	19.9	39.0	36.4	34.0	2.45	15.3	0.94	2.95	1.32	4.31
14	15.4	24.9	20.2	39.4	24.8	63.9	5.48	11.2	0.97	3.38	1.27	5.71
15	20.1	20.9	10.8	42.3	13.7	153	6.87	5.91	0.85	3.78	0.69	16.7
16	9.32	26.1	20.9	43.0	9.52	35.2	5.25	5.03	2.96	2.67	0.62	21.2
17	7.02	20.3	29.8	43.0	27.3	90.3	3.51	4.11	3.70	2.65	1.18	26.1
18	11.2	21.1	16.3	42.1	49.0	30.9	8.43	3.78	1.13	2.70	2.48	13.2
19	17.4	22.0	14.1	44.2	74.6	35.2	9.12	5.87	1.31	0.85	3.69	13.2
20	8.30	16.6	4.49	53.0	44.4	36.8	6.16	14.0	1.70	0.51	3.98	9.33
21	9.40	18.0	24.3	43.6	39.7	95.8	8.88	20.3	3.81	0.69	3.94	11.4
22	10.5	16.2	25.4	45.3	26.5	157	11.7	21.7	3.59	2.38	6.92	14.7
23	8.75	17.8	41.9	45.0	21.7	47.9	7.20	22.3	9.53	1.06	6.38	20.2
24	5.38	13.9	54.0	42.4	33.6	37.0	2.64	20.6	10.4	0.62	4.82	31.1
25	3.24	10.4	47.5	40.3	45.8	38.0	3.42	19.4	10.8	0.86	10.2	28.8
26	3.96	16.1	44.9	37.8	82.7	46.5	4.44	31.3	7.95	0.63	13.2	29.3
27	10.6	21.8	43.3	35.5	100	31.7	4.05	34.9	7.66	0.47	7.02	26.0
28	15.5	20.4	30.3	34.3	34.2	34.8	7.11	33.0	6.92	0.58	3.86	21.1
29	23.5	12.4	42.2	34.1		22.3	11.8	35.1	3.50	0.78	3.07	24.3
30	17.1	12.6	41.2	15.3		11.4	12.0	35.1	2.29	1.97	5.34	51.6
31	20.9		28.1	22.4		8.90		27.0		2.26	6.25	
Total	326	555	704	1,936	952	1,545	205	474	205	57.7	104	492
Mean	10.5	18.5	22.7	62.4	34.0	49.9	6.82	15.3	6.84	1.86	3.35	16.4
Max	23.5	27.3	54.0	670	100	157	12.1	35.1	22.5	4.16	13.2	51.6
Min	3.24	9.15	4.49	15.3	7.11	8.90	1.81	1.63	0.62	0.47	0.25	4.31
Ac-ft	646	1,101	1,396	3,840	1,888	3,065	406	940	407	114	206	975

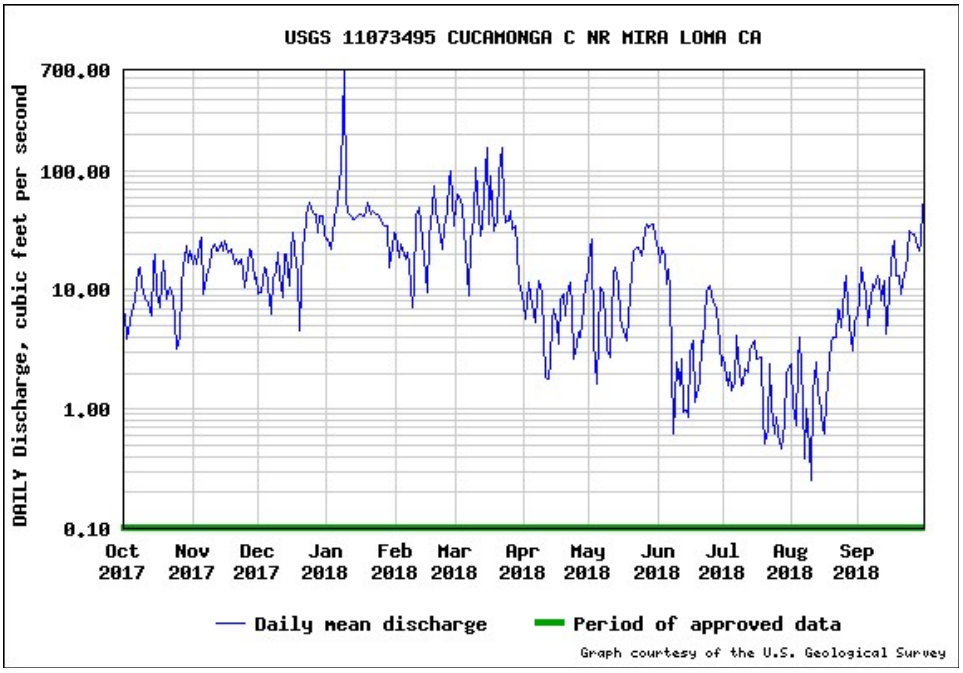
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1986 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	40.1	40.2	63.1	87.1	96.8	60.6	41.6	33.0	28.6	27.0	26.7	30.7
Max	223	102	328	442	350	198	114	69.4	57.1	53.4	51.8	52.0
(WY)	(2005)	(2003)	(2011)	(2005)	(2005)	(1995)	(2006)	(2003)	(1992)	(2004)	(1992)	(1986)
Min	10.5	12.5	16.7	15.6	14.5	12.1	6.27	6.60	2.54	1.86	2.67	3.86
(WY)	(2018)	(2013)	(2014)	(2014)	(2016)	(2017)	(2013)	(2014)	(2017)	(2018)	(2015)	(2016)

SUMMARY STATISTICS

	Water Year 2018		Water Years 1986 - 2018	
Annual total	7,555			
Annual mean	20.7		47.7	
Highest annual mean			137.4	2005
Lowest annual mean			15.8	2013
Highest daily mean	670.0	Jan 09	5,200	Jan 09, 2005
Lowest daily mean	0.250	Aug 10	0.030	Jul 28, 2017
Annual 7-day minimum	0.714	Jul 23	0.533	Jun 23, 2017
Maximum peak flow			17,300[a]	Oct 20, 2004
Maximum peak stage			6.58	Oct 20, 2004
Annual runoff (cfsm)	0.273		0.630	
Annual runoff (inches)	3.71		8.55	
10 percent exceeds	43.1		60.0	
50 percent exceeds	12.1		33.0	
90 percent exceeds	1.64		9.26	

[a] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11073360 Chino Creek at Schaefer Avenue, near Chino, CA

LOCATION - Lat 34°00'14", long 117°43'34" referenced to North American Datum of 1927, San Bernardino County, CA, Hydrologic Unit 18070203, in Santa Ana del Chino Grant, on right bank, 300 ft downstream from old Schaefer Avenue Bridge, 0.8 mi downstream from San Antonio Creek, and 1.5 mi southwest of Chino.

DRAINAGE AREA - 48.9 mi².

REVISIONS HISTORY - WDR CA-84-1: 1983 (instantaneous maximum discharge). WDR CA-95-1: 1992, 1993.

SURFACE-WATER RECORDS

PERIOD OF RECORD - October 1969 to current year. CHEMICAL DATA: Water year 1998. SEDIMENT DATA: Water year 1998.

GAGE - Water-stage recorder and concrete-lined flood-control channel. Concrete dikes formed low-water control from October 1975 to Apr. 16, 1991. Elevation of gage is 685 ft above NGVD of 1929, from topographic map.

REMARKS - Since 1997, due to construction in area of gage, Schaefer Avenue no longer extends to the Chino Creek crossing. The Schaefer Avenue Bridge, however, remains. Flow mostly regulated by San Antonio Flood-Control Reservoir, capacity, 7,700 acre-ft. Natural streamflow affected by extensive ground-water withdrawals, diversions for power, domestic use, irrigation, and return flow from irrigated areas. Releases of imported water are made to the basin by the California Water Project at times in some years, via San Antonio Creek from Rialto Pipeline below San Antonio Dam, at a site approximately 11 mi upstream. During the current water year, the California Water Project reported no releases were made into the basin. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES OUTSIDE PERIOD OF RECORD - Flood of Jan. 25, 1969, reached a stage of 9.23 ft, present datum, discharge, 9,200 ft³/s, on basis of contracted-opening measurement at site 6.1 mi downstream.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 12,700 ft³/s, Feb. 27, 1983, gage height, 10.32 ft, from rating curve extended above 560 ft³/s, on basis of slope-conveyance study; no flow May 21, June 30, July 1, Oct. 30, Nov. 3, 1977.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [March 15, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8167&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11073360&agency_cd=USGS

