SANTA ANA RIVER WATERMASTER

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

WATERMASTER
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June 30, 2012

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

Re: Watermaster Report for Water Year October 1, 2010 - September 30, 2011

Ladies and Gentlemen:

We have the honor of submitting herewith the Forty-first 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 2010-11 are as follows:

At Prado

1	Measured Outflow at Prado	324,892	acre-feet
2	Base Flow at Prado	102,031	acre-feet
3	Annual Weighted TDS in Base and Storm Flows	528	mg/L
4	Annual Adjusted Base Flow	116,655	acre-feet
5	Cumulative Adjusted Base Flow	5,021,659	acre-feet
6	Other Credits (Debits)	1,193	acre-feet
7	Cumulative Entitlement of OCWD	1,722,000	acre-feet
8	Cumulative Credit	3,339,059	acre-feet
9	One-Third of Cumulative Debit	0	acre-feet
10	Minimum Required Base Flow in 2011-12	34,000	acre-feet

At Riverside Narrows

1	Base Flow at Riverside Narrows	49,753	acre-feet
2	Annual Weighted TDS in Base Flow	654	mg/L
3	Annual Adjusted Base Flow	49,753	acre-feet
4	Cumulative Adjusted Base Flow	1,846,883	acre-feet
5	Cumulative Entitlement of IEUA and WMWD	625,250	acre-feet
6	Cumulative Credit	1,221,633	acre-feet
7	One-Third of Cumulative Debit	0	acre-feet
8	Minimum Required Base Flow in 2011-12	12,420	acre-feet

Based on these findings, the Watermaster concludes that there was full compliance with the provisions of the Stipulated Judgment in 2010-11.

At the end of the 2010-11 water year, Inland Empire Utilities Agency (formerly Chino Basin Municipal Water District) and Western Municipal Water District have a cumulative credit of 3,339,059 acre-feet to their Base Flow obligation at Prado Dam. San Bernardino Valley Municipal Water District has a cumulative credit of 1,221,633 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.

Sincerely yours,

Santa Ana River Watermaster

By: Samuel H. Fuller

Samuel H. Fuller

Michael R. Markus

Roy L. Herndon

John V. Rossi

Thomas A. Love

SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

v. CITY OF CHINO, et al.

CASE NO. 117628 - COUNTY OF ORANGE

FORTY-FIRST
ANNUAL REPORT
OF THE
SANTA ANA RIVER WATERMASTER

FOR WATER YEAR
OCTOBER 1, 2010 - SEPTEMBER 30, 2011

JUNE 30, 2012

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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-first Annual Report of the Santa Ana River Watermaster covers Water Year 2010-11. 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 duty of the Watermaster is 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.) For this Forty-first annual report the Watermaster requested an extension of time allowed to submit this Forty-first annual report for an additional four months to eleven months after the end of the water year (August 31.) The Watermaster requested this additional time to allow discussions of the issues related to the release of water that had been captured at Seven Oaks Dam.

For the Water Year 2010-11 the Watermaster consisted of Samuel H. Fuller, Roy L. Herndon, Thomas A. Love, Michael R. Markus, and John V. Rossi. Mr. Love was elected Chairman and Mr. Fuller was elected Secretary/Treasurer at the December 9, 2011 meeting. The history of the Watermaster Committee 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 Watermaster's determinations.

For Water Year 2010-11 the United States Geological Survey (USGS) provided discharge and water quality data for the River at two gaging stations, "Santa Ana River Below Prado" (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), based on continuous recordings. The water quality data at Prado consist of daily maximum and minimum and mean values for electrical conductivity (EC), measured as specific conductance and expressed in microsiemens per centimeter (μs/cm) based on a continuous recording, and twice-monthly measured values for total dissolved solids (TDS), expressed in milligrams per liter (mg/L). The water quality data at Riverside Narrows consist of twice-monthly values for both EC and TDS. 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, Chino Creek at Schaefer Avenue, Cucamonga Creek near Mira Loma, and Temescal Creek in the City of Corona (see Appendix A). At times the USGS must estimate daily mean discharges due to damaged or malfunctioning recording equipment.

The Water Year 2010-11 daily mean discharge record at Prado is considered by the USGS to be "fair". 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, 5,010 cfs on December 30, 2010 and 58 cfs on September 29, 2011. The maximum and minimum daily flow-weighted mean EC values reported by the USGS at Prado were 1,346 μs/cm on June 27, 2011 and 472 μs/cm on March 4, 2011, respectively. The corresponding calculated TDS concentrations were 825 and 289 mg/L. EC records were rated "good" by the USGS.

The Water Year 2010-11 daily mean discharge record at Riverside Narrows was rated by the USGS to be "poor". The maximum and minimum daily mean discharge values during the year were 17,400 cfs on December 22, 2010 and 36 cfs on August 22, 2011, respectively. The maximum and minimum EC values reported by the USGS were 1,130 μs/cm on July 29, 2011 and 609 μs/cm on March 24, 2011, respectively. The corresponding measured TDS concentrations were 709 mg/L and 367 mg/L.

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 San Bernardino County Department of Public Works (SBCDPW) Station 2146, located at the San Bernardino County Hospital, was used to define the hydrologic base period for the physical solution in the Judgment, and until Water Year 2000-01 the annual reports of

the Watermaster presented the daily and total annual precipitation record at Station 2146 in order 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 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 2003-04 Water Year 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.

For Water Year 2010-11, the total precipitation recorded at the Gilbert Street gage was 23.50 inches, or 131% 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 reported by the Watermaster from 1934-35 through 2010-11.

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.

The United States Army Corps of Engineers (USACE) constructed Seven Oaks Dam as a flood control facility. Seven Oaks Dam is located on the Santa Ana River East of Highland, California, about one mile upstream from the Greenspot Road Bridge crossing and about one-half mile upstream from the United States Geological Survery streamgage, "Santa Ana River near Mentone." During Water Year 2009-10 and during Water Year 2010-11, the USACE stored storm flow runoff from the Santa Ana River Watershed area in the reservoir created by Seven Oaks Dam. The USACE stored this water to test the outlet structure of Seven Oaks Dam. The USACE performed the testing of the outlet structure in July 2010 and in late March 2011 and early April 2011. The release of water from Seven Oaks Dam at times when no storms were present in the Santa Ana River Watershed area resulted in an identifiable increase in the flow at both the Riverside Narrows and Prado points of measurement. The Watermaster is assured that the USACE will not soon repeat this outlet structure testing process and that the releases of water from Seven Oaks Dam will be made in accordance with the control manual for the facility. The Watermaster has determined that the releases from Seven Oaks Dam during July 2010 and late March 2011 and April 2011 were unique and likely will not recur and for these specific events, the water that was released from Seven Oaks Dam and that was identified at Riverside Narrows and at Prado will be considered Storm Flow. The Watermaster agrees that this determination does not establish a precedent for determining the character of flow in the future. The Watermaster may in the future consider the releases from Seven Oaks Dam as either Base Flow or Storm Flow independent of the determination made for Water Years 2009-10 and 2010-11.

During Water Year 2010-11 there were no sources of nontributary flow in the river at Riverside Narrows. There were two sources of nontributary flow in the river at Prado, that the Watermaster has not included in Base Flow:

- A total of 11,874 acre-feet of Nontributary Flow attributable to imported State Water Project water purchased by OCWD arrived at Prado. Of this water, 10,102 acre-feet was released at the OC-59 turnout from MWDSC's Foothill Feeder into San Antonio Creek, 932 acre-feet was released at IEUA turnout CB-11 into Haven Avenue Storm Drain, and 840 acre-feet was released at IEUA turnout CB-18 into San Sevaine Channel.
- Eastern Municipal Water District (EMWD) reported that it discharged 5,680 acre-feet of treated wastewater to Temescal Creek, with a flow-weighted average TDS of 682 mg/L, that originated in the San Jacinto River Watershed. Discharges from the San Jacinto Watershed were not taken into account in the settlement discussions and calculations that led to the flow obligations in the Judgment. In the past the Watermaster decided

that fifty percent of any portion of such discharges that reach Prado Reservoir and that are subsequently captured by OCWD should be added to the Cumulative Credit at Prado (after the usual water quality adjustment). OCWD Hydrogeologist Gwen Sharp estimated that 5,418 acre-feet of the EMWD treated wastewater, with an average TDS concentration of 715 mg/L, reached Prado Reservoir and that 2,385 acre-feet of it was captured by OCWD, and recommended that the Cumulative Credit at Prado be increased accordingly using the previously established fifty percent rule. The Watermaster accepted the estimate and the recommendation.

The Watermasters' determinations for Water Year 2010-11 are explained in detail for Prado in Chapter II and for Riverside Narrows in Chapter III. A summary of annual determinations by the Watermaster for both locations for the period 1970-71 through 2010-11 is presented in Table 1. Note that the Base Flow obligations set forth in the Judgment at both Prado and Riverside Narrows have been met and cumulative credits have accrued to the Upper Area.

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]
1970-71	11.97	51,864	51,864	38,402	727	38,402	-3,598
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	33.41	462,646	456,316	154,021	392	193,553	1,836,100
1998-99	8.02	184,998	182,310	158,637	581	174,369	1,968,469
1999-00	11.09	207,850	188,538	148,269	527	169,644	2,096,113
2000-01	16.13	222,559	208,535	153,914	525	176,360	2,230,473
2001-02	5.08	174,968	156,596	145,981	587	159,728	2,348,201
2002-03	16.22	256,157	245,947	146,113	463	174,970	2,482,058
2003-04	10.80	214,102	201,967	143,510	508	166,472	2,606,777
2004-05	29.89	638,513	637,568	154,307	348	199,570	2,766,713
2005-06	13.23	247,593	246,101	147,736	517	170,266	2,898,541
2006-07	4.61	156,147	153,823	129,830	604	140,216	3,002,288
2007-08	13.70	199,690	194,309	116,483	495	136,382	3,100,835
2008-09	10.14	162,698	161,026	102,711	527	117,519	3,178,543
2009-10	17.79	243,776	243,690	103,099	443	125,179	3,263,211
2010-11	23.50	324,892	313,018	102,031	528	116,655	3,339,059

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]
1970-71	11.97	42,732	24,112	17,061	704	17,012	1,762
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	13.70	78,619	74,554	46,776[6]	674	46,776[6]	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

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 amount for 2007-08 at Riverside Narrows was published as 47,760 acre-feet in the 2007-08 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 Watermaster's determinations, do have significant potential to affect River flow or quality. The following are brief descriptions of five such items.

Upper Area Treated Wastewater Discharges

Data on treated wastewater discharged in the Upper Area are compiled annually because it 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) 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 first went into service in 1985-86. The NRWS has been in service since prior to 1970, but records of flow data prior to 1981-82 are missing.

The locations of the SARI 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 streamflows. 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 4,300 acres of *Arundo* in the Watershed.