Water-Data Report 2018

11073360 Chino Creek at Schaefer Avenue, near Chino, CA -- Continued

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	0.23	0.25	0.17	0.43	0.48	0.31	0.28	0.28	0.44	0.33	0.51	0.42
2	0.23	0.22	0.17	0.30	0.43	7.78	0.27	1.80	0.39	0.35	0.64	0.43
3	0.24	0.24	0.17	0.32	0.41	0.85	0.30	0.52	0.41	0.35	1.77	0.45
4	0.21	0.18	0.16	0.38	0.40	0.47	0.32	0.48	0.39	0.37	1.20	0.68
5	0.21	0.20	0.15	0.38	0.41	0.30	0.32	0.48	0.39	0.40	1.43	0.51
6	0.21	0.18	0.19	0.37	0.40	0.27	0.34	0.47	0.37	0.41	2.28	0.39
7	0.20	0.19	0.22	0.31	0.41	0.26	0.35	0.48	0.38	0.59	2.05	0.42
8	0.20	0.20	0.47	16.5	0.38	0.26	0.37	0.48	0.42	0.34	1.86	0.41
9	0.20	0.20	0.52	341	0.34	0.30	0.35	0.49	0.48	0.36	0.44	0.38
10	0.22	0.20	0.46	1.19	0.32	47.2	0.35	0.47	0.33	0.35	0.46	0.38
11	0.23	0.18	0.48	0.60	0.31	11.9	0.34	0.44	0.33	0.35	0.42	0.38
12	0.22	0.23	0.30	0.43	0.51	0.51	0.31	0.42	0.33	0.38	0.85	0.68
13	0.24	0.18	0.32	0.39	0.62	3.16	0.29	0.59	0.37	0.41	0.62	0.39
14	0.23	0.19	0.29	0.38	0.31	16.1	0.33	0.53	0.36	0.39	0.66	0.49
15	0.23	0.20	0.28	0.37	0.28	15.4	0.30	0.45	0.37	0.38	0.75	0.43
16	0.24	0.22	0.28	0.38	0.30	5.63	0.28	0.46	0.33	0.39	0.38	0.38
17	0.24	0.21	0.27	0.42	0.24	24.5	0.27	0.50	0.29	0.35	0.36	0.39
18	0.26	0.19	0.26	0.39	0.25	0.48	0.29	0.44	0.31	0.44	0.35	0.40
19	0.27	0.17	0.30	1.56	0.31	0.38	0.28	0.46	0.33	0.82	0.33	0.40
20	0.27	0.17	0.30	2.06	0.19	0.32	0.29	1.10	0.36	2.84	0.49	0.40
21	0.24	0.18	0.28	0.38	0.22	13.9	0.29	0.60	0.36	2.49	0.39	0.42
22	0.25	0.20	0.26	0.36	0.29	47.3	0.30	0.48	0.37	2.97	0.33	0.41
23	0.25	0.20	0.25	0.36	0.32	4.41	0.32	0.48	0.34	1.77	0.34	0.40
24	0.26	0.18	0.28	0.36	0.19	0.61	0.33	0.60	0.33	2.72	0.34	0.39
25	0.26	0.18	0.34	0.43	0.29	0.56	0.30	0.49	0.37	3.22	0.35	0.40
26	0.25	0.17	0.37	0.46	3.16	0.36	0.30	0.44	0.39	2.71	0.42	0.44
27	0.25	0.20	0.31	0.44	42.5	0.30	0.30	0.45	0.31	2.72	0.35	0.51
28	0.24	0.18	0.30	0.46	0.37	0.27	0.30	0.45	0.31	2.58	0.76	0.54
29	0.27	0.18	0.31	0.49		0.28	0.29	0.48	0.32	1.82	0.40	0.57
30	0.28	0.17	0.28	0.44		0.30	0.36	0.59	0.34	1.13	0.41	0.52
31	0.23		0.37	0.43		0.30		0.52		1.24	0.43	
Total	7.36	5.84	9.11	373	54.6	205	9.32	16.9	10.8	36.0	22.4	13.4
Mean	.24	.19	.29	12.0	1.95	6.61	.31	.55	.36	1.16	.72	.45
Max	0.28	0.25	0.52	341	42.5	47.3	0.37	1.80	0.48	3.22	2.28	0.68
Min	0.20	0.17	0.15	0.30	0.19	0.26	0.27	0.28	0.29	0.33	0.33	0.38
Ac-ft	14.6	11.6	18.1	739	108	407	18.5	33.6	21.5	71.3	44.4	26.6

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2018, BY WATER YEAR (WY)

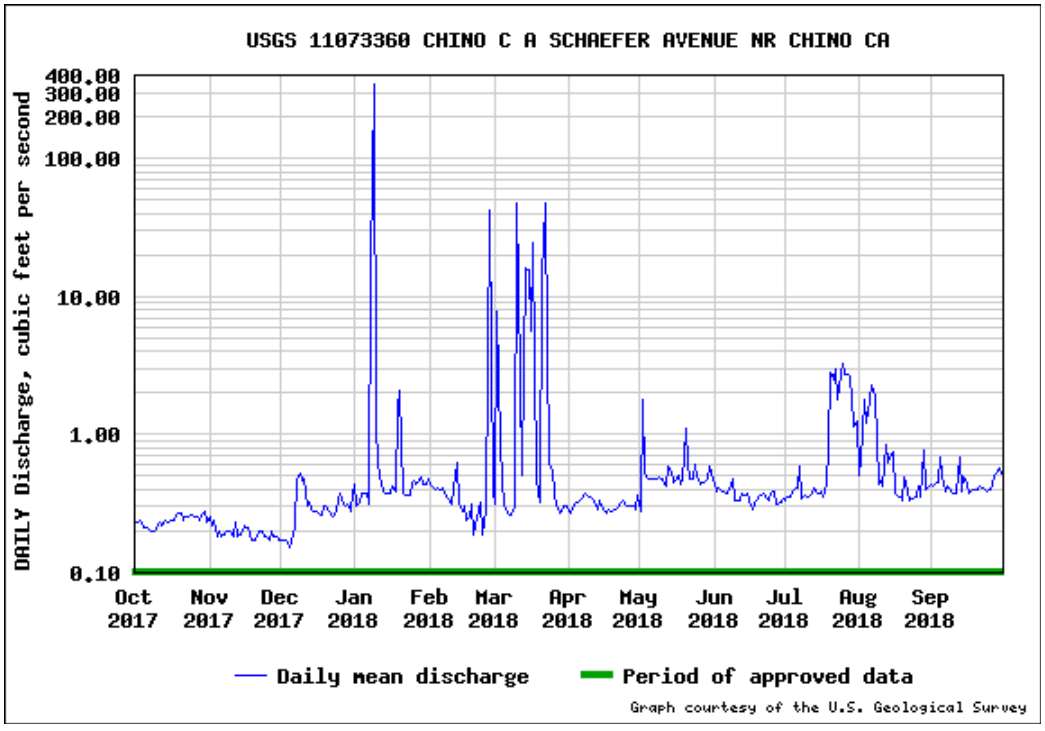
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	14.4	13.7	23.5	32.1	33.9	22.6	8.29	10.1	14.8	16.7	14.6	11.7
Max	126	113	189	221	193	257	68.6	104	184	176	191	198
(WY)	(1979)	(1976)	(1976)	(2005)	(1980)	(1978)	(1974)	(1997)	(1976)	(1974)	(1974)	(1997)
Min	.061	.20	.29	.48	.33	.30	.14	.22	.062	.069	.12	.13
(WY)	(1978)	(2018)	(2018)	(2014)	(1972)	(1972)	(1977)	(1973)	(1977)	(1977)	(2015)	(1977)

Water-Data Report 2018
11073360 Chino Creek at Schaefer Avenue, near Chino, CA -- Continued

SUMMARY STATISTICS

	Water Year 2018		Water Years 1970 - 2018	
Annual total	763.5			
Annual mean	2.09		18.0	
Highest annual mean			92.4	1974
Lowest annual mean			2.10	2018
Highest daily mean	341.0	Jan 09	2,060	Mar 01, 1978
Lowest daily mean	0.150	Dec 05	0.0	May 21, 1977
Annual 7-day minimum	0.167	Nov 29	0.024	Oct 28, 1977
Maximum peak flow			13,100[a,b]	Feb 27, 1983
Maximum peak stage			10.32	Feb 27, 1983
Annual runoff (cfsm)	0.043		0.368	
Annual runoff (inches)	0.581		5.00	
10 percent exceeds	1.15		57.0	
50 percent exceeds	0.370		1.20	
90 percent exceeds	0.210		0.300	

[a] Discharge affected by Regulation or Diversion
[b] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11065000 Lytle Creek at Colton, CA

LOCATION - Lat 34°04'44", long 117°18'17" referenced to North American Datum of 1927, San Bernardino County, CA, Hydrologic Unit 18070203, in San Bernardino Grant, on right bank, 400 ft downstream from Colton Avenue, 1,930 ft upstream from outlet end of channel, and 1.3 mi northeast of Colton.

DRAINAGE AREA - 186 mi².

REVISIONS HISTORY - WDR CA-83-1: Drainage area.

SURFACE-WATER RECORDS

PERIOD OF RECORD - October 1957 to September 1983, October 1984 to current year.

GAGE - Water-stage recorder and concrete-lined flood-control channel. Datum of gage is 974.67 ft above NGVD of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS - Records fair. Estimated daily vaules are considered poor. Flow partly regulated by Lytle Creek spreading grounds 3.2 mi upstream. Diversions upstream from station for irrigation, power development, domestic use, and ground-water replenishment. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 17,500 ft³/s, Mar. 4, 1978, gage height, 14.8 ft, from rating curve extended above 4,200 ft³/s, on basis of discharge for design flood at gage height 21.4 ft; no flow at times.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [March 15, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8090&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11065000&agency_cd=USGS

Water-Data Report 2018
11065000 Lytle Creek at Colton, CA -- Continued

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	0.26	0.23	e0.22	0.39	0.12	0.25	0.11	0.23	0.22	0.35	0.02	0.01
2	0.20	0.18	e0.41	e0.59	0.13	3.89	0.15	3.22	0.34	0.24	0.01	0.08
3	0.23	0.10	0.18	0.87	0.13	0.35	0.12	0.20	0.26	0.12	0.01	0.06
4	0.17	0.08	0.09	0.69	0.13	0.30	0.13	0.28	0.19	0.05	0.01	0.13
5	0.15	0.23	0.14	1.07	0.09	0.38	0.16	0.29	0.16	0.02	0.01	0.02
6	0.07	0.37	0.12	1.80	0.12	0.19	0.26	0.27	0.17	0.01	0.01	0.01
7	0.09	0.39	0.13	0.26	0.26	0.13	0.30	0.38	0.13	0.02	0.00	0.01
8	0.15	0.31	0.10	e7.63	0.31	0.13	0.34	0.39	0.14	0.03	0.01	0.02
9	0.19	0.33	0.10	e198	0.24	0.13	0.24	0.32	0.38	0.13	e0.00	0.01
10	0.15	0.48	0.08	1.27	0.25	29.6	0.21	0.22	0.22	0.10	0.01	0.01
11	0.10	0.17	0.08	0.14	0.26	e3.40	0.18	0.42	0.29	0.01	0.01	0.01
12	0.13	0.10	0.07	0.15	0.33	0.13	0.20	0.18	0.40	0.02	0.01	0.06
13	0.10	0.06	0.09	0.18	0.24	0.12	0.51	0.20	0.31	0.15	0.01	0.02
14	0.12	0.11	0.10	0.23	0.37	0.50	1.55	0.23	0.22	0.10	0.00	0.03
15	0.19	0.15	0.17	0.25	0.24	e12.0	0.53	0.22	0.22	0.09	e0.00	0.03
16	0.18	0.22	0.93	0.26	0.21	0.12	0.25	0.16	0.32	0.33	0.01	0.02
17	0.18	0.27	0.58	0.30	0.21	e33.0	0.20	0.22	0.59	0.65	0.01	0.02
18	0.18	0.25	0.39	0.41	0.27	e0.26	0.19	0.19	0.22	0.22	0.00	0.01
19	0.22	0.25	0.39	0.50	0.19	0.37	0.20	0.33	0.17	0.19	0.00	0.00
20	0.28	0.19	0.45	0.24	0.29	0.37	0.31	0.48	0.12	0.02	e0.20	0.00
21	0.19	0.11	0.56	0.26	0.21	0.60	0.20	0.58	0.15	0.00	0.05	0.00
22	0.14	0.13	0.69	0.27	0.27	e28.7	0.24	0.42	0.57	0.03	0.00	0.01
23	0.14	0.15	1.06	0.23	0.37	11.3	0.22	0.19	0.10	0.02	0.01	0.04
24	0.09	0.20	0.46	0.14	0.39	0.13	0.27	0.29	0.06	0.10	0.01	0.23
25	0.10	e0.24	0.22	0.11	0.23	0.15	0.30	0.56	0.09	0.10	0.00	0.48
26	0.11	0.28	0.09	0.10	0.33	0.18	0.28	0.19	0.08	0.00	0.01	e0.10
27	0.11	0.43	0.11	0.17	5.15	0.15	0.33	0.15	0.12	0.00	0.03	e0.10
28	0.12	0.29	0.16	0.31	0.19	0.18	0.21	0.18	0.31	0.00	0.02	0.03
29	0.13	0.35	0.14	0.19		0.13	0.41	0.21	0.21	0.01	0.01	0.02
30	0.16	0.25	0.20	0.19		0.13	0.53	0.23	0.27	0.04	0.01	0.01
31	0.11		0.61	0.11		0.11		0.25		0.06	0.02	
Total	4.74	6.90	9.12	217	11.5	127	9.13	11.7	7.03	3.21	.51	1.58
Mean	.15	.23	.29	7.01	.41	4.11	.30	.38	.23	.10	.016	.053
Max	0.28	0.48	1.06	198	5.15	33.0	1.55	3.22	0.59	0.65	0.20	0.48
Min	0.07	0.06	0.07	0.10	0.09	0.11	0.11	0.15	0.06	0.00	0.00	0.00
Ac-ft	9.40	13.7	18.1	431	22.9	253	18.1	23.2	13.9	6.37	1.01	3.13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2018, BY WATER YEAR (WY)

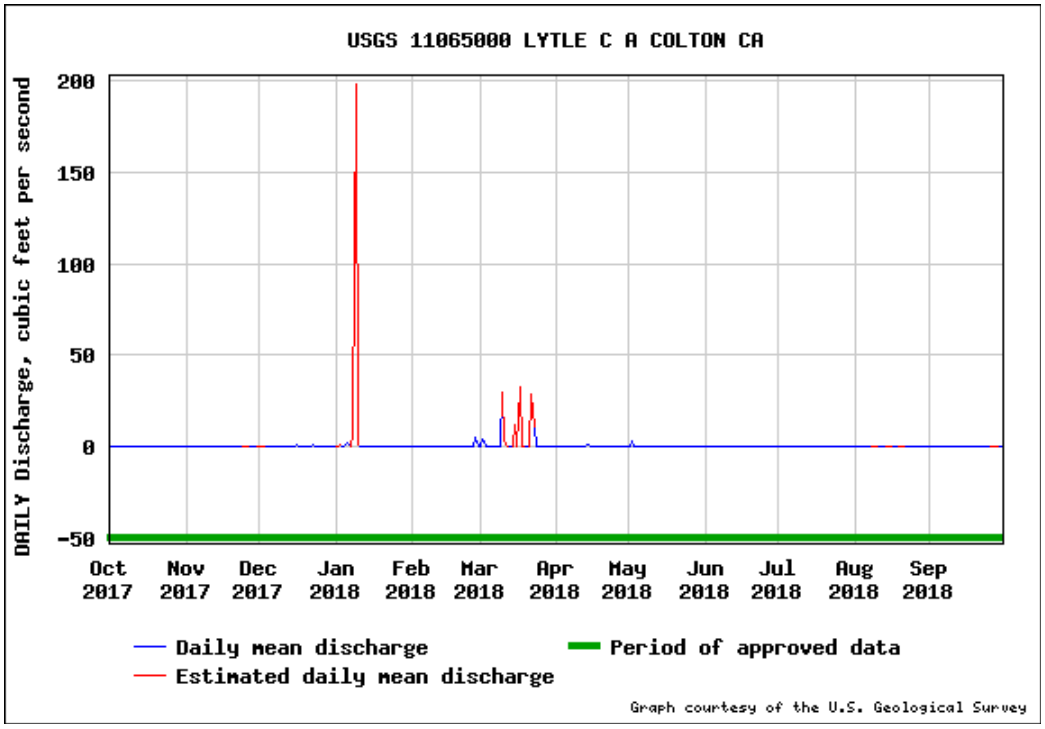
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	2.04	3.58	9.49	18.9	26.2	14.7	3.83	3.30	1.88	1.19	.80	.64
Max	83.2	79.1	142	318	363	326	57.3	87.6	61.3	35.4	17.1	9.58
(WY)	(2005)	(1966)	(2011)	(1969)	(1980)	(1978)	(1969)	(1969)	(1978)	(1978)	(1969)	(1980)
Min	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	(1958)	(1958)	(1959)	(1963)	(1961)	(1959)	(1961)	(1959)	(1958)	(1958)	(1958)	(1958)

Water-Data Report 2018
11065000 Lytle Creek at Colton, CA -- Continued

SUMMARY STATISTICS

	Water Year 2018		Water Years 1958 - 2018	
Annual total	410.1			
Annual mean	1.12		7.14	
Highest annual mean			65.4	1969
Lowest annual mean			0.008	1977
Highest daily mean	198.0	Jan 09	5,040	Jan 25, 1969
Lowest daily mean	0.0	Jul 21	0.0	Oct 01, 1957
Annual 7-day minimum	0.004	Aug 13	0.0	Oct 01, 1957
Maximum peak flow			17,500[a,b]	Mar 04, 1978
Maximum peak stage			14.80	Mar 04, 1978
Annual runoff (cfsm)	0.006		0.038	
Annual runoff (inches)	0.082		0.520	
10 percent exceeds	0.480		2.80	
50 percent exceeds	0.180		0.0	
90 percent exceeds	0.010		0.0	

[a] Discharge affected to unknown degree by Regulation or Diversion
[b] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11060400 Warm Creek near San Bernardino, CA

LOCATION - Lat 34°04'42", long 117°17'58" referenced to North American Datum of 1927, San Bernardino County, CA, Hydrologic Unit 18070203, in San Bernardino Grant, on left bank, 0.2 mi downstream from Interstate Highway 215 Bridge, and 2.0 mi southwest of San Bernardino.

DRAINAGE AREA - 11 mi².

REVISIONS HISTORY - WDR CA-83-1: Drainage area. WDR CA-92-1: 1978 (instantaneous maximum discharge), 1980-81 (instantaneous maximum discharge), 1983-86 (instantaneous maximum discharge).

SURFACE-WATER RECORDS

PERIOD OF RECORD - February 1964 to September 1972, October 1974 to current year. CHEMICAL DATA: Water years 1999-2004. SPECIFIC CONDUCTANCE: Water years 1999-2001. WATER TEMPERATURE: Water years 1999-2001. SEDIMENT DATA: Water years 1999-2004.

GAGE - Water-stage recorder and concrete-lined flood-control channel. Elevation of gage is 960 ft above NGVD of 1929, from topographic map. Prior to Oct. 1, 1974, at site 0.1 mi upstream at different datum.