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

Water Year	Treated wastewater discharges upstream from Colton that generally do not flow continuously to Santa Ana River above E Street				Treated wastewater discharges to Santa Ana River and its tributaries that have hydraulic continuity to the Santa Ana River above Riverside Narrows					Treated wastewater discharges to Santa Ana River between Riverside Narrows and Prado Dam								Treated 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 Treated Wastewater Discharged in Watershed
	Redlands	Beaumont	Yucaipa	Subtotal (A)	San Bernardino	Colton	Rialto	RIX[1]	Subtotal (B)	Riverside	Corona	IEUA #1[2]	IEUA #2	IEUA #5	IEUA CCWRF[3]	WRCR[4]	Subtotal (C)	EMWD Discharge (1)	Est. EMWD Arriving at Prado (2)	Elsinore Valley MWD (3)	Lee Lake WRP (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	1,690	--	--	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	109,299	--	--	3,049	--	3,049	166,459	178,333
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	--	--	4,477	352	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	5,012	444	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	5,037	549	6,726	166,385	181,906
2004-05	7,632	2,051	3,899	13,582	4,406	183	7,815	42,025	54,429	38,123	12,558	40,644	--	8,777	8,637	3,521	112,260	15,195	13,746	7,025	653	21,424	188,113	203,144
2005-06	5,789	2,246	3,945	11,980	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	6,259	701	19,591	180,619	194,637
2006-07	4,991	2,555	4,056	11,602	10	0	7,654	44,011	51,675	36,355	11,727	31,829	--	12,534	6,851	4,376	103,672	13,105	11,092	4,792	691	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	1,553	811	11,294	158,839	171,293
2008-09	2,386	2,894	3,993	9,273	263	0	6,724	40,310	47,297	33,636	9,062	23,854	--	9,711	8,920	6,374	91,557	6,669	4,653	518	948	6,119	144,973	156,262
2009-10	2,876	2,956	4,105	9,937	298	0	6,658	40,672	47,628	33,731	8,808	21,983	--	8,046	7,258	6,153	85,979	4,961	4,814	876	934	6,624	140,231	150,315
2010-11	3,271	3,050	4,196	10,517	1,292	0	6,710	39,333	47,335	33,487	9,275	18,177	--	7,279	5,987	6,486	80,691	5,680	5,418	4,464	622	10,504	138,530	149,309

1. RIX = Rapid Infiltration and Extraction Facility for San Bernadino and Colton, including over-extraction of groundwater
2. Beginning in 1997-98, includes IEUA Plant #4 flows.
3. CCWRF = Carbon Canyon Water Reclamation Facility
4. WRCR = Western Riverside County Regional Wastewater Treatment Plant

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	Santa Ana Watershed Project Authority Santa Ana Regional Interceptor (SARI)[1]		
	North System (acre-feet)	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

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 ("HCP") 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.

The Chino Basin Watermaster files an annual report with RWQCB on the program, water chemistry, hydrologic balance, piezometric groundwater surface elevations, and groundwater modeling.

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 2010-11 fiscal year as well as the budget adopted for the 2011-12 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, 2010 to June 30, 2011 Budget	July 1, 2010 to June 30, 2011 Expenses	July 1, 2011 to June 30, 2012 Budget
Support Services	$12,500.00	$10,180.00	$12,500.00
Reproduction of Annual Report	1,500.00	880.71	1,500.00
TOTAL	$14,000.00	$11,060.71	$14,000.00

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 2010-11, 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, 2010 to September 30, 2011

	Total Cost	USGS Share	Parties' Share
USGS PRECIPITATION GAGING STATIONS			
Gilbert Street Gage at San Bernardino	$7,850	$0	$7,850
"E" Street Gage	7,850	0	7,850
Middle Fork Lytle Creek Gage	7,850	0	7,850
Ridge Top Gage near Devore	7,850	0	7,850
USGS FLOW AND WATER QUALITY GAGING STATIONS			
Santa Ana River at MWD Crossing (Riverside Narrows)			
Surface Water Gage	31,500	12,600	18,900
Water Quality Monitoring/TDS Sampling	13,050	5,200	7,850
Santa Ana River below Prado Dam			
Surface Water Gage	22,400	8,950	13,450
Continuous Temperature and Conductance	29,950	11,950	18,000
Water Quality Conductance Program	2,500	0	2,500
Extra Measurements	2,800	0	2,800
Temescal Creek above Main St., near Corona	22,400	8,950	13,450
Chino Creek at Schaefer	22,400	8,950	13,450
Cucamonga Creek at Mira Loma	22,400	8,950	13,450
TOTAL COST AND SHARES	$200,800	$65,550	$135,250
COST DISTRIBUTION AMONG PARTIES			
Inland Empire Utilities Agency	20%		$27,050
Orange County Water District	40%		$54,100
San Bernardino Valley Municipal Water District	20%		$27,050
Western Municipal Water District	20%		$27,050

CHAPTER II

BASE FLOW AT PRADO

This chapter deals with determinations of 1) the components of flow at Prado, which include Nontributary Flow, Arlington Desalter discharge, 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 2010-11, the flow of the River as measured at the USGS gaging station below Prado Dam amounted to 324,892 acre-feet. One acre-foot of water was in storage at the beginning of the Water Year, and no water remained in storage at the end of the Water Year. Inflow to the reservoir included 102,031 acre-feet of Base Flow and 205,568 acre-feet of Storm Flow. Nontributary flows consisted of State Water Project water discharges. Water discharged from the San Jacinto Watershed was also excluded from Base Flow, but was partially credited to the Cumulative Credit at Prado. Of the flow due to State Water Project water discharge, 11,874 acre-feet reached Prado Reservoir during Water Year 2010-11. Discharge from the San Jacinto Watershed calculated to have reached Prado Reservoir was 5,418 acre-feet. The monthly components of flow of the River at Prado Dam for Water Year 2010-11 are listed in Table 6 and are shown graphically on Plate 4. Historical Base and Storm Flows of the Santa Ana River below Prado during the period Water Years 1934-35 through 2010-11 are presented on Plate 5.

As noted in the Fortieth Annual Report for Water Year October 1, 2009 – September 30, 2010, the United States Army Corps of Engineers (USACE) stored storm water in the reservoir upstream from Seven Oaks Dam to allow testing of the outlet structure in Seven Oaks Dam during July 2010. The USACE also stored water and then released that stored water from Seven Oaks Dam late in March, 2011 and early April, 2011 to complete the testing of the outlet structure. The released water was identifiable on the hydrograph for Prado. The releases were made at times when no storms were identifiable in the Santa Ana River Watershed area. For these events, and with no intent to establish a precedent for characterizing the flow in the future as either Base Flow or Storm Flow, the Watermaster has determined that the water released for testing of the outlet structure at Seven Oaks Dam is Storm Flow.

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 2010-11 it included State Water Project water. Some flows from the San Jacinto Watershed were also determined to have reached Prado Reservoir. In the past nontributary flows have included, and in the future may include, other water discharged to the river pursuant to the water exchanges or other such programs.

TABLE 6

COMPONENTS OF FLOW AT PRADO DAM
WATER YEAR 2010-11
(acre-feet)

	USGS Measured Outflow	Storage Change (1)	Computed Inflow	San Jacinto Watershed Flow at Prado (2)	WMWD Transfer Water (3)	San Antonio Creek (4)	Haven Avenue Storm Drain & San Sevaine Channel (5)	Storm Flow	Base Flow
2010									
October	8,341	324	8,665	0	0	0	0	1,456	7,209
November	9,515	1,750	11,265	0	0	0	0	2,640	8,625
December	79,912	70,946	150,858	0	0	0	0	140,300	10,558
2011									
January	86,951	(63,919)	23,032	2,200	0	0	0	9,086	11,746
February	33,685	681	34,366	932	0	0	0	21,875	11,559
March	26,063	9,880	35,943	1,580	0	0	0	22,872	11,491
April	21,475	(6,113)	15,362	706	0	0	0	5,505	9,151
May	14,162	(5,340)	8,822	0	0	0	0	1,345	7,477
June	15,933	(8,210)	7,723	0	0	22	0	0	7,701
July	10,984	6	10,990	0	0	4,615	0	316	6,059
August	10,951	(6)	10,945	0	0	3,597	1,772	173	5,403
September	6,920	0	6,920	0	0	1,868	0	0	5,052
Total	324,892	(1)	324,891	5,418	0	10,102	1,772	205,568	102,031

(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) WMWD-OCWD Transfer Program water pumped from the Bunker Hill, Riverside, and Colton basins and discharged to the Santa Ana River above the Riverside Narrows delivered this year.

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

(5) State Water Project water released for OCWD into Haven Avenue Storm Drain from turnout CB-11 and into San Sevaine Channel from turnout CB-18 and calculated to have reached Prado Dam this Water Year.

High Groundwater Mitigation Project

No High Groundwater Mitigation Project water was discharged to the River during Water Year 2010-11.

Releases to San Antonio Creek, Haven Avenue Storm Drain and San Sevaine Channel

During Water Year 2010-11, State Water Project (SWP) water was released for OCWD from three turnouts, OC-59, CB-11, and CB-18. A total of 10,448 acre-feet of SWP water was released into San Antonio Creek from the Foothill Feeder at turnout OC-59 near Upland for OCWD. Additionally, 960 acre-feet of SWP was released from turnout CB-11 to the Haven Avenue Storm Drain in Fontana, which flows into Deer Creek and then Cucamonga Creek, Mill Creek and Chino Creek before reaching Prado reservoir, and 864 acre-feet of SWP water was released from turnout CB-18 to San Sevaine Channel in Rancho Cucamonga, which flows into the Santa Ana River between Van Buren and Interstate 15. Total monthly deliveries and daily flow rates were provided by the MWDSC.

Water loss between OC-59 and Prado Dam was calculated per the procedures set forth in the Twelfth Annual Report (1981-82), Appendix C. It was determined that of the OC-59 water released, a total of 10,102 acre-feet arrived at Prado reservoir and 346 acre-feet (3.3%) was lost to evaporation. A monthly summary of Nontributary Flow released from OC-59 into San Antonio Creek is contained in Appendix E.

Turnouts CB-11 and CB-18 had not been used for delivery of SWP water to OCWD in the past, so it was necessary to develop procedures for calculating the losses. The method for calculating losses for these turnouts was modeled after the procedures for OC-59 described in the Twelfth Annual Report. It was determined that of the CB-11 and CB-18 water released, 932 acre-feet and 840 acre-feet, respectively, arrived at Prado reservoir and 28 acre-feet and 24 acre-feet, respectively, was lost to evaporation. A summary of Nontributary Flow released from CB-11 and CB-18 is contained in Appendix E.

Arlington Desalter Discharge

Groundwater flowing from the Arlington Basin has historically been a component of the River flow. This groundwater has been degraded through agricultural and other uses. Two parties to the Judgment, WMWD and OCWD, as members of the Santa Ana Watershed Project Authority, constructed a groundwater cleanup project that is designed to reduce the poor quality underflow from the basin. This project is known as the Arlington Desalter and consists of five extraction wells and a treatment facility that reduces salinity. The capacity of the facility is approximately 6 million gallons per day (mgd). The facility began operation in July 1990, with OCWD buying the product water delivered through the River. Beginning in 2004, the City of Norco began purchasing a portion of the Arlington Desalter product water for direct potable use.

The Watermaster determined that the flow and TDS of the water delivered to OCWD via the River from this facility would be excluded from the computation of Base Flow and Adjusted Base at Prado. During Water Year 2010-11, no Arlington Desalter flows were discharged to the Arlington drain for OCWD.

WMWD-OCWD Transfer Program

In 2001, OCWD and WMWD entered into an agreement that provides for delivery of groundwater pumped primarily from the Colton and Riverside Basins via the Riverside Canal and the River. No WMWD-OCWD Transfer Program water deliveries were made to the River upstream of Riverside Narrows and Prado Dam during Water Year 2010-11.

San Jacinto Watershed Discharge

Prior to the 1997-98 Water Year, 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 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 2010-11, EMWD discharged 5,680 acre-feet of treated wastewater to Temescal Wash, and 5,418 acre-feet of that discharge was estimated to have reached Prado Reservoir. The Watermaster previously determined that to the extent such discharges occur and are captured by OCWD, fifty percent of such captured water will be added as Cumulative Credit at Prado. OCWD captured 2,385 acre-feet of the San Jacinto Watershed discharge and 3,033 acre-feet flowed past OCWD's groundwater recharge facilities and was considered as lost to the ocean. Summaries of the EMWD Discharges, San Jacinto Watershed Discharge Calculations, and San Jacinto Watershed Discharges are contained in Appendix G. Page G-7 contains hydrographs of Discharge of Temescal Creek at Main Street in Corona, EMWD Discharge, and Elsinore Precipitation and illustrates the known and estimated components of flow of Temescal Creek.

Storm Flow

Portions of storm flows are retained behind Prado Dam for flow regulation and for water conservation purposes. The USACE owns the Dam, which has a spillway elevation of 543 feet above mean sea level, and operates it 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. On April 12, 1995, the USACE, the U.S. Fish and Wildlife Service, 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 U.S. Fish and Wildlife Service 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 to habitat restoration in the watershed. Monthly and annual quantities of Storm Flow are shown in Table 6.

During Water Year 2010-11, the maximum volume of water stored in Prado Reservoir reached 97,120 acre-feet on December 23, 2010. The maximum daily mean flow released from Prado Dam to the Santa Ana River was 5,010 cfs on December 30, 2010.

Base Flow

The Base Flow is that portion of the total flow remaining after subtracting Storm Flow, Nontributary Flow, Exchange Water, and certain other flows determined by the Watermaster. Flows affecting the determination of Base Flow in Water Year 2010-11 included State Water Project water and discharges from the San Jacinto Watershed. The general procedure used by the Watermaster to separate the Water Year 2010-11 flow components was the same as used for previous years and is fully described in the Fifth (1974-75) and the Twelfth (1981-82) Annual Reports. 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, including State Water Project water and San Jacinto Watershed discharge, was found to be 517 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 22 grab samples for EC collected by the USGS and analyzed for TDS.

A correlation between TDS and EC yields the following best fit equation:

$$TDS = EC \times 0.61297$$

(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 daily average 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 H. At Prado Dam, the flow-weighted average annual TDS concentration of 517 mg/L represents the quality of the total flow including State Water Project water and discharges from the San Jacinto Watershed. 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 High Groundwater Mitigation Project Discharge

During Water Year 2010-11, SBVMWD did not discharge High Groundwater Mitigation Project water. Therefore, no water quality adjustment was necessary.

Adjustment for State Water Project Flow to San Antonio Creek, Deer Creek and San Sevaine Channel

During Water Year 2010-11, 10,102 acre-feet of water released from OC-59 to San Antonio Creek, 932 acre-feet released from CB-11 to Haven Avenue Storm Drain, and 840 acre-feet released from CB-18 to San Sevaine Channel was calculated to have reached Prado Dam. A flow-weighted average TDS of 148 mg/L was calculated for OC-59 water reaching Prado Dam, and a flow-weighted TDS of 155 mg/L was calculated for CB-11 and CB-18 water reaching Prado Dam. A summary of these calculations is contained in Appendix E.

Adjustment for Arlington Desalter Discharge

During Water Year 2010-11, no water was discharged from the Arlington Desalter to the Arlington drain for OCWD, so no water quality adjustment was necessary.

Adjustment for WMWD-OCWD Transfer Program Discharge

During Water Year 2010-11, no WMWD-OCWD Transfer Program water was delivered. Therefore, no water quality adjustment was necessary.

Adjustment for San Jacinto Watershed Discharge

Discharge from the San Jacinto Watershed during Water Year 2010-11 reaching Prado Reservoir was estimated to be 5,418 acre-feet. Using EMWD discharge data, the TDS data for the discharge, and monthly volume of the discharge estimated to have reached Prado reservoir, a flow-weighted average TDS of 715 mg/L was calculated. A summary of these calculations is contained in Appendix G.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow X Average TDS
1. Measured Outflow	324,892	517	167,969,164
2. Less High Groundwater Mitigation Project	0	---	---
3. Less Nontributary Flow San Antonio Creek	(10,102)	148	(1,495,096)
4. Less Nontributary Flow Haven Avenue Storm Drain and San Sevaine Channel	(1,772)	155	(274,660)
5. Less Arlington Desalter	0	---	---
6. Less WMWD Transfer Program	0	---	---
7. Less San Jacinto Watershed Discharge	(5,418)	715	(3,873,870)
8. Measured Outflow less lines 2 through 7	307,600		162,325,538
Average TDS in Total Base and Storm Flow	162,325,538 ÷ 307,600 = 528 mg/L		

After adjusting for State Water Project flows and San Jacinto Watershed discharge, the flow-weighted average annual TDS of Storm Flow and Base Flow for Water Year 2010-11 is 528 mg/L, as shown above.

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 528 mg/L is less than 700 mg/L. Therefore, the Base Flow must be adjusted by the above equation for TDS less than 700 mg/L. Thus the Adjusted Base Flow is as follows:

$$(102{,}031 \text{ acre-feet}) + \frac{35}{42{,}000} (102{,}031 \text{ acre-feet}) (700 - 528) = 116{,}655 \text{ acre-feet}$$

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 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.

Of the 5,418 acre-feet of San Jacinto Watershed outflows reaching Prado Reservoir in Water Year 2010-11, 3,033 acre-feet flowed past OCWD's groundwater recharge facilities and was considered as lost to the ocean. Therefore, a net of 2,385 acre-feet of San Jacinto Watershed outflow recharged the Orange County groundwater basin in Water Year 2010-11. One-half of that amount has been considered a credit against the Upper Area Base Flow obligation at Prado Dam. Thus, an additional 1,193 acre-feet was added to the Cumulative Credit at Prado Dam.

While compiling the 2002-03 Watermaster Report, it came to the attention of the Watermaster that in previous reports one-half the San Jacinto Watershed discharge reaching Prado and recharging Orange County groundwater basin had been included in the Cumulative Adjusted Base Flow as well as in the Cumulative Credit. The Watermaster determined that the San Jacinto Watershed discharge should be included only in the Cumulative Credit and not in the Cumulative Adjusted Base Flow. Therefore, the Watermaster revised the Cumulative Adjusted Base Flow and has included Table 7 summarizing the historical Watermaster findings concerning flow at Prado that reflect the revision in the report following the findings of the Watermaster.

The findings of the Watermaster concerning flow at Prado for Water Year 2010-11 required under the Judgment are as follows:

1.	Measured Outflow at Prado	324,892 acre-feet
2.	Base Flow at Prado	102,031 acre-feet
3.	Annual Weighted TDS of Base and Storm Flow	528 mg/L
4.	Annual Adjusted Base Flow	116,655 acre-feet
5.	Cumulative Adjusted Base Flow	5,021,659 acre-feet
6.	Other Credits (Debits) [1]	1,193 acre-feet
7.	Cumulative Entitlement of OCWD	1,722,000 acre-feet
8.	Cumulative Credit [2]	3,339,059 acre-feet
9.	One-Third of Cumulative Debit	0 acre-feet
10.	Minimum Required Base Flow in 2011-12	34,000 acre-feet

1. Other Credits (Debits) are comprised of San Jacinto Watershed outflow.
2. Cumulative Credit includes 39,400 acre-feet of San Jacinto Watershed 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	154,021	193,553	2,994,329	0	1,176,000	1,836,100
1998-99	158,637	174,369	3,168,698	0	1,218,000	1,968,469
1999-00	148,269	169,644	3,338,342	0	1,260,000	2,096,113
2000-01	153,914	176,360	3,514,702	0	1,302,000	2,230,473
2001-02	145,981	159,728	3,674,430	0	1,344,000	2,348,201
2002-03	146,113	174,970	3,849,400	887	1,386,000	2,482,058
2003-04	143,510	166,472	4,015,872	247	1,428,000	2,606,777
2004-05	154,307	199,570	4,215,442	2,366	1,470,000	2,766,713
2005-06	147,736	170,266	4,385,708	3,562	1,512,000	2,898,541
2006-07	129,830	140,216	4,525,924	5,531	1,554,000	3,002,288
2007-08	116,483	136,382	4,662,306	4,165	1,596,000	3,100,835
2008-09	102,711	117,519	4,779,825	2,189	1,638,000	3,178,543
2009-10	103,099	125,179	4,905,004	1,489	1,680,000	3,263,211
2010-11	102,031	116,655	5,021,659	1,193	1,722,000	3,339,059

1. Other Credits (Debits) are comprised of San Jacinto Watershed outflow.
2. Cumulative Credit includes 39,400 acre-feet of San Jacinto Watershed outflow.

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 amounted to 174,075 acre-feet, measured at the USGS gaging station near the MWD Crossing. Separated into its components, Base Flow was 49,753 acre-feet and Storm Flow was 126,559 acre-feet. Included in Base Flow is 2,237 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 2010-11 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 2010-11 are presented on Plate 8.

As noted in the Fortieth Annual Report for Water Year October 1, 2009 – September 30, 2010, the United States Army Corps of Engineers (USACE) stored water in the reservoir upstream from Seven Oaks Dam to allow testing of the outlet structure in Seven Oaks Dam during July 2010. The USACE also stored storm water and then released that stored water from Seven Oaks Dam late in March, 2011 and early April, 2011 to complete the testing of the outlet structure. The released water was identifiable on the hydrograph for Riverside Narrows. The releases were made at times when no storms were identifiable in the Santa Ana River Watershed area. For these events, and with no intent to establish a precedent for characterizing the flow in the future as either Base Flow or Storm Flow, the Watermaster has determined that the water released for testing of the outlet structure at Seven Oaks Dam is Storm Flow.

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 2010-11 no nontributary flow was delivered to the River upstream of Riverside Narrows and Prado Dam.

High Groundwater Mitigation Project

No High Groundwater Mitigation Project water was discharged to the River during Water Year 2010-11.

TABLE 8

COMPONENTS OF FLOW AT RIVERSIDE NARROWS
WATER YEAR 2010-11
(acre-feet)

	Month	USGS Measured Flow	Storm Flow	SBVMWD HGMP Water (1)	WMWD Transfer Program (2)	Rubidoux Waste-water	Base Flow (3)
2010	October	3,765	95	0	0	189	3,859
	November	5,117	1,140	0	0	184	4,161
	December	106,350	101,627	0	0	197	4,920
2011	January	6,500	1,719	0	0	188	4,969
	February	11,097	6,902	0	0	170	4,365
	March	15,471	10,691	0	0	189	4,969
	April	8,763	4,175	0	0	183	4,771
	May	4,157	121	0	0	188	4,224
	June	4,092	0	0	0	181	4,273
	July	3,261	67	0	0	188	3,382
	August	2,727	22	0	0	194	2,899
	September	2,775	0	0	0	186	2,961
Total		174,075	126,559	0	0	2,237	49,753

(1) HGMP water pumped from the Bunker Hill groundwater basin and discharged into the Santa Ana River less 1% for evapotranspiration above Riverside Narrows.

(2) WMWD-OCWD Transfer Program water pumped from the Bunker Hill, Riverside, and Colton basins and discharged to the Santa Ana River above the Riverside Narrows.

(3) Base Flow equals USGS measured flow, minus storm flow, minus HGMP, and minus WMWD-OCWD Transfer water, plus Rubidoux Wastewater.

WMWD-OCWD Transfer Program

In 2001, OCWD and WMWD entered into an agreement that provides for delivery of groundwater pumped primarily from the Colton and Riverside Basins to OCWD via the Riverside Canal and the River. During Water Year 2010-11, no WMWD-OCWD Transfer Program water was delivered to the River.

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 2010-11, in the amount of 2,237 acre-feet, has been added to the Base Flow as measured at the gaging station. A summary of Rubidoux discharges is contained in Appendix I.

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. Water quality data based on samples taken during storm flow periods were not used in the calculations. A summary of TDS and EC data of the River at Riverside Narrows is contained in Appendix J.

Adjustment for High Groundwater Mitigation Project Discharge

During Water Year 2010-11, there was no discharge of High Groundwater Mitigation Project water. Therefore, no water quality adjustment was required.

Adjustment for WMWD-OCWD Transfer Program Flows

During Water Year 2010-11, no WMWD-OCWD Transfer Program water was delivered to the River. 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 775 mg/L. A monthly summary of discharges and quality is contained in Appendix I.

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 654 mg/L.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS
1. Base Flow plus Nontributary Flow	47,516	648	30,790,368
2. Less Nontributary Flow HGMP Pumped Water	0	---	---
3. Less WMWD Transfer Flow	0	---	---
4. Plus Rubidoux Treated Wastewater	2,237	775	1,733,675
5. Base Flow (line 1 less lines 2 and 3 plus line 4)	49,753		32,524,043
Average TDS of Base Flow	32,524,043 ÷ 49,753 = 654 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 2010-11 was 654 mg/L. Therefore, no adjustment is necessary, and the Adjusted Base Flow for Water Year 2010-11 is 49,753 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."