REMARKS - Natural channel prior to October 1972; concrete-lined channel since October 1974. Possible diversion during high flows into Warm Creek from Lytle Creek flood detention basin 3.4 mi upstream. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 8,500 ft³/s, Mar. 4, 1978, gage height, 4.88 ft, from rating curve extended above 420 ft³/s, on basis of step-backwater analysis, maximum gage height, 6.33 ft, Nov. 22, 1965, site and datum then in use; no flow at times in some years.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&80060&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11060400&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	0.07	0.07	0.08	0.14	1.69	0.44	0.01	1.57	0.06	0.10	0.02	0.04
2	0.07	0.08	0.08	0.17	1.76	8.38	0.02	14.7	0.35	0.07	0.00	0.04
3	0.15	0.09	0.08	0.17	0.21	4.72	0.03	0.12	0.03	0.00	0.00	0.11
4	0.06	0.08	0.07	0.14	0.05	0.56	0.07	0.06	0.03	0.00	0.00	0.47
5	0.05	0.09	0.05	0.13	0.05	0.34	0.03	0.05	0.01	0.00	0.00	1.01
6	0.09	0.09	0.06	0.12	0.35	0.53	0.03	0.03	0.00	0.00	0.00	1.00
7	0.05	0.12	0.10	0.11	0.03	0.25	0.02	0.02	0.00	0.57	0.00	0.74
8	0.05	0.10	0.10	23.8	0.17	0.22	0.01	0.00	0.00	0.06	0.00	0.04
9	0.03	0.10	0.12	170	0.18	0.22	0.00	0.00	0.00	0.03	0.00	0.03
10	0.07	0.12	0.12	1.57	0.09	48.7	0.12	0.05	0.00	0.04	0.00	0.81
11	0.05	0.14	0.12	0.05	0.00	8.91	0.01	0.02	0.07	0.06	0.00	0.76
12	0.05	0.13	0.17	0.00	0.68	0.91	0.00	0.51	0.24	0.06	0.00	1.14
13	0.05	0.15	0.19	0.00	0.00	0.83	0.00	0.03	0.22	0.04	0.00	0.53
14	0.03	0.13	0.23	0.00	0.00	6.41	0.00	0.01	0.23	0.03	0.20	0.01
15	0.03	0.10	0.42	0.00	0.06	32.6	0.00	0.11	0.09	0.03	0.00	0.06
16	0.03	0.11	0.12	0.01	0.00	2.84	0.01	0.02	0.00	0.01	0.02	0.12
17	0.08	0.10	0.10	0.09	0.00	34.9	0.02	0.00	0.00	0.24	0.03	0.10
18	0.05	0.11	0.42	0.03	0.00	1.95	0.03	0.01	0.05	0.04	0.03	0.01
19	0.05	0.11	0.15	0.00	0.03	0.50	0.03	0.00	0.03	0.04	0.02	0.03
20	0.06	0.20	0.12	1.33	0.75	0.33	0.04	0.06	0.01	0.04	0.01	0.03
21	0.05	0.12	0.10	0.00	0.47	5.77	0.04	0.10	0.00	0.04	0.00	0.00
22	0.07	0.07	0.15	0.00	0.09	42.7	0.04	0.20	0.02	0.04	0.22	0.00
23	0.06	0.07	0.15	0.00	5.68	9.55	0.04	0.11	0.04	0.06	0.04	0.00
24	0.09	0.07	0.16	0.00	0.41	0.74	0.07	0.15	0.05	0.04	0.01	0.00
25	0.05	0.07	0.14	0.00	0.32	0.45	0.13	0.06	0.04	0.03	0.00	0.00
26	0.06	0.07	0.17	0.00	0.27	0.14	0.54	0.04	0.01	0.07	0.02	0.00
27	0.05	0.10	0.12	0.00	13.3	0.03	0.03	0.04	0.00	0.03	0.02	0.00
28	0.08	0.11	0.13	0.00	0.61	0.04	0.03	0.16	0.01	0.12	0.02	0.00
29	0.09	0.10	0.12	0.00		0.03	0.04	0.05	0.00	0.17	0.03	0.01
30	0.10	0.19	0.11	0.00		0.02	0.04	0.05	0.04	0.13	0.06	0.00
31	0.12		0.12	0.69		0.04		0.02		0.05	0.05	
Total	1.99	3.19	4.37	199	27.3	214	1.48	18.4	1.63	2.24	.80	7.09
Mean	.064	.11	.14	6.40	.97	6.90	.049	.59	.054	.072	.026	.24
Max	0.15	0.20	0.42	170	13.3	48.7	0.54	14.7	0.35	0.57	0.22	1.14
Min	0.03	0.07	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ac-ft	3.95	6.33	8.67	394	54.0	425	2.94	36.4	3.23	4.44	1.59	14.1

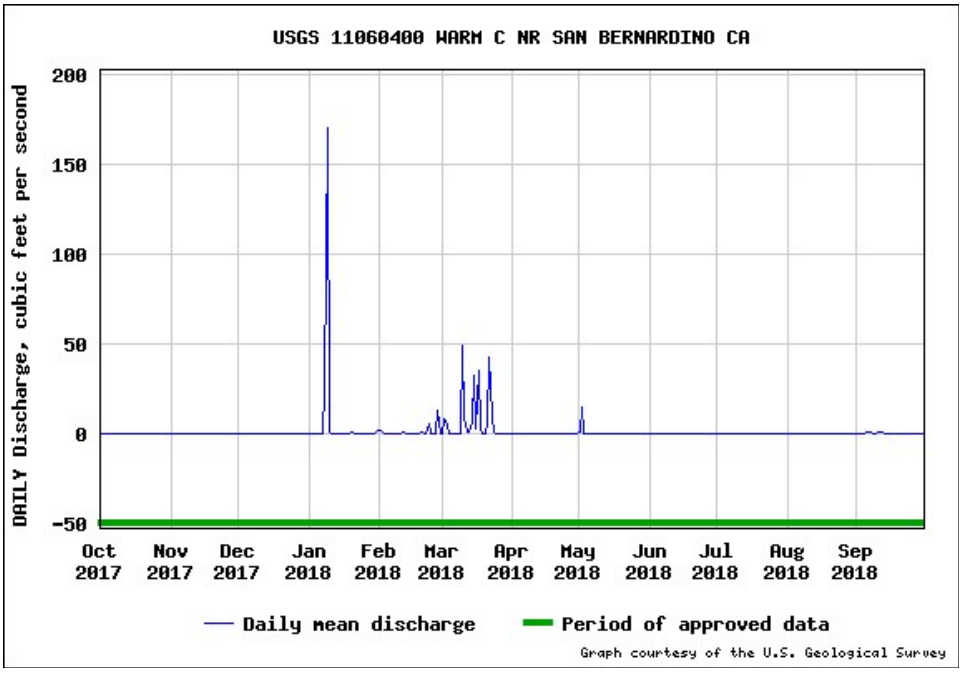
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	5.48	6.91	10.2	13.9	26.5	22.6	10.4	8.13	5.94	5.21	5.04	4.87
Max	32.4	33.1	48.3	41.2	418	376	44.2	86.7	43.6	34.5	50.6	30.3
(WY)	(1984)	(1986)	(2011)	(1993)	(1978)	(1978)	(1986)	(1980)	(1980)	(1980)	(1983)	(1983)
Min	.011	.087	.14	.066	.72	.12	.049	.076	.008	.011	.002	.022
(WY)	(2015)	(1996)	(2018)	(2003)	(2002)	(2015)	(2018)	(2016)	(2015)	(2016)	(2016)	(2016)

SUMMARY STATISTICS

	Water Year 2018		Water Years 1975 - 2018	
Annual total	481.0			
Annual mean	1.32		10.3	
Highest annual mean			70.5	1978
Lowest annual mean			1.23	2002
Highest daily mean	170.0	Jan 09	3,400	Mar 01, 1978
Lowest daily mean	0.0	Jan 12	0.0	Nov 29, 1974
Annual 7-day minimum	0.0	Jan 21	0.0	Dec 07, 1974
Maximum peak flow			8,500[a]	Mar 04, 1978
Maximum peak stage			4.88	Mar 04, 1978
Annual runoff (cfsm)	0.120		0.940	
Annual runoff (inches)	1.63		12.8	
10 percent exceeds	0.564		24.0	
50 percent exceeds	0.060		1.74	
90 percent exceeds	0.0		0.050	

[a] All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other



USGS Water-Year Summary 2018

11057500 San Timoteo Creek near Loma Linda, CA

LOCATION - Lat 34°03'41", long 117°16'00" referenced to North American Datum of 1927, in NW 1/4 NE 1/4 sec.26, T.1 S., R.4 W., San Bernardino County, CA, Hydrologic Unit 18070203, on left bank, 1,500 ft upstream from Redlands Boulevard Bridge, and 0.6 mi northwest of Loma Linda.

DRAINAGE AREA - 125 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD - October 1954 to September 1965, February 1968 to September 1975, April 1979 to current year. Discharge measurements only, October 1997 to September 1998. WATER TEMPERATURE: Water years 1979-82, 1992-94. SEDIMENT DATA: Water years 1979-82, 1992-94.

GAGE - Water-stage recorder and concrete-lined flood-control channel. Elevation of gage is 1,040 ft above NGVD of 1929, from topographic map. Prior to April 1979, water-stage recorder at site 0.45 mi downstream at different datum. April 1979 to Dec. 7, 1997, at site 0.25 mi downstream at different datum.

REMARKS - Since Dec. 7, 1997, channel is a trapezoidal concrete floodway. No regulation upstream from station. Natural flow affected by pumping and return flow from irrigated areas. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

EXTREMES FOR PERIOD OF RECORD - Maximum discharge, 15,000 ft³/s, Feb. 25, 1969, gage height, 8.2 ft, from floodmark, from rating curve extended above 2,100 ft³/s, on basis of slope-conveyance study of peak flow, at site and datum then in use; no flow for many days most years.