The Watermaster's findings concerning flow at Riverside Narrows for Water Year 2010-11 required under the Judgment are as follows:

1.	Base Flow at Riverside Narrows	49,753 acre-feet
2.	Annual Weighted TDS of Base Flow	654 mg/L
3.	Annual Adjusted Base Flow	49,753 acre-feet
4.	Cumulative Adjusted Base Flow	1,846,883 acre-feet
5.	Cumulative Entitlement of IEUA and WMWD	625,250 acre-feet
6.	Cumulative Credit	1,221,633 acre-feet
7.	One-Third of Cumulative Debit	0 acre-feet
8.	Minimum Required Base Flow in 2011-12	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

Santa Ana River Watershed

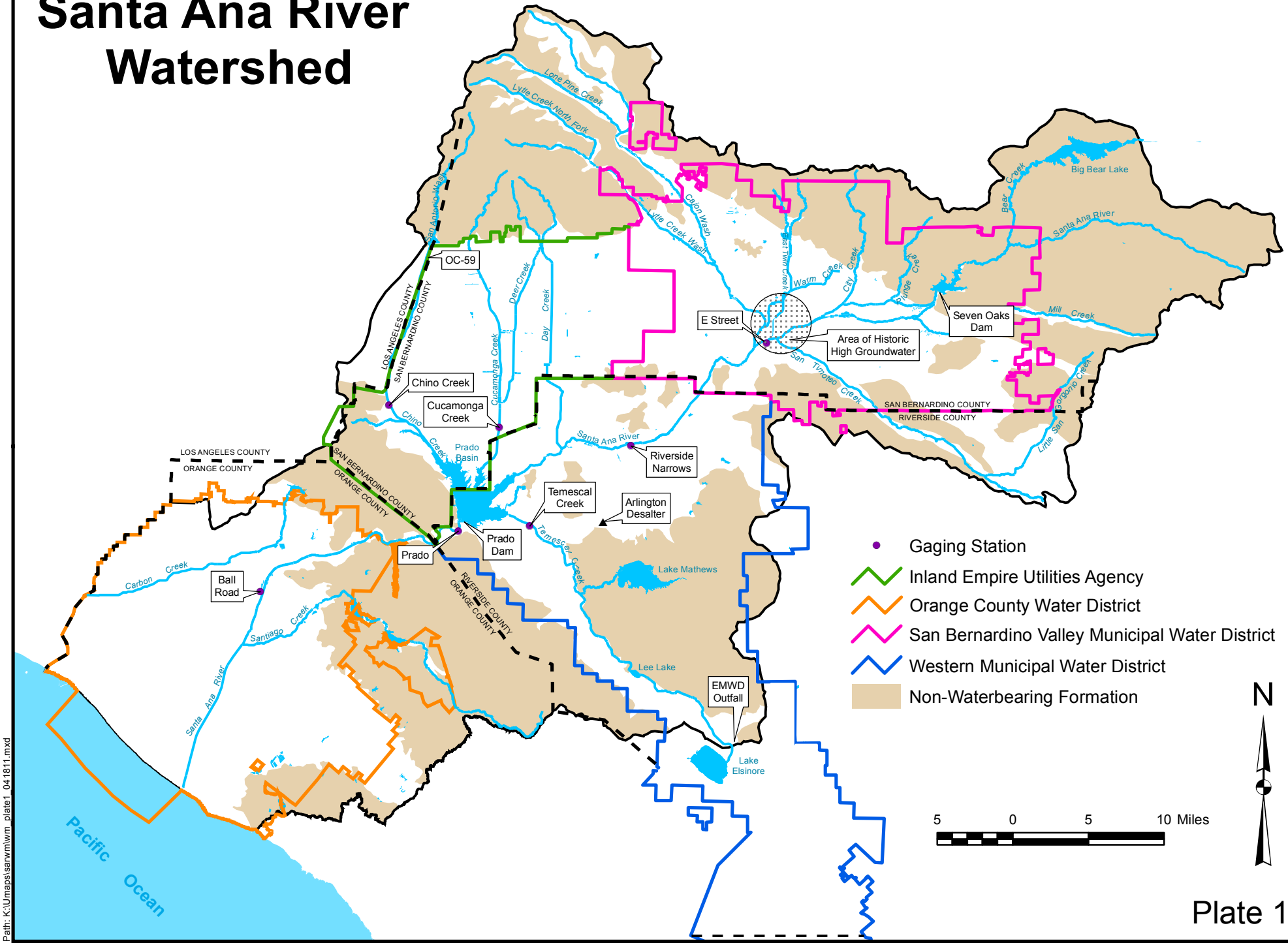

Plate 1

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Santa Ana River Watershed Wastewater Treatment Plants and Salt Export Pipelines

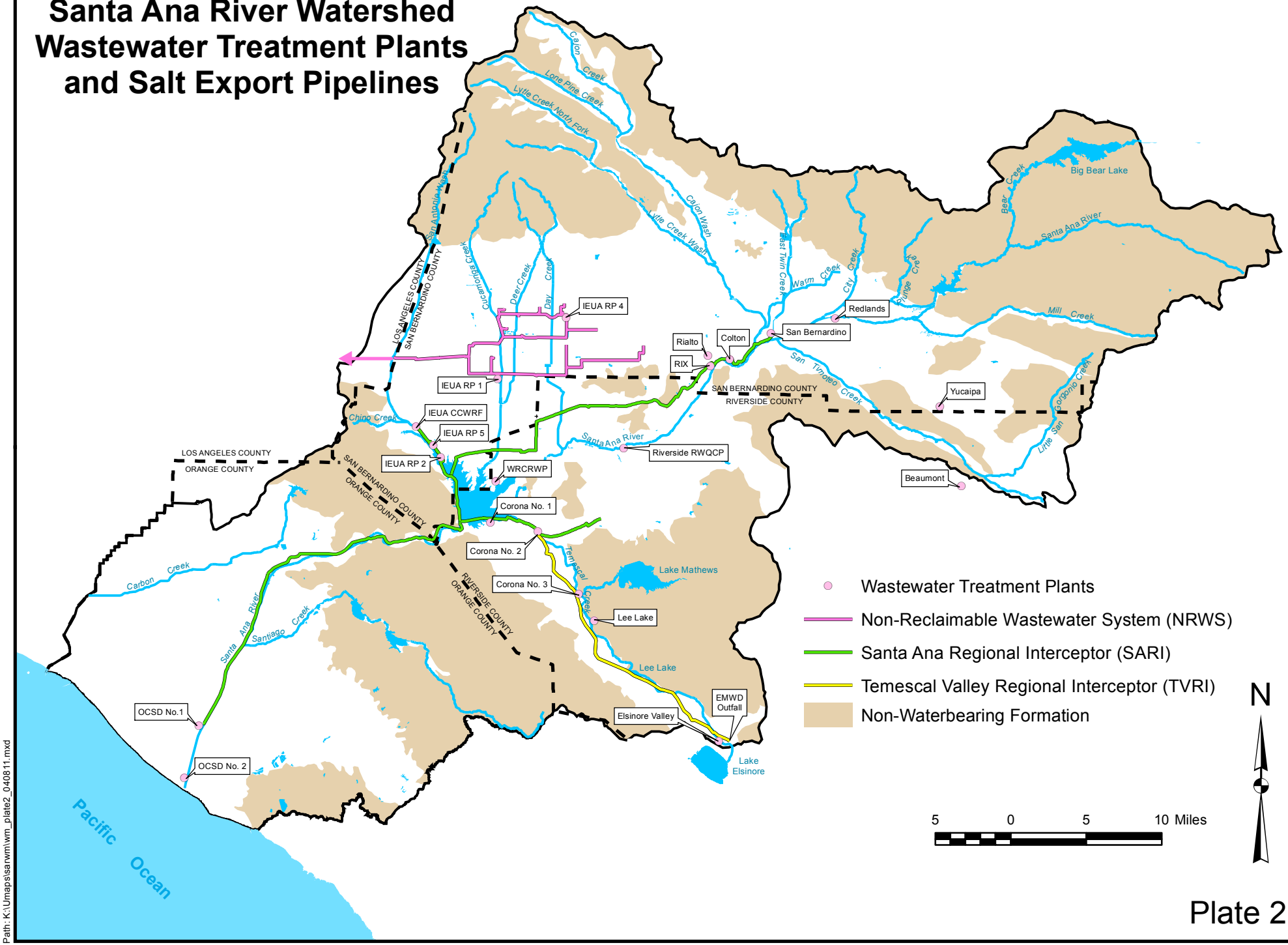

Plate 2

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PRECIPITATION AT SAN BERNARDINO STARTING WITH 1934-35

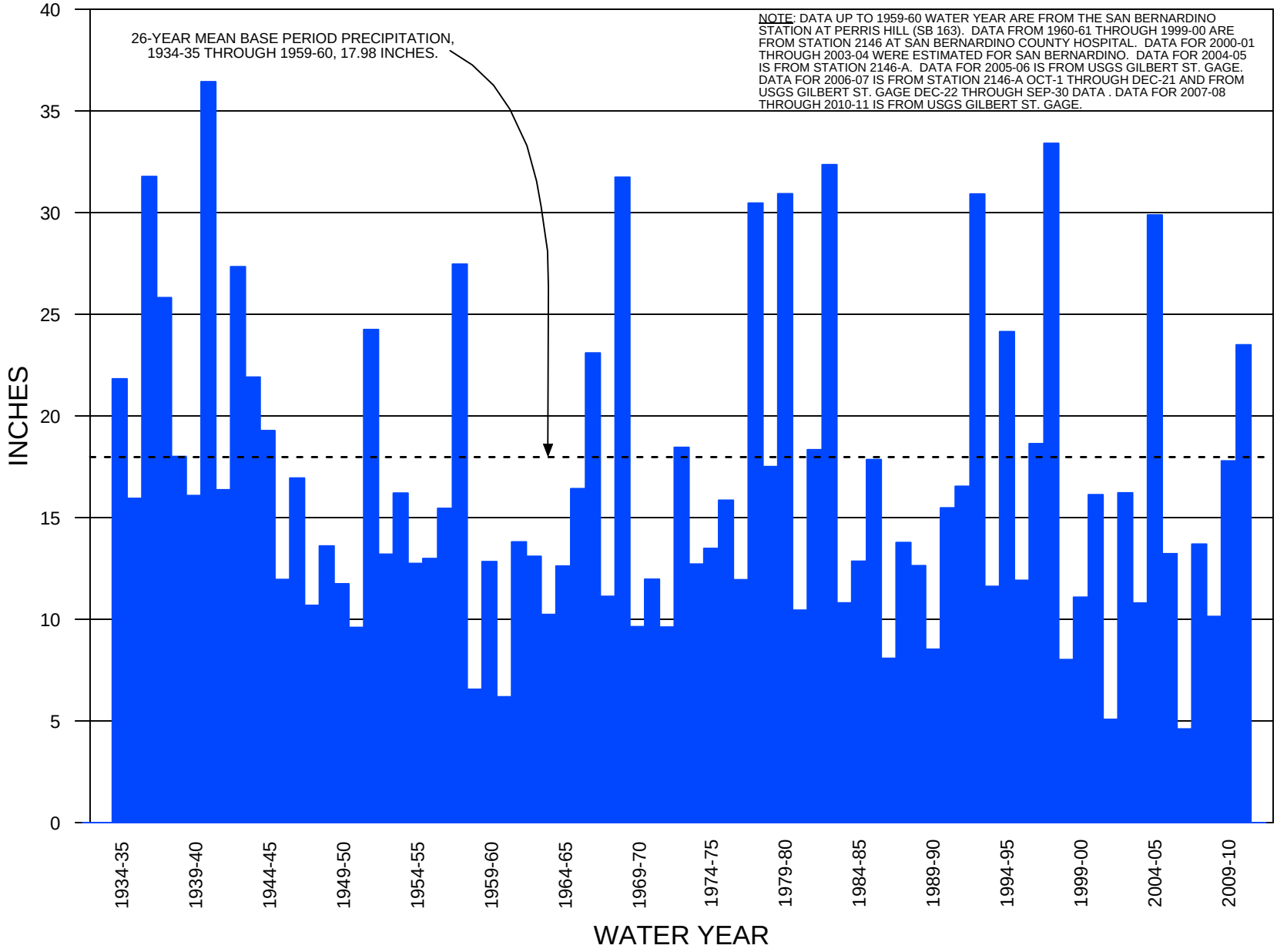
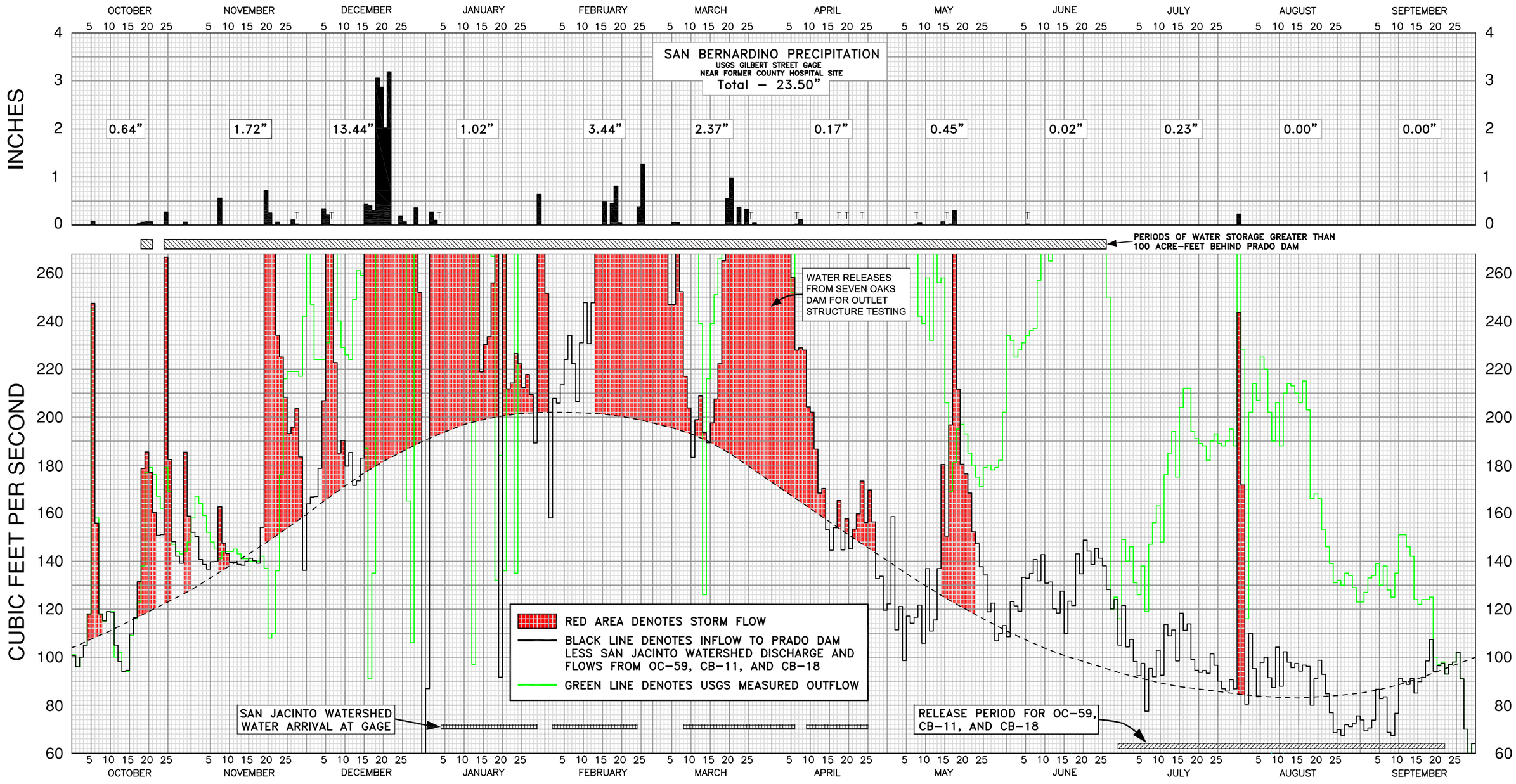


PLATE 3



DISCHARGE OF SANTA ANA RIVER AT PRADO DAM & SAN BERNARDINO PRECIPITATION
WATER YEAR 2010-11

Plate 4

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

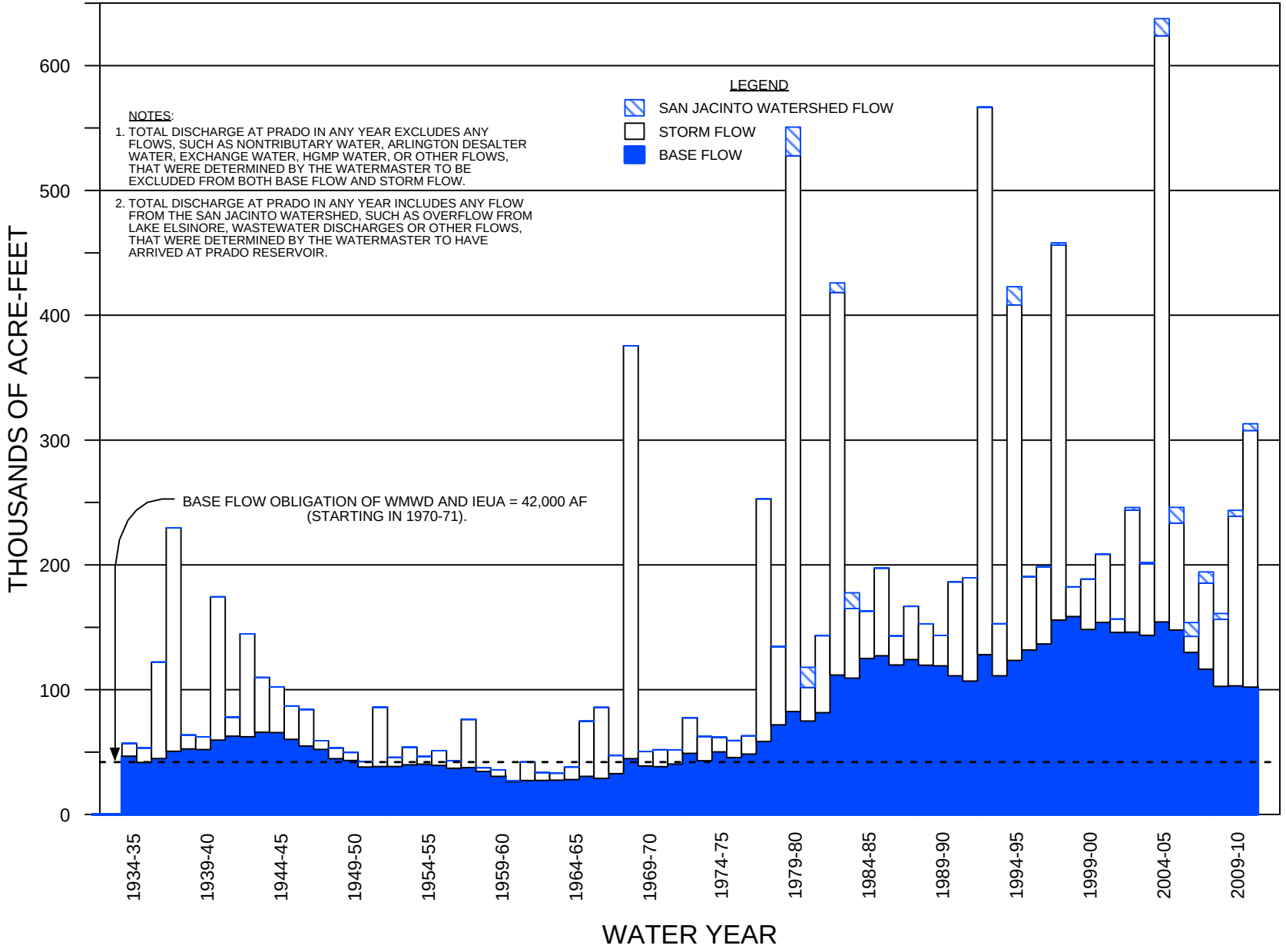
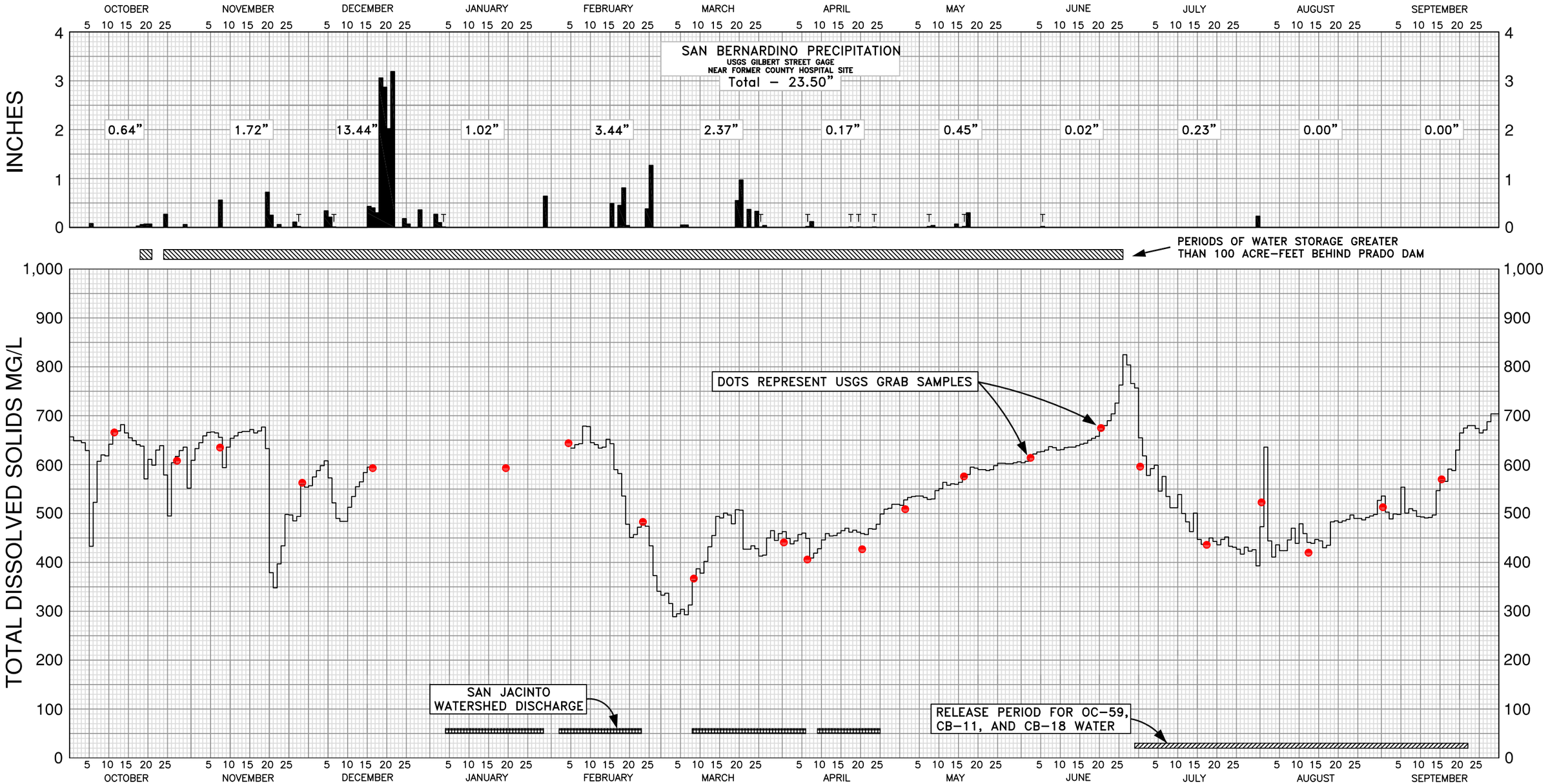
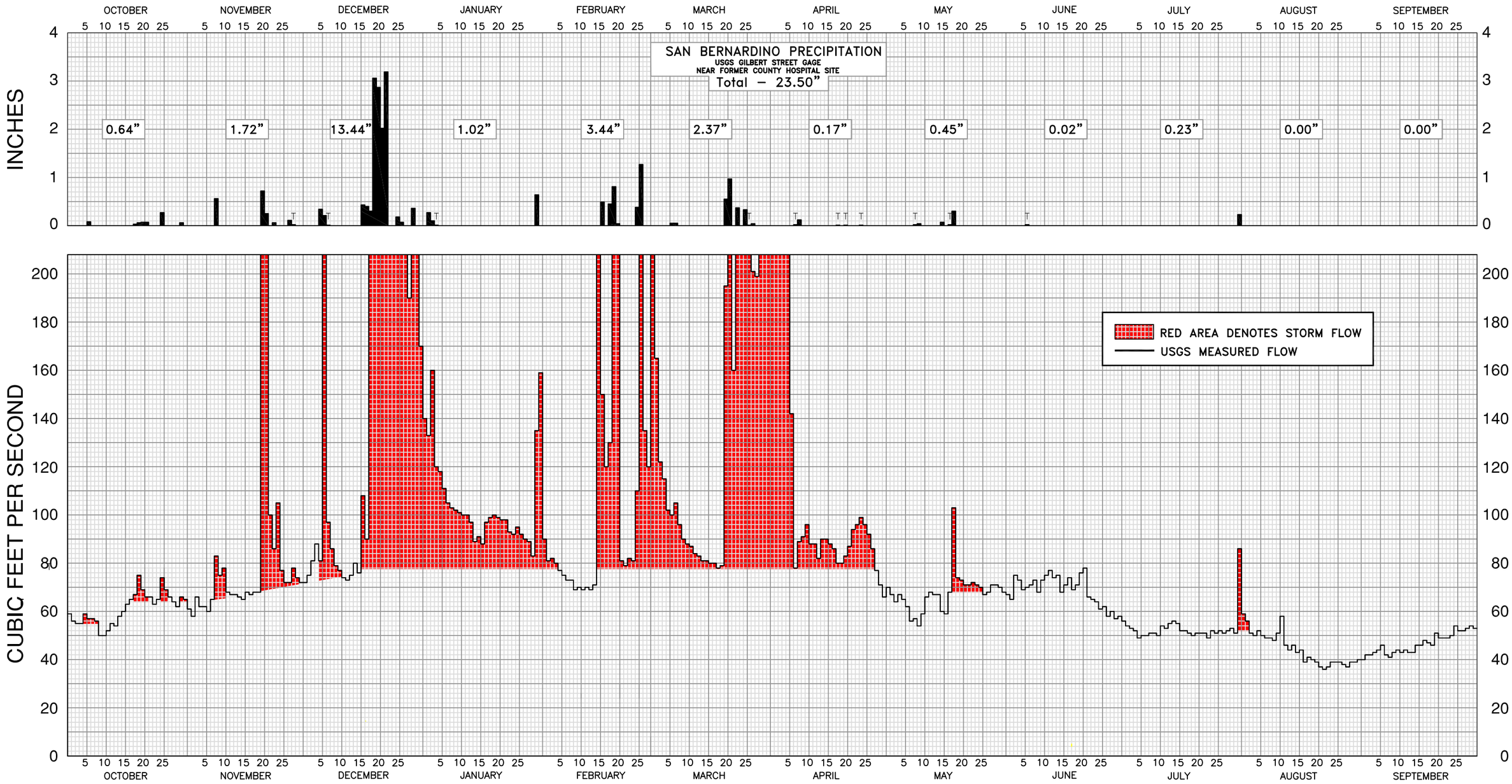