U.S. Department of the Interior
U.S. Geological Survey

Suggested citation: U.S. Geological Survey, 2019, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation), accessed [February 27, 2019], https://nwis.waterdata.usgs.gov/nwis/wys_rpt?dv_ts_ids=&8045&adr_begin_date=2017-10-01&adr_end_date=2018-09-30&site_no=11057500&agency_cd=USGS

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2017-10-01 to 2018-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2017	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018
1	1.59	2.10	2.93	3.66	13.2	5.86	e1.70	5.97	2.57	3.03	1.94	1.08
2	1.63	1.90	3.51	3.15	12.0	6.19	e2.40	e10.4	1.59	3.12	e1.66	1.12
3	1.36	2.33	3.99	3.64	6.19	13.7	e2.58	e2.50	1.13	3.21	e1.15	1.06
4	1.54	2.23	4.39	3.81	7.23	8.18	e2.76	1.89	1.23	e3.89	1.21	1.24
5	1.24	2.02	3.91	3.97	4.69	6.57	e1.96	1.84	1.10	3.00	2.88	1.27
6	0.77	3.10	3.88	6.61	5.49	6.73	e2.18	2.02	1.11	3.01	3.98	0.83
7	0.96	e5.59	4.32	7.14	5.29	2.53	e2.48	1.92	0.87	5.78	2.72	0.78
8	1.00	e5.19	3.13	18.3	5.33	6.44	e2.33	1.37	1.00	2.29	6.96	1.81
9	1.14	3.07	3.01	225	4.95	5.08	e2.29	1.02	0.78	2.66	6.52	0.94
10	0.98	2.98	2.98	144	4.51	12.5	e1.58	0.86	1.35	2.09	9.90	0.96
11	1.26	3.64	2.77	e41.0	9.17	35.3	1.43	1.45	1.15	2.72	2.83	1.96
12	1.48	3.99	3.41	e19.9	11.8	14.6	e0.98	1.59	1.14	2.85	2.58	1.71
13	1.66	3.05	3.05	12.0	14.3	7.96	1.27	2.37	1.64	1.80	2.38	1.49
14	1.90	2.50	2.70	12.9	e12.5	8.79	2.07	3.29	1.71	2.04	1.34	1.70
15	1.62	e3.39	2.62	18.0	e8.46	22.6	1.68	3.17	1.85	1.25	1.91	1.81
16	1.76	e5.71	3.27	14.0	5.87	21.0	1.92	2.73	1.65	1.29	1.83	3.51
17	1.00	e6.31	3.56	15.7	8.56	10.5	1.37	2.59	1.77	1.73	1.50	1.11
18	0.77	e4.41	3.63	14.0	4.46	e8.22	1.85	2.71	1.50	1.67	1.59	1.72
19	1.09	e5.47	3.16	16.9	6.23	e7.38	1.31	3.89	2.44	1.43	1.59	1.56
20	1.47	e6.96	3.98	23.8	6.94	e4.84	3.34	4.48	2.53	1.65	1.83	1.74
21	1.49	e6.82	2.91	20.4	6.02	e4.46	3.51	4.85	2.05	1.68	3.17	2.01
22	1.50	e4.13	3.05	15.5	5.62	e19.3	2.70	4.67	4.58	e1.88	1.58	1.50
23	1.30	3.74	3.44	8.44	5.07	10.7	3.22	5.39	4.34	e2.22	1.36	1.02
24	1.03	4.40	3.51	8.39	5.21	e5.24	3.01	3.92	4.30	2.30	1.88	1.94
25	1.61	3.08	3.64	7.36	11.1	e4.17	2.14	2.23	4.61	e1.71	2.40	2.36
26	0.75	2.50	3.93	8.34	6.03	e4.36	3.19	1.95	3.82	1.37	1.94	4.08
27	1.07	3.84	3.30	9.25	16.8	e4.65	2.47	1.77	3.03	1.08	2.20	2.04
28	0.85	3.14	3.55	10.2	6.72	e4.17	1.86	2.17	3.99	2.37	1.15	0.42
29	0.68	3.16	3.50	9.25		e2.07	2.17	0.88	3.86	1.23	0.80	0.40
30	0.94	3.19	3.12	10.1		e1.24	1.65	1.92	3.47	1.26	0.99	0.39
31	2.20		3.44	10.2		e1.46		2.25		1.10	2.17	
Total	39.6	114	106	725	220	277	65.4	90.1	68.2	68.7	77.9	45.6
Mean	1.28	3.80	3.41	23.4	7.85	8.93	2.18	2.91	2.27	2.22	2.51	1.52
Max	2.20	6.96	4.39	225	16.8	35.3	3.51	10.4	4.61	5.78	9.90	4.08
Min	0.68	1.90	2.62	3.15	4.46	1.24	0.98	0.86	0.78	1.08	0.80	0.39
Ac-ft	78.6	226	209	1,438	436	549	130	179	135	136	155	90.4

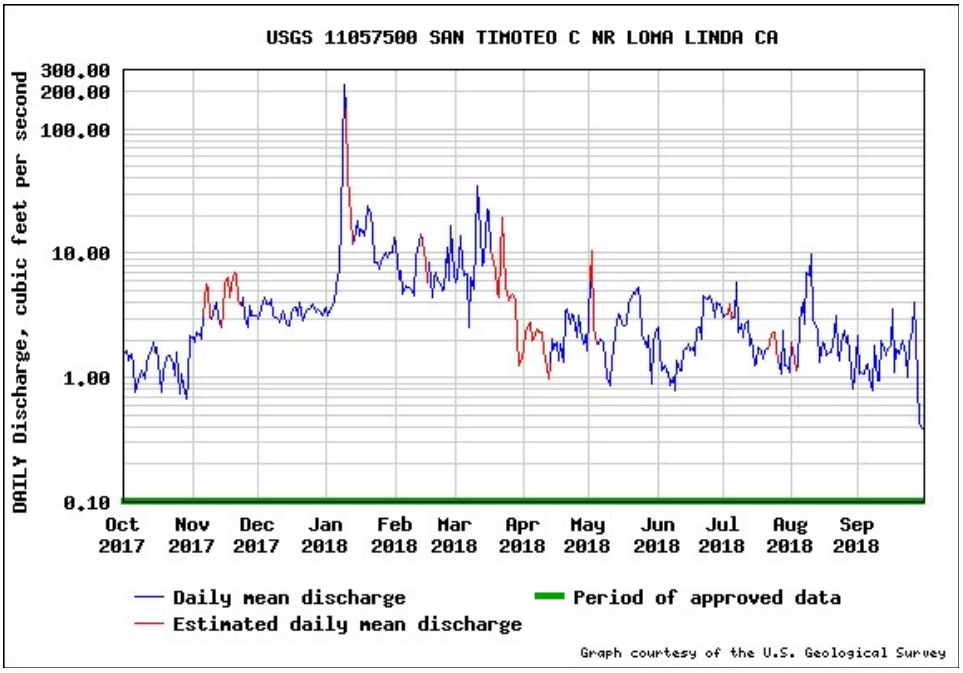
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1955 - 2018, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	2.04	2.84	6.74	14.4	13.9	7.86	3.37	1.90	1.24	.85	.80	.95
Max	39.8	16.5	76.2	124	186	53.7	23.1	12.7	7.37	6.82	3.06	4.95
(WY)	(2005)	(2014)	(2011)	(2005)	(1969)	(1991)	(2006)	(2016)	(2013)	(2015)	(2014)	(2015)
Min	.000	.000	.16	.079	.17	.000	.000	.000	.000	.000	.000	.000
(WY)	(1996)	(1996)	(1996)	(1972)	(1968)	(1997)	(1979)	(1996)	(1996)	(1995)	(1995)	(1995)

SUMMARY STATISTICS

	Water Year 2018		Water Years 1955 - 2018	
Annual total	1,896			
Annual mean	5.20		4.86	
Highest annual mean			25.3	2005
Lowest annual mean			0.447	2002
Highest daily mean	225.0	Jan 09	3,500	Feb 25, 1969
Lowest daily mean	0.390	Sep 30	0.0	Feb 04, 1968
Annual 7-day minimum	0.990	Oct 24	0.0	Apr 15, 1969
Maximum peak flow			15,000	Feb 25, 1969
Maximum peak stage			8.50[a]	Feb 16, 1980
Annual runoff (cfsm)	0.042		0.037	
Annual runoff (inches)	0.564		0.507	
10 percent exceeds	9.51		6.33	
50 percent exceeds	2.72		0.750	
90 percent exceeds	1.11		0.0	

[a] Gage datum changed during this year



APPENDIX B

DAILY PRECIPITATION DATA
FOR SAN BERNARDINO

WATER YEAR 2017-18

TABLE B-1

DAILY PRECIPITATION
USGS GILBERT STREET PRECIPITATION GAGE AT SAN BERNARDINO
NEAR FORMER COUNTY HOSPITAL SITE
(inches)

	2017			2018								
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.32	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.01	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00
12	0.00	0.00	0.00	0.01	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.05	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.01	0.51	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.15	0.13	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.01	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
Total	0.00	0.01	0.00	2.68	0.65	2.88	0.00	0.58	0.00	0.01	0.00	0.00

Total Rainfall = 6.81 Inches

APPENDIX C

SANTA ANA RIVER WATERMASTER
FINANCIAL STATEMENTS WITH REPORT
ON EXAMINATION BY
ORANGE COUNTY WATER DISTRICT CONTROLLER

WATER YEAR 2017-18

SINCE 1933

ORANGE COUNTY WATER DISTRICT

ORANGE COUNTY'S GROUNDWATER AUTHORITY

March 12, 2019

Santa Ana River Watermaster
C/O SBVMWD
P.O. Box 5906
San Bernardino, CA 92412-5906

Subject: Review of Fiscal Year 2017-18 Financial Transactions

Gentlemen:

I have reviewed the transactions and prepared the attached Statement of Assets and Liabilities comprised of cash transactions for the Santa Ana River Watermaster, and the related Statement of Revenue, Expenses and Changes in Fund Balance for the year ended June 30, 2018. This review includes examining supporting documentation that supports the amounts and disclosures in the financial statements. We have reviewed minutes of meetings, annual budgets as well as Bank of America Checking Accounts' transactions and statements, and have concluded that all transactions were properly recorded.