PLATE 5



DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM
WATER YEAR 2010-11

Plate 6



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION
WATER YEAR 2010-11

Plate 7

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

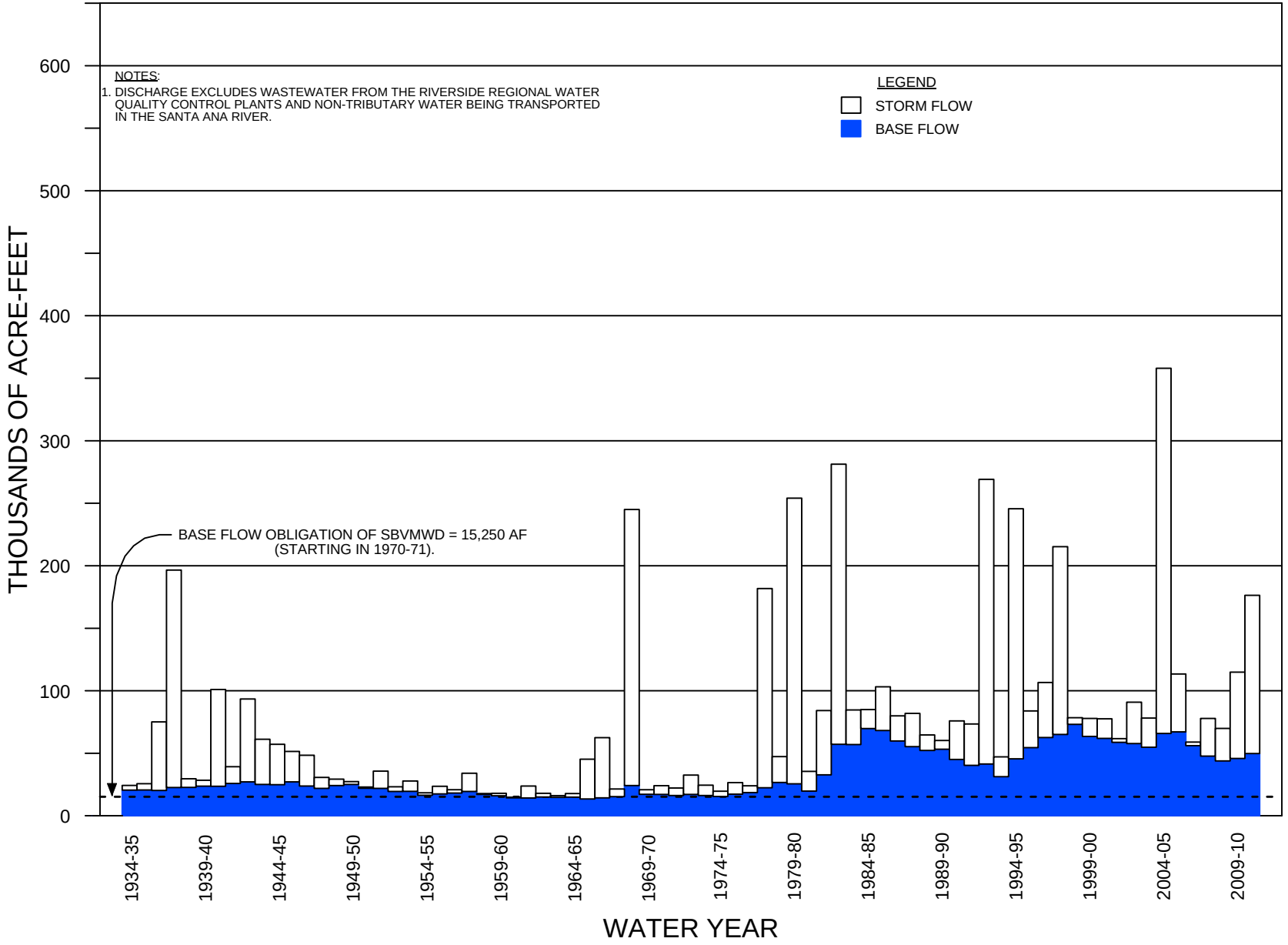


PLATE 8

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-FIRST ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 2010 - SEPTEMBER 30, 2011

JUNE 30, 2012

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, AND OF TEMESCAL CREEK ABOVE MAIN STREET (AT CORONA), CUCAMONGA CREEK (NEAR MIRA LOMA) AND CHINO CREEK AT SCHAEFER AVENUE (NEAR CHINO)

WATER YEAR 2010-11

11074000 Santa Ana River below Prado Dam, CA

Santa Ana River Basin

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.

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, the California Water Project released 12,190 acre-ft to the basin. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

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).

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.

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11074000, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11074000.2011.pdf

11074000 Santa Ana River below Prado Dam, CA—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	101	158	269	4,810	357	567	778	311	234	149	228	123
2	96	167	247	4,140	369	492	814	313	232	140	116	127
3	100	164	224	1,040	350	272	814	310	225	146	202	133
4	105	159	224	3,170	321	270	615	305	228	131	214	134
5	118	152	224	3,190	322	269	296	301	231	126	207	139
6	245	148	231	3,170	324	269	252	298	234	138	225	130
7	158	145	248	3,220	340	339	310	295	236	119	220	138
8	118	141	270	3,230	333	392	311	291	237	147	202	128
9	115	144	240	3,230	322	392	310	242	257	156	190	125
10	119	144	229	3,240	385	392	308	239	280	163	206	135
11	119	144	226	3,230	396	342	306	258	269	148	188	151
12	100	145	224	2,590	399	277	304	232	265	176	210	151
13	102	143	249	97	403	239	299	279	299	185	214	146
14	94	141	261	342	406	126	294	256	319	194	213	142
15	94	141	259	357	398	216	290	258	321	175	210	124
16	109	140	187	357	374	239	287	206	324	204	206	122
17	116	140	91	357	353	251	286	169	327	212	215	124
18	123	140	135	267	335	266	288	181	330	212	203	124
19	138	142	1,200	132	510	277	285	195	330	194	166	125
20	177	137	3,200	184	884	281	282	197	330	191	168	100
21	179	108	4,360	136	974	352	310	193	329	189	166	97
22	176	110	4,960	357	979	661	323	185	328	188	153	98
23	167	136	2,700	345	601	753	314	180	329	182	146	93
24	162	176	2,670	135	327	810	310	175	313	190	139	97
25	179	216	2,670	402	311	916	307	171	313	193	131	98
26	169	219	2,410	410	2,120	757	305	179	302	189	132	102
27	147	219	165	393	2,350	543	305	180	250	188	130	91
28	144	219	106	346	1,440	303	307	178	120	190	135	70
29	143	217	1,880	311	---	360	308	179	125	195	134	58
30	144	242	5,010	311	---	710	309	182	116	188	129	64
31	148	---	4,920	339	---	807	---	202	---	340	123	---
Total	4,205	4,797	40,289	43,838	16,983	13,140	10,827	7,140	8,033	5,538	5,521	3,489
Mean	136	160	1,300	1,414	607	424	361	230	268	179	178	116
Max	245	242	5,010	4,810	2,350	916	814	313	330	340	228	151
Min	94	108	91	97	311	126	252	169	116	119	116	58
Ac-ft	8,340	9,510	79,910	86,950	33,690	26,060	21,480	14,160	15,930	10,980	10,950	6,920