Best Regards,

ORANGE COUNTY WATER DISTRICT

Vishav Sharma
Finance Manager

CC: R. Fick

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

JUNE 30, 2018

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM CASH TRANSACTIONS

JUNE 30, 2018

ASSETS

Cash in Bank Account	$ 3,242

LIABILITIES AND NET ASSETS

Total Net Assets	$ 3,242

SANTA ANA RIVER WATERMASTER

STATEMENT OF REVENUE AND EXPENSES ARISING FROM CASH TRANSACTIONS

FOR THE PERIOD JULY 1, 2017 - JUNE 30, 2018

	Actual	Budget	Variance - Favorable (Unfavorable)	
REVENUE COLLECTED:				
Water District Contributions				
Orange County Water District	$ -	$ -	-	
Inland Empire Utilities Agency	-	-	-	
Western Municipal Water District	-	-	-	
San Bernardino Valley Municipal Water District	-	-	-	
TOTAL REVENUE COLLECTED	$ -	$ -	$ -	(A)
EXPENSES PAID:				
Professional Engineering Services - OCWD	$ 7,900	$ 7,900	0	(B)
Administrative Expenses:				
Auditing Services				
Reproduction of Annual Report	743	-	(743)	(C)
Bank service charges				
	$ 8,643	$ 7,900	$ (743)	
CHANGE IN NET ASSETS	$ (8,643)			
NET ASSETS - BEGINNING OF THE YEAR	$ 11,885			
NET ASSETS - END OF THE YEAR	$ 3,242			

(A) No revenue was budgeted or collected for the fiscal year 2017-18

(B) The payment of $7,900 to IEUA was for the work done during the FY 2016-2017.

(C) For the administrative expense of the WY 2016-17, the payment was made in June 2018 to OCWD.

SANTA ANA RIVER WATERMASTER

NOTES TO FINANCIAL STATEMENTS

JUNE 30, 2018

1. SIGNIFICANT ACCOUNTING POLICIES:

Basis of Accounting:

The Santa Ana River Watermaster's ("Watermaster") policy is to prepare its financial statements on the cash basis of accounting. Consequently, certain revenues are recognized when received rather than when earned, and certain expenses are recognized when cash is disbursed rather than when the obligation is incurred.

2. ORGANIZATION AND HISTORY:

The Santa Ana River Watermaster is composed of a committee of five representatives from four water districts. Two representatives serve from Orange County Water District and one representative each serves from the Inland Empire Utilities Agency, Western Municipal Water District and San Bernardino Valley Municipal Water District. The committee was established on April 23, 1969, by order of the Superior Court of California in Orange County as part of a judgment resulting from a lawsuit by the Orange County Water District as plaintiff vs. City of Chino, et al, as defendants.

Costs and expenses incurred by the individual representatives are reimbursed directly from the water districts. Collective Watermaster costs and expenses are budgeted and paid for by the Watermaster after receiving contributions from the water districts. Water districts contributions are made in the following ratios:

Orange County Water District	40%
Inland Empire Utilities Agency	20%
Western Municipal Water District	20%
San Bernardino Valley Municipal Water District	20%
Total	100%

For WY 2017-18, no contributions were budgeted or collected as the Secretary/Treasurer believed that the account had sufficient funds to cover the anticipated cost.

The Water master issues a report each year to satisfy its obligation to monitor and test water flows from the Upper Area to the Lower Area of the Santa Ana River.

3. CASH IN BANK:

The following disclosures are made in accordance with Statement No. 3 of the Governmental Accounting Standards Board (GASB 3):

Cash at June 30, 2018 consisted of the following:

Bank of America:	$3,242

All cash is fully insured by the FDIC.

APPENDIX D

WATER QUALITY AND DISCHARGE OF WATER RELEASED BY MWDSC TO SAN ANTONIO CREEK NEAR UPLAND (CONNECTION OC-59)

WATER YEAR 2017-18

There was no discharge of OC-59 water to Santa Ana River during the 2017-2018 water year.

APPENDIX E

WATER QUALITY AND DISCHARGE FROM THE SAN JACINTO WATERSHED

WATER YEAR 2017-18

There was no discharge of the San Jacinto Watershed to the Santa Ana River during the 2017-18 water year.

APPENDIX F

WATER QUALITY AND DISCHARGE OF THE SANTA ANA RIVER BELOW PRADO DAM

WATER YEAR 2017-18

TABLE F-1

WATER QUALITY SAMPLES BELOW PRADO DAM
WATER YEAR 2017-18

Date	TDS (mg/L)	EC (um/cm)	TDS/EC Ratio	Source
10/3/2017	697	1120	0.6223	USGS
10/19/2017	715	1190	0.6008	USGS
10/26/2017	715	1190	0.6008	USGS
11/7/2017	696	1130	0.6159	USGS
11/8/2017	696	1150	0.6052	USGS
11/28/2017	661	1090	0.6064	USGS
12/5/2017	673	1150	0.5852	USGS
12/19/2017	697	1140	0.6114	USGS
12/20/2017	706	1150	0.6139	USGS
1/10/2018	332	544	0.6103	USGS
1/11/2018	398	643	0.6190	USGS
1/18/2018	449	739	0.6076	USGS
1/23/2018	742	1230	0.6033	USGS
2/2/2018	684	1140	0.6000	USGS
2/8/2018	699	1150	0.6078	USGS
2/26/2018	648	1080	0.6000	USGS
2/27/2018	587	1020	0.5755	USGS
3/7/2018	665	1120	0.5938	USGS
3/14/2018	566	1340	0.4224	USGS
3/29/2018	684	1110	0.6162	USGS
3/29/2018	677	1110	0.6099	USGS
4/10/2018	669	1120	0.5973	USGS
4/12/2018	668	1130	0.5912	USGS
4/25/2018	668	1140	0.5860	USGS
4/26/2018	691	1160	0.5957	USGS
5/8/2018	691	1170	0.5906	USGS
5/10/2018	674	1150	0.5861	USGS
5/24/2018	674	1140	0.5912	USGS
5/24/2018	664	1120	0.5929	USGS
6/6/2018	682	1140	0.5982	USGS
6/7/2018	664	1130	0.5876	USGS
6/25/2018	675	1110	0.6081	USGS
6/27/2018	670	1120	0.5982	USGS
7/6/2018	742	1220	0.6082	USGS
7/18/2018	744	1210	0.6149	USGS
7/24/2018	726	1200	0.6050	USGS
8/8/2018	704	1160	0.6069	USGS
8/10/2018	726	1110	0.6541	USGS
8/23/2018	735	1220	0.6025	USGS
9/5/2018	734	1220	0.6016	USGS
9/10/2018	711	1080	0.6583	USGS
9/26/2018	671	1110	0.6045	USGS

TABLE F-2

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

October 2017

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	79	1,170	707	55,641
2	86	1,150	695	59,979
3	86	1,150	695	59,770
4	78	1,180	713	55,828
5	75	1,160	701	52,225
6	74	1,160	701	52,084
7	67	1,160	701	46,967
8	72	1,150	695	50,040
9	71	1,160	701	49,841
10	67	1,170	707	47,016
11	69	1,180	713	49,411
12	74	1,170	707	52,177
13	71	1,180	713	50,338
14	77	1,180	713	54,687
15	79	1,160	701	55,309
16	80	1,140	689	54,844
17	78	1,170	707	55,429
18	76	1,200	725	55,245
19	76	1,190	719	54,285
20	77	1,170	707	54,580
21	75	1,200	725	54,665
22	78	1,190	719	55,866
23	77	1,190	719	55,291
24	72	1,210	731	52,632
25	70	1,220	737	51,222
26	72	1,210	731	52,924
27	77	1,190	719	55,147
28	82	1,180	713	58,181
29	95	1,160	701	66,595
30	105	1,140	689	72,345
31	107	1,130	683	73,081
Total	2,420			1,713,644

Monthly Flow-weighted TDS = 708 mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

November 2017

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	116	1,110	670	77,720
2	108	1,120	676	73,008
3	102	1,110	670	68,340
4	107	1,110	670	71,690
5	107	1,090	658	70,406
6	109	1,080	652	71,068
7	96	1,110	670	64,119
8	101	1,110	670	67,670
9	89	1,120	676	60,096
10	88	1,120	676	59,285
11	89	1,120	676	60,029
12	96	1,120	676	64,693
13	102	1,120	676	68,952
14	107	1,100	664	71,048
15	108	1,100	664	71,712
16	110	1,100	664	73,040
17	110	1,100	664	73,040
18	104	1,110	670	69,680
19	102	1,110	670	68,340
20	101	1,110	670	67,670
21	98	1,110	670	65,928
22	99	1,120	676	66,924
23	100	1,120	676	67,262
24	101	1,110	670	67,670
25	93	1,130	683	63,178
26	94	1,130	683	64,407
27	103	1,110	670	69,010
28	106	1,100	664	70,384
29	98	1,120	676	66,316
30	102	1,130	683	69,666
Total	3,045			2,042,351

Monthly Flow-weighted TDS = 671 mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

December 2017

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	109	1,120	676	73,684
2	92	1,140	689	63,388
3	97	1,140	689	66,489
4	104	1,120	676	70,304
5	89	1,140	689	61,114
6	70	1,130	683	48,015
7	99	1,140	689	67,867
8	86	1,170	707	60,873
9	90	1,160	701	63,090
10	90	1,160	701	63,230
11	97	1,170	707	68,720
12	90	1,170	707	63,559
13	81	1,200	725	58,653
14	82	1,190	719	58,599
15	80	1,180	713	56,969
16	81	1,170	707	56,984
17	86	1,150	695	59,492
18	91	1,120	676	61,448
19	85	1,130	683	57,714
20	86	1,160	701	60,356
21	82	1,160	701	57,482
22	87	1,170	707	61,580
23	87	1,170	707	61,438
24	94	1,160	701	65,614
25	97	1,150	695	67,415
26	98	1,140	689	67,315
27	90	1,180	713	64,313
28	92	1,180	713	65,525
29	93	1,180	713	66,523
30	99	1,170	707	69,781
31	103	1,150	695	71,585
Total	2,804			1,959,117
		Monthly Flow-weighted TDS =	699	mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

January 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	106	1,140	689	73,034
2	109	1,160	701	76,409
3	99	1,170	707	69,852
4	101	1,200	725	73,225
5	106	1,190	719	76,214
6	111	1,160	701	77,811
7	118	1,130	683	80,594
8	139	1,070	646	89,794
9	218	582	352	76,736
10	260	561	339	88,140
11	390	663	400	156,000
12	482	637	385	185,570
13	473	714	431	203,863
14	466	648	391	182,206
15	464	608	367	170,288
16	578	614	371	214,438
17	654	673	406	265,524
18	595	768	464	276,080
19	386	846	511	197,246
20	372	941	568	211,296
21	357	957	578	206,346
22	353	1,030	622	219,566
23	300	1,160	701	210,300
24	166	1,160	701	116,366
25	152	1,110	670	101,840
26	150	1,100	664	99,600
27	142	1,100	664	94,288
28	136	1,090	658	89,488
29	134	1,080	652	87,368
30	126	1,090	658	82,908
31	130	1,100	664	86,320
Total	8,373			4,238,710
		Monthly Flow-weighted TDS =	506 mg/L	

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

February 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	130	1,070	646	83,980
2	130	1,070	646	83,980
3	121	1,090	658	79,618
4	131	1,100	664	86,984
5	133	1,110	670	89,110
6	124	1,150	695	86,180
7	125	1,150	695	86,875
8	129	1,140	689	88,881
9	119	1,150	695	82,705
10	108	1,170	707	76,356
11	109	1,180	713	77,717
12	131	1,110	670	87,770
13	139	1,100	664	92,296
14	136	1,100	664	90,304
15	116	1,120	676	78,416
16	110	1,150	695	76,450
17	112	1,140	689	77,168
18	119	1,130	683	81,277
19	126	1,110	670	84,420
20	125	1,110	670	83,750
21	126	1,110	670	84,420
22	126	1,120	676	85,176
23	124	1,120	676	83,824
24	117	1,120	676	79,092
25	122	1,120	676	82,472
26	110	1,090	658	72,380
27	94	985	595	55,990
28	216	669	404	87,264
Total	3,508			2,304,855
		Monthly Flow-weighted TDS =	657	mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

March 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	387	921	556	215,172
2	195	1,130	683	133,185
3	211	999	603	127,233
4	194	1,020	616	119,504
5	168	1,080	652	109,536
6	146	1,120	676	98,696
7	136	1,140	689	93,704
8	140	1,140	689	96,460
9	150	1,110	670	100,500
10	164	1,090	658	107,912
11	322	498	301	96,922
12	394	599	362	142,628
13	383	938	567	217,161
14	250	1,030	622	155,500
15	313	649	392	122,696
16	327	718	434	141,918
17	326	704	425	138,550
18	329	748	452	148,708
19	248	1,040	628	155,744
20	176	1,110	670	117,920
21	167	1,090	658	109,886
22	181	891	538	97,378
23	278	610	368	102,304
24	353	608	367	129,551
25	334	848	512	171,008
26	301	1,080	652	196,252
27	227	1,190	719	163,213
28	161	1,220	737	118,657
29	153	1,230	743	113,679
30	150	1,210	731	109,650
31	143	1,200	725	103,675
Total	7,407			4,054,902

Monthly Flow-weighted TDS = 547 mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

April 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	144	1,180	713	102,672
2	142	1,170	707	100,394
3	136	1,180	713	96,968
4	135	1,170	707	95,445
5	131	1,170	707	92,617
6	126	1,180	713	89,838
7	121	1,190	719	86,999
8	124	1,190	719	89,156
9	125	1,170	707	88,375
10	118	1,160	701	82,718
11	113	1,150	695	78,535
12	110	1,140	689	75,790
13	102	1,140	689	70,278
14	99	1,140	689	68,004
15	103	1,120	676	69,628
16	105	1,110	670	70,350
17	104	1,100	664	69,056
18	99	1,100	664	66,002
19	92	1,100	664	61,088
20	100	1,080	652	65,200
21	106	1,080	652	69,112
22	102	1,070	646	65,892
23	99	1,060	640	63,232
24	90	1,060	640	57,408
25	96	1,060	640	61,312
26	89	1,100	664	58,830
27	88	1,110	670	59,161
28	88	1,150	695	61,438
29	89	1,160	701	62,389
30	95	1,130	683	64,680
Total	3,270			2,242,567
		Monthly Flow-weighted TDS =	686 mg/L	

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

May 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	96	1,120	676	64,896
2	124	1,070	646	80,104
3	118	1,040	628	74,104
4	98	1,120	676	65,978
5	90	1,150	695	62,272
6	88	1,180	713	62,530
7	92	1,170	707	64,973
8	90	1,150	695	62,203
9	90	1,150	695	62,342
10	89	1,140	689	61,252
11	88	1,150	695	60,882
12	91	1,150	695	63,315
13	94	1,130	683	64,202
14	94	1,120	676	63,544
15	89	1,110	670	59,831
16	86	1,110	670	57,754
17	82	1,100	664	54,514
18	81	1,110	670	54,404
19	87	1,120	676	58,744
20	86	1,120	676	57,866
21	93	1,120	676	62,936
22	73	1,100	664	48,406
23	57	1,120	676	38,329
24	134	1,120	676	90,584
25	104	1,130	683	71,032
26	88	1,150	695	61,021
27	94	1,140	689	64,766
28	93	1,120	676	62,665
29	95	1,100	664	62,947
30	88	1,110	670	58,625
31	87	1,110	670	57,955
Total	2,855			1,934,975
		Monthly Flow-weighted TDS=	678 mg/L	

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

June 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	86	1,100	664	56,905
2	86	1,100	664	56,772
3	89	1,130	683	60,719
4	91	1,130	683	62,426
5	84	1,120	676	56,649
6	86	1,120	676	58,136
7	90	1,090	658	59,417
8	81	1,120	676	54,418
9	74	1,150	695	51,708
10	76	1,160	701	53,346
11	78	1,170	707	55,287
12	79	1,160	701	55,029
13	75	1,180	713	53,475
14	74	1,190	719	52,990
15	71	1,190	719	50,833
16	69	1,180	713	49,482
17	74	1,190	719	52,918
18	77	1,180	713	54,616
19	76	1,170	707	53,520
20	72	1,180	713	51,407
21	71	1,200	725	51,113
22	73	1,180	713	51,906
23	76	1,140	689	52,433
24	79	1,120	676	53,134
25	82	1,150	695	56,643
26	80	1,140	689	55,189
27	79	1,110	670	52,729
28	78	1,120	676	52,593
29	74	1,130	683	50,610
30	70	1,160	701	48,790
Total	2,346			1,625,193
		Monthly Flow-weighted TDS =	693	mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

July 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	70	1,170	707	49,207
2	66	1,170	707	46,733
3	65	1,190	719	46,951
4	63	1,190	719	45,369
5	59	1,190	719	42,421
6	60	1,180	713	42,566
7	59	1,160	701	41,499
8	66	1,160	701	46,126
9	61	1,160	701	42,621
10	58	1,160	701	40,868
11	59	1,170	707	41,713
12	61	1,180	713	43,778
13	61	1,170	707	43,056
14	59	1,180	713	41,782
15	62	1,210	731	45,395
16	62	1,200	725	45,095
17	60	1,170	707	42,349
18	57	1,170	707	40,299
19	52	1,180	713	37,361
20	51	1,180	713	36,648
21	53	1,190	719	38,107
22	63	1,260	761	48,171
23	67	1,280	773	51,714
24	61	1,260	761	46,193
25	57	1,250	755	42,809
26	55	1,240	749	41,120
27	55	1,220	737	40,314
28	56	1,210	731	40,644
29	58	1,160	701	40,868
30	54	1,160	701	38,064
31	50	1,170	707	35,491
Total	1,840			1,325,333
		Monthly Flow-weighted TDS =	720 mg/L	