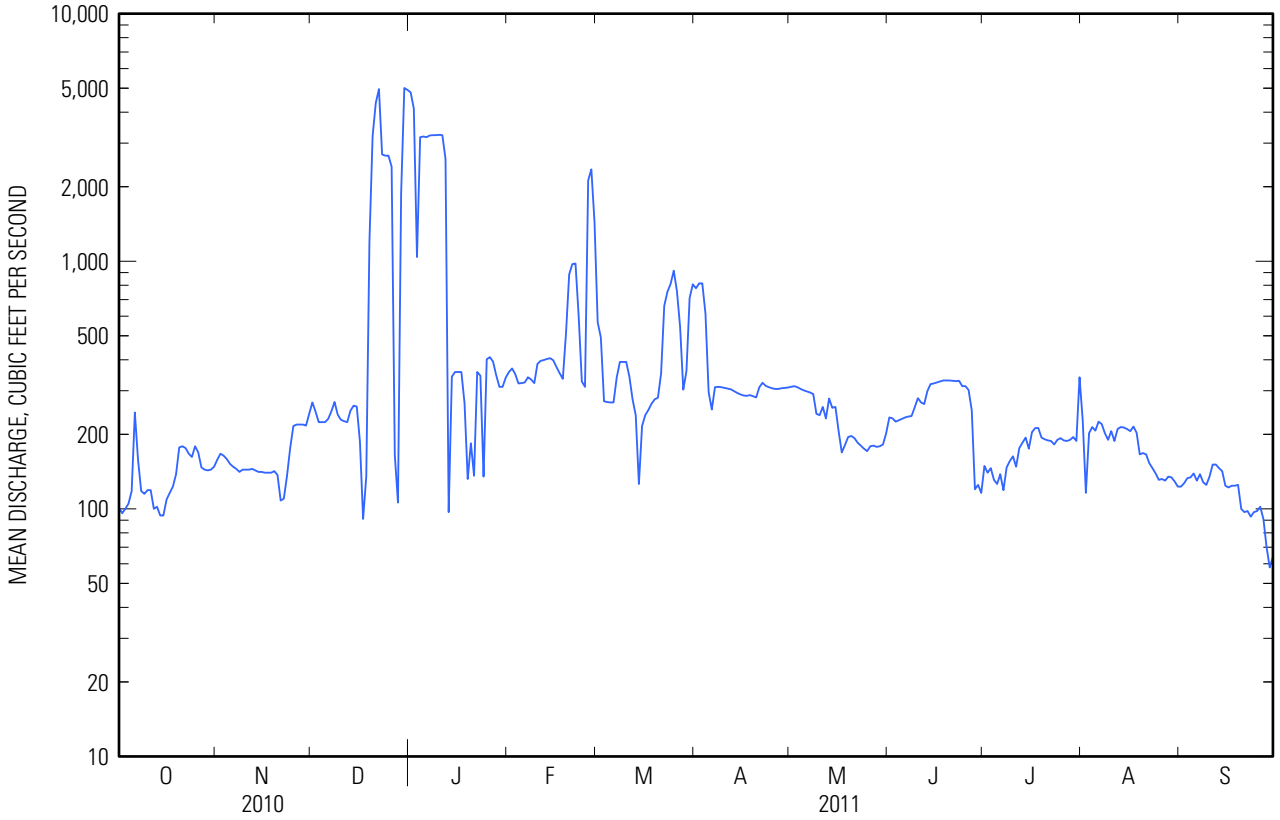
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 2011, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	130	150	239	396	448	402	266	191	158	129	109	103
Max	910	322	1,300	3,543	2,733	2,556	1,101	915	736	446	402	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)

11074000 Santa Ana River below Prado Dam, CA—Continued

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1941 - 2011	
Annual total	152,120		163,800			
Annual mean	417		449		226	
Highest annual mean					882	2005
Lowest annual mean					36.4	1961
Highest daily mean	5,010	Dec 30	5,010	Dec 30	11,400	Jan 14, 2005
Lowest daily mean	79	Jul 23	58	Sep 29	2.4	Jul 29, 1978
Annual seven-day minimum	85	Aug 21	83	Sep 24	3.0	Sep 24, 1973
Maximum peak flow			5,230	Dec 22	13,200	Jan 15, 2005
Maximum peak stage			7.93	Dec 22	8.73	Jan 15, 2005
Annual runoff (ac-ft)	301,700		324,900		163,500	
10 percent exceeds	505		755		390	
50 percent exceeds	175		224		140	
90 percent exceeds	98		123		41	



11074000 Santa Ana River below Prado Dam, CA—Continued

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.

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.
Specific conductance records rated good.
Water temperature records rated excellent.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 1,830 microsiemens, Apr. 30, 1971; minimum recorded, 150 microsiemens, Jan. 5, 2008.
WATER TEMPERATURE: Maximum recorded, 36.0°C, Sept. 4, 1972, Sept. 8, 1984; minimum recorded, 2.5°C, Dec. 30, 1969.
SEDIMENT CONCENTRATION: Maximum daily mean, 2,870 mg/L, Mar. 5, 1978; minimum daily mean, 3 mg/L, Apr. 2, 1980, and several days during 1982.
SEDIMENT LOAD: Maximum daily, 18,900 tons, Mar. 5, 1978; minimum daily, 0.58 ton, Sept. 20, 1978.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum recorded, 1,370 microsiemens, June 27; minimum recorded, 406 microsiemens, Oct. 6.
WATER TEMPERATURE: Maximum recorded, 27.2°C, July 6-7; minimum recorded, 10.8°C, Dec. 1.

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter]

Sample date-time	Temperature, air, °C (00020)	Discharge, instantaneous, ft^3/s (00061)	Specific conductance, water, unfiltered, µS/cm at 25 °C (00095)	Temperature, water, °C (00010)	Dissolved solids dried at 180 °C, water, filtered, mg/L (70300)
10-12-2010 1400	26.5	113	1,110	21.9	666
10-28-2010 1130	24.0	144	1,020	18.0	608
11-08-2010 1240	18.5	140	1,090	18.8	635
11-29-2010 1405	16.5	216	933	12.0	563
12-17-2010 1020	14.0	91	970	14.1	593
01-20-2011 1020	19.5	44	971	13.4	593
02-05-2011 1050	17.5	324	1,010	12.4	644
02-24-2011 1415	15.5	311	790	13.0	483
03-09-2011 1420	22.5	392	595	13.6	367
04-01-2011 1020	26.0	768	745	15.1	441
04-07-2011 1105	20.5	311	728	16.2	406
04-21-2011 1300	18.5	334	742	18.2	427
05-02-2011 1235	25.5	314	862	19.6	509
05-17-2011 1205	15.5	174	944	19.1	576
06-03-2011 1215	21.0	227	1,010	20.1	614
06-21-2011 1320	25.5	330	1,100	22.4	675
07-01-2011 1325	29.5	161	1,030	23.3	596
07-18-2011 1140	25.5	224	702	22.4	436
08-01-2011 1200	27.5	201	829	23.9	523
08-13-2011 1215	24.0	227	713	22.3	420
09-01-2011 1240	31.5	122	861	23.0	513
09-16-2011 1230	25.0	120	904	22.2	570

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 1 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Barometric pressure, mm Hg (00025)	Temperature, air, °C (00020)	Discharge, instantaneous, ft^3/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conductance, water, unfiltered, µS/cm at 25 °C (00095)	Temperature, water, °C (00010)	Alkalinity, water, filtered, inflection-point, incremental titration method, field, mg/L as $CaCO_3$ (39086)
10-12-2010 1215	750	28.0	76	8.5	99	8.0	1,090	22.0	219
11-04-2010 1615	749	34.0	159	7.0	78	7.6	1,080	19.5	222
12-29-2010 1400	739	--	2,190	10.4	102	7.3	325	13.0	70
01-13-2011 1345	752	23.5	22	10.0	101	7.6	875	15.0	183
01-27-2011 1145	753	25.0	406	12.6	121	7.8	930	13.0	201
02-10-2011 1100	750	--	385	13.4	129	7.8	1,130	13.0	230
02-25-2011 1045	751	11.5	311	9.9	94	7.7	771	12.5	170
03-10-2011 1245	751	28.0	395	9.9	97	8.1	645	13.9	148
03-22-2011 1115	751	18.5	757	9.1	91	7.7	688	14.5	149
04-07-2011 1130	746	18.5	311	10.1	106	7.7	733	16.5	160
04-28-2011 1130	749	29.5	308	10.1	111	7.6	840	19.0	195
05-17-2011 1030	748	--	170	--	--	7.5	960	19.0	217
05-27-2011 0945	748	26.5	182	11.8	130	7.6	991	19.0	228
06-16-2011 1000	745	20.5	321	8.3	95	7.9	1,060	21.0	244
06-28-2011 1215	747	29.0	114	5.3	62	8.1	1,340	22.0	332
07-15-2011 1230	747	27.5	161	8.0	94	7.5	885	22.5	192
08-11-2011 1000	750	--	184	8.0	92	8.0	777	21.5	166
09-01-2011 1230	747	30.5	122	8.2	98	8.0	844	23.0	176

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

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[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Bicarbonate, water, filtered, inflection-point, incremental titration method, field, mg/L (00453)	Carbonate, water, filtered, inflection-point incremental titration method, field, mg/L (00452)	Chloride, water, filtered, mg/L (00940)	Sulfate, water, filtered, mg/L (00945)	Ammonia, water, filtered, mg/L as N (00608)	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Nitrite, water, filtered, mg/L as N (00613)	Orthophos-phate, water, filtered, mg/L as P (00671)	Phosphorus, water, unfiltered, mg/L as P (00665)
10-12-2010 1215	264	1	146	111	.086	4.70	.048	1.24	1.44
11-04-2010 1615	271	--	135	101	< .010	3.75	.111	1.34	1.34
12-29-2010 1400	86	--	20.2	25.2	.070	1.21	.056	.184	.47
01-13-2011 1345	222	1	94.6	104	.272	1.82	.094	.456	.54
01-27-2011 1145	243	1	104	103	< .010	2.34	.073	.555	.64
02-10-2011 1100	280	--	142	141	.123	4.03	.067	.557	.57
02-25-2011 1045	207	--	87.8	77.5	.112	3.59	.060	.484	.50
03-10-2011 1245	180	--	64.8	65.5	.059	2.35	.039	.318	.36
03-22-2011 1115	180	1	72.2	71.7	.055	2.74	.039	.369	.48
04-07-2011 1130	195	--	79.7	75.0	.221	2.19	.064	.587	.18
04-28-2011 1130	238	--	93.2	79.8	.204	2.36	.052	.717	.75
05-17-2011 1030	265	--	113	94.0	.185	2.42	.051	.877	.99
05-27-2011 0945	275	1	120	97.4	.092	2.24	.054	.849	.94
06-16-2011 1000	297	--	135	102	.183	1.58	.065	1.08	1.15
06-28-2011 1215	404	--	154	135	.786	4.36	.088	.411	1.11
07-15-2011 1230	237	--	101	89.9	.114	3.54	.052	.605	.82
08-11-2011 1000	202	--	87.5	74.4	.074	3.05	.026	.669	.84
09-01-2011 1230	211	2	98.3	80.6	.056	3.31	.032	.810	.91