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

August 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	53	1,180	713	37,789
2	56	1,170	707	39,733
3	52	1,180	713	36,862
4	55	1,210	731	39,840
5	59	1,200	725	42,558
6	61	1,170	707	43,198
7	57	1,170	707	40,158
8	55	1,180	713	39,144
9	62	1,180	713	44,063
10	51	1,190	719	36,885
11	39	1,260	761	29,527
12	43	1,280	773	33,162
13	50	1,260	761	38,202
14	51	1,250	755	38,807
15	52	1,240	749	39,248
16	52	1,220	737	38,545
17	61	1,210	731	44,591
18	61	1,200	725	44,153
19	55	1,210	731	39,840
20	56	1,200	725	40,673
21	53	1,190	719	38,107
22	53	1,170	707	37,683
23	51	1,180	713	36,648
24	52	1,190	719	37,604
25	51	1,220	737	37,587
26	54	1,240	749	40,746
27	58	1,220	737	42,820
28	60	1,210	731	43,933
29	56	1,220	737	41,419
30	56	1,220	737	41,346
31	54	1,220	737	40,093
Total	1,681			1,224,960
		Monthly Flow-weighted TDS =	729	mg/L

(1) TDS = EC x 0.6040

TABLE F-2 (continued)

SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2017-18

September 2018

Day	Prado Outflow (cfs)	Daily Median EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	56	1,210	731	40,790
2	59	1,200	725	42,920
3	64	1,190	719	46,160
4	60	1,210	731	43,860
5	61	1,220	737	45,252
6	61	1,220	737	44,589
7	62	1,220	737	45,326
8	59	1,210	731	43,348
9	61	1,210	731	44,299
10	63	1,210	731	45,688
11	66	1,200	725	47,850
12	67	1,210	731	48,904
13	65	1,200	725	47,415
14	70	1,200	725	50,460
15	65	1,200	725	47,053
16	65	1,200	725	47,125
17	71	1,190	719	50,833
18	70	1,170	707	49,773
19	67	1,180	713	47,771
20	66	1,200	725	47,633
21	68	1,200	725	49,518
22	72	1,190	719	51,480
23	73	1,180	713	52,049
24	86	1,170	707	60,590
25	87	1,180	713	62,174
26	88	--- [2]	---	---
27	86	--- [2]	---	---
28	81	1,140	689	55,671
29	76	1,150	695	52,890
30	79	1,150	695	54,836
Total	2,072			1,366,252
		Monthly Flow-weighted TDS =	720	mg/L
Total	1,898 [3]			

(1) TDS = EC x 0.6040

(2) Equipment malfunction thus EC data are missing for 09/26/2018 and 09/27/2018. Flow data period of missing EC are excluded in the monthly flow-weighted TDS calculation.

(3) Total outflow less days where data is missing.

TABLE F-3

ANNUAL SUMMARY OF FLOW-WEIGHTED TDS BELOW PRADO DAM

WATER YEAR 2017-18

Month	Monthly Flow [1] (cfs-days)	Monthly Flow-weighted TDS[1] (mg/L)	Monthly Flow x TDS
2017			
October	2,420	708	1,713,644
November	3,045	671	2,042,351
December	2,804	699	1,959,117
2018			
January	8,373	506	4,238,710
February	3,508	657	2,304,822
March	7,407	547	4,054,902
April	3,270	686	2,242,567
May	2,855	678	1,934,975
June	2,346	693	1,625,193
July	1,840	720	1,325,333
August	1,681	729	1,224,960
September	2,072	720	1,366,252
Total	41,621 [1]		26,032,824
	Yearly Flow-weighted TDS[1] =	625	

(1) Prado Outflow and Flow Weighted TDS values exclude days when EC data are missing

APPENDIX G

WATER QUALITY AND FLOW OF WASTEWATER FROM RUBIDOUX COMMUNITY SERVICES DISTRICT DISCHARGED BELOW THE RIVERSIDE NARROWS GAGING STATION

WATER YEAR 2017-18

TABLE G-1

QUANTITY AND QUALITY OF WASTEWATER FROM RUBIDOUX
DISCHARGED BELOW THE
RIVERSIDE NARROWS GAGING STATION

WATER YEAR 2017-18

MONTH	Discharge (acre -feet)	TDS (mg/L)	Discharge xTDS
2017			
October	187	963	180,081
November	180	881	158,580
December	181	768	139,008
2018			
January	184	887	163,208
February	166	848	140,768
March	182	1002	182,364
April	176	1002	176,352
May	181	959	173,579
June	180	979	176,220
July	187	897	167,739
August	192	978	187,776
September	180	895	161,100
Total	2,176		2,006,775

Flow weighted TDS = 922 mg/L

APPENDIX H

WATER QUALITY AND DISCHARGE OF THE SANTA ANA RIVER AT RIVERSIDE NARROWS

WATER YEAR 2017-18

TABLE H-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2017-18

Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data		Ratio	Monthly Average TDS
2017						
10/03/17	1050	636	USGS		0.61	
10/04/17	1058	656	C of R		0.62	
10/11/17	1056	664	C of R		0.63	
10/18/17	1068	692	C of R		0.65	
10/25/17	1064	650	C of R		0.61	
10/26/17	1030	619	USGS		0.60	***653***
11/01/17	1032	636	C of R		0.62	
11/08/17	1020	641	USGS		0.63	
11/08/17	1048	650	C of R		0.62	
11/15/17	1024	604	C of R		0.59	
11/22/17	1060	644	C of R		0.61	
11/28/17	1040	645	USGS		0.62	
11/29/17	1060	676	C of R		0.64	***642***
12/05/17	1040	648	USGS		0.62	
12/06/17	1047	638	C of R		0.61	
12/13/17	1067	660	C of R		0.62	
12/19/17	1050	615	USGS		0.59	
12/20/17	1061	636	C of R		0.60	
12/27/17	1044	654	C of R		0.63	***642***
2018						
01/03/18	1036	644	C of R		0.62	
01/10/18	470	378	C of R	*	0.80	
01/10/18	444	288	USGS	*	0.65	
01/17/18	1033	628	C of R		0.61	
01/18/18	1030	626	USGS		0.61	
01/24/18	1033	650	C of R		0.63	
01/31/18	1050	648	C of R		0.62	***639***
02/02/18	1020	651	USGS		0.64	
02/07/18	1053	656	C of R		0.62	
02/14/18	1034	636	C of R		0.62	

TABLE H-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2017-18

Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Monthly Average TDS
02/21/18	1042	670	C of R	0.64	
02/28/18	987	626	C of R	0.63	
02/28/18	952	582	USGS	0.61	***637***
03/07/18	1000	604	USGS	0.60	
03/07/18	1032	646	C of R	0.63	
03/14/18	1007	646	C of R	0.64	
03/21/18	988	634	C of R	0.64	
03/28/18	1017	632	C of R	0.62	
03/29/18	979	604	USGS	0.62	***628***
04/04/18	1012	630	C of R	0.62	
04/10/18	1010	615	USGS	0.61	
04/11/18	1012	650	C of R	0.64	
04/18/18	1014	668	C of R	0.66	
04/25/18	1034	666	C of R	0.64	
04/26/18	1000	607	USGS	0.61	***639***
05/02/18	844	514	C of R	0.61	
05/08/18	986	599	USGS	0.61	
05/09/18	1048	700	C of R	0.67	
05/16/18	1049	670	C of R	0.64	
05/23/18	995	676	C of R	0.68	
05/24/18	1020	611	USGS	0.60	
05/30/18	1039	662	C of R	0.64	***633***
06/06/18	1042	666	C of R	0.64	
06/07/18	1140	628	USGS	0.55	
06/13/18	1044	682	C of R	0.65	
06/21/17	1038	574	C of R	0.55	
06/25/18	1140	634	USGS	0.56	
06/27/18	1033	580	C of R	0.56	***627***
07/04/18	1039	626	C of R	0.60	
07/06/18	1020	623	USGS	0.61	

TABLE H-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2017-18

Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Monthly Average TDS
07/11/18	1047	686	C of R	0.66	
07/18/18	1024	696	C of R	0.68	
07/24/18	1040	622	USGS	0.60	
07/25/18	1042	642	C of R	0.62	***649***
08/01/18	1053	648	C of R	0.62	
08/10/18	1040	640	USGS	0.62	
08/08/18	1050	680	C of R	0.65	
08/15/18	1193	668	C of R	0.56	
08/22/18	1011	640	C of R	0.63	
08/23/18	1050	636	USGS	0.61	
08/29/18	1023	642	C of R	0.63	***651***
09/05/18	1021	654	C of R	0.64	
09/10/18	1010	620	USGS	0.61	
09/12/18	1011	648	C of R	0.64	
09/19/18	1018	652	C of R	0.64	
09/26/18	1010	635	USGS	0.63	
09/26/18	1015	694	C of R	0.68	***651***
Max	1193	700		0.804	653
Min	444	288		0.551	627

* TDS data not used in determining monthly averages
C of R City of Riverside
USGS U.S. Geological Survey

TABLE H-2

ANNUAL SUMMARY OF FLOW-WEIGHTED TDS AT RIVERSIDE NARROWS
WATER YEAR 2017-18

Month	Stream Flow [1] (acre-feet)	Monthly Average TDS [2] (mg/L)	Stream Flow x TDS
2017			
October	1,849	653	1,207,089
November	2,164	642	1,389,906
December	2,318	642	1,487,770
2018			
January	2,408	639	1,539,194
February	2,456	637	1,564,063
March	2,936	628	1,842,829
April	2,542	639	1,625,185
May	2,180	633	1,380,251
June	1,871	627	1,173,741
July	1,845	649	1,197,713
August	1,825	651	1,187,293
September	1,808	651	1,176,104
Total	26,202		16,771,137

$$\text{Flow weighted TDS} = \frac{16{,}771{,}137}{26{,}202} = 640 \text{ mg/L}$$

(1) USGS measured flow minus storm flow.

(2) TDS based on water quality data from Table H-1.