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 3 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Total nitrogen, water, unfiltered, analytically determined, mg/L (62855)	1-Naphthol, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (49295)	2,6-Diethylaniline, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82660)	2-Chloro-2',6'-diethylacetanilide, water, filtered, recoverable, µg/L (61618)	2-Chloro-4-isopropylamino-6-amino-s-triazine, water, filtered, recoverable, µg/L (04040)	2-Ethyl-6-methylaniline, water, filtered, recoverable, µg/L (61620)	3,4-Dichloroaniline, water, filtered, recoverable, µg/L (61625)	3,5-Dichloroaniline, water, filtered, recoverable, µg/L (61627)	4-Chloro-2-methylphenol, water, filtered, recoverable, µg/L (61633)
10-12-2010 1215	5.78	< .036	< .006	< .010	E .014	< .010	E .009	< .004	< .005
11-04-2010 1615	E 4.40	< .036	< .006	< .010	< .016	< .010	E .009	< .004	< .005
12-29-2010 1400	1.96	< .036	< .006	< .010	< .006	< .010	E .015	< .004	< .005
01-13-2011 1345	2.75	< .036	< .006	< .010	< .009	< .010	E .011	< .004	< .005
01-27-2011 1145	3.38	< .036	< .006	< .010	< .011	< .010	E .009	< .004	< .005
02-10-2011 1100	4.71	< .036	< .006	< .010	E .014	< .010	E .010	< .004	< .005
02-25-2011 1045	4.25	< .036	< .006	< .010	< .011	< .010	E .036	< .004	< .005
03-10-2011 1245	2.89	< .036	< .006	< .010	< .009	< .010	E .028	< .004	< .005
03-22-2011 1115	3.53	< .036	< .006	< .010	< .012	< .010	E .018	< .004	< .005
04-07-2011 1130	2.49	< .036	< .006	< .010	E .009	< .010	E .033	< .004	< .005
04-28-2011 1130	3.34	< .036	< .006	< .010	< .013	< .010	E .033	< .004	< .005
05-17-2011 1030	3.21	< .036	< .006	< .010	E .017	< .010	E .029	< .004	< .005
05-27-2011 0945	3.18	< .036	< .006	< .010	E .020	< .010	E .024	< .004	< .005
06-16-2011 1000	2.75	< .036	< .006	< .010	E .014	< .010	E .020	< .004	< .005
06-28-2011 1215	6.83	< .036	< .006	< .010	< .014	< .010	E .019	< .004	< .005
07-15-2011 1230	4.38	< .036	< .006	< .010	E .016	< .010	E .013	< .004	< .005
08-11-2011 1000	3.62	< .036	< .006	< .010	E .015	< .010	E .016	< .004	< .005
09-01-2011 1230	3.89	< .036	< .006	< .010	E .015	< .010	E .012	< .004	< .005

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 4 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Aceto-chlor, water, filtered, recover-able, µg/L (49260)	Alachlor, water, filtered, recover-able, µg/L (46342)	alpha-Endo-sulfan, water, filtered, recover-able, µg/L (34362)	Atrazine, water, filtered, recover-able, µg/L (39632)	Azinphos-methyl oxygen analog, water, filtered, recover-able, µg/L (61635)	Azinphos-methyl, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82686)	Benfluralin, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82673)	Carbaryl, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82680)	Carbofuran, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82674)
10-12-2010 1215	< .010	.011	< .006	< .008	< .04	< .120	< .014	< .060	< .060
11-04-2010 1615	< .010	< .009	< .006	< .008	< .04	< .120	< .014	E .009	< .060
12-29-2010 1400	< .010	.018	< .006	< .008	< .04	< .120	< .014	E .013	< .060
01-13-2011 1345	< .010	< .015	< .006	< .008	< .04	< .120	< .014	< .060	< .060
01-27-2011 1145	< .010	< .011	< .006	< .008	< .04	< .120	< .014	< .060	< .060
02-10-2011 1100	< .010	.010	< .006	< .008	< .04	< .120	< .014	< .060	< .060
02-25-2011 1045	< .010	< .012	< .006	< .008	< .04	< .120	< .014	E .012	< .060
03-10-2011 1245	< .010	.011	< .006	< .008	< .04	< .120	< .014	< .060	< .060
03-22-2011 1115	< .010	< .008	< .006	< .008	< .04	< .120	< .014	E .020	< .060
04-07-2011 1130	< .010	< .008	< .006	.006	< .04	< .120	< .014	E .012	< .060
04-28-2011 1130	< .010	< .008	< .006	.008	< .04	< .120	< .014	< .060	< .060
05-17-2011 1030	< .010	< .008	< .006	.010	< .04	< .120	< .014	< .060	< .060
05-27-2011 0945	< .010	< .010	< .006	.012	< .04	< .120	< .014	< .060	< .060
06-16-2011 1000	< .010	< .010	< .006	< .010	< .04	< .120	< .014	< .060	< .060
06-28-2011 1215	< .010	< .012	< .006	< .010	< .04	< .120	< .014	< .060	< .060
07-15-2011 1230	< .010	< .008	< .006	< .009	< .04	< .120	< .014	< .060	< .060
08-11-2011 1000	< .010	< .008	< .006	< .008	< .04	< .120	< .014	< .060	< .060
09-01-2011 1230	< .010	< .008	< .006	< .009	< .04	< .120	< .014	< .060	< .060

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

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[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Chlorpyrifos oxygen analog, water, filtered, recoverable, µg/L (61636)	Chlorpyrifos, water, filtered, recoverable, µg/L (38933)	cis-Permethrin, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82687)	cis-Propiconazole, water, filtered, recoverable, µg/L (79846)	Cyanazine, water, filtered, recoverable, µg/L (04041)	Cyfluthrin, water, filtered, recoverable, µg/L (61585)	Cypermethrin, water, filtered, recoverable, µg/L (61586)	DCPA, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82682)	Desulfinylfipronil amide, water, filtered, recoverable, µg/L (62169)
10-12-2010 1215	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.002	E .002
11-04-2010 1615	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.002	E .003
12-29-2010 1400	< .06	< .004	< .010	< .013	< .022	< .016	< .020	.008	E .004
01-13-2011 1345	< .06	< .004	< .010	E .012	< .022	< .016	< .020	.007	E .002
01-27-2011 1145	< .06	< .004	< .010	E .009	< .022	< .016	< .020	.005	E .005
02-10-2011 1100	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.005	E .004
02-25-2011 1045	< .06	< .004	< .010	E .013	< .022	< .016	< .020	.006	E .002
03-10-2011 1245	< .06	< .004	< .010	E .008	< .022	< .016	< .020	.005	E .004
03-22-2011 1115	< .06	< .004	< .010	E .013	< .022	< .016	< .020	.004	E .003
04-07-2011 1130	< .06	< .004	< .010	E .010	< .022	< .016	< .020	.005	< .029
04-28-2011 1130	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.004	< .029
05-17-2011 1030	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.004	< .029
05-27-2011 0945	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.004	< .029
06-16-2011 1000	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.003	E .008
06-28-2011 1215	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.004	< .029
07-15-2011 1230	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.004	< .029
08-11-2011 1000	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.003	< .029
09-01-2011 1230	< .06	< .004	< .010	< .008	< .022	< .016	< .020	.003	< .029

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

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[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Desulfinyl-fipronil, water, filtered, recover-able, µg/L (62170)	Diazinon, water, filtered, recover-able, µg/L (39572)	Dichlor-vos, water, filtered, recover-able, µg/L (38775)	Dicroto-phos, water, filtered, recover-able, µg/L (38454)	Dieldrin, water, filtered, recover-able, µg/L (39381)	Dimetho-ate, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82662)	Disulfoton sulfone, water, filtered, recover-able, µg/L (61640)	Disulfoton, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82677)	Endosulfan sulfate, water, filtered, recover-able, µg/L (61590)
10-12-2010 1215	.007	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
11-04-2010 1615	.006	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
12-29-2010 1400	.012	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
01-13-2011 1345	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
01-27-2011 1145	.007	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
02-10-2011 1100	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
02-25-2011 1045	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	.011
03-10-2011 1245	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
03-22-2011 1115	.010	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
04-07-2011 1130	.008	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
04-28-2011 1130	.011	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
05-17-2011 1030	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
05-27-2011 0945	.010	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
06-16-2011 1000	.011	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
06-28-2011 1215	.011	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
07-15-2011 1230	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
08-11-2011 1000	.009	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016
09-01-2011 1230	.008	< .006	< .04	< .08	< .008	< .006	< .01	< .04	< .016

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

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[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	EPTC, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82668)	Ethion monoxon, water, filtered, recoverable, µg/L (61644)	Ethion, water, filtered, recoverable, µg/L (82346)	Ethoprop, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82672)	Fenamiphos sulfone, water, filtered, recoverable, µg/L (61645)	Fenamiphos sulfoxide, water, filtered, recoverable, µg/L (61646)	Fenamiphos, water, filtered, recoverable, µg/L (61591)	Fipronil sulfide, water, filtered, recoverable, µg/L (62167)	Fipronil sulfone, water, filtered, recoverable, µg/L (62168)
10-12-2010 1215	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.003	.004
11-04-2010 1615	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.004	E .005
12-29-2010 1400	< .006	< .02	< .008	< .016	< .054	< .08	< .03	< .012	.009
01-13-2011 1345	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.006	.005
01-27-2011 1145	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.006	.007
02-10-2011 1100	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.008	.005
02-25-2011 1045	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.007	.007
03-10-2011 1245	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.007	E .008
03-22-2011 1115	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.003	.011
04-07-2011 1130	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.004	.004
04-28-2011 1130	< .006	< .02	< .008	< .016	< .054	< .08	< .03	< .012	< .024
05-17-2011 1030	< .006	< .02	< .008	< .016	< .054	< .08	< .03	< .012	< .024
05-27-2011 0945	< .006	< .02	< .008	< .016	< .054	< .08	< .03	E .004	.003
06-16-2011 1000	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.008	< .024
06-28-2011 1215	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.004	.007
07-15-2011 1230	< .006	< .02	< .008	< .016	< .054	< .08	< .03	< .012	< .024
08-11-2011 1000	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.008	< .024
09-01-2011 1230	< .006	< .02	< .008	< .016	< .054	< .08	< .03	.006	< .024

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

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[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Fipronil, water, filtered, recoverable, µg/L (62166)	Fonofos, water, filtered, recoverable, µg/L (04095)	Hexazinone, water, filtered, recoverable, µg/L (04025)	Iprodione, water, filtered, recoverable, µg/L (61593)	Isofenphos, water, filtered, recoverable, µg/L (61594)	lambda-Cyhalothrin, water, filtered, recoverable, µg/L (61595)	Malaoxon, water, filtered, recoverable, µg/L (61652)	Malathion, water, filtered, recoverable, µg/L (39532)	Metalaxyl, water, filtered, recoverable, µg/L (61596)
10-12-2010 1215	E .005	< .005	< .011	< .014	< .040	< .010	< .022	< .016	< .014
11-04-2010 1615	E .006	< .005	< .012	< .014	< .006	< .010	< .022	< .016	< .014
12-29-2010 1400	E .015	< .005	.028	< .014	< .006	< .010	< .022	< .016	< .014
01-13-2011 1345	E .011	< .005	E .021	< .014	< .006	< .010	< .022	< .016	< .014
01-27-2011 1145	E .009	< .005	.015	< .014	< .006	< .010	< .022	< .016	< .081
02-10-2011 1100	E .009	< .005	.070	< .014	< .006	< .010	< .022	< .016	< .106
02-25-2011 1045	E .016	< .005	.122	< .014	< .006	< .010	< .022	< .016	< .014
03-10-2011 1245	E .010	< .005	E .076	< .014	< .006	< .010	< .022	< .016	< .014
03-22-2011 1115	E .020	< .005	.100	< .014	< .006	< .010	< .022	< .018	< .014
04-07-2011 1130	E .008	< .005	.037	< .014	< .006	< .010	< .022	< .016	< .014
04-28-2011 1130	< .018	< .005	.028	< .014	< .006	< .010	< .022	< .016	< .014
05-17-2011 1030	< .018	< .005	.032	< .014	< .006	< .010	< .022	< .016	< .139
05-27-2011 0945	E .002	< .005	.031	< .014	< .006	< .010	< .022	< .016	< .014
06-16-2011 1000	< .018	< .005	.023	< .014	< .031	< .010	< .022	< .016	< .014
06-28-2011 1215	< .018	< .005	< .018	< .014	< .006	< .010	< .022	< .016	< .014
07-15-2011 1230	< .018	< .005	< .017	< .014	< .006	< .010	< .022	< .016	< .014
08-11-2011 1000	< .018	< .005	.018	< .014	< .006	< .010	< .022	< .016	< .082
09-01-2011 1230	E .006	< .005	.016	< .014	< .006	< .010	< .022	< .016	< .014

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 9 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Methida-thion, water, filtered, recover-able, µg/L (61598)	Methyl paraoxon, water, filtered, recover-able, µg/L (61664)	Methyl parathion, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82667)	Metola-chlor, water, filtered, recover-able, µg/L (39415)	Metri-buzin, water, filtered, recover-able, µg/L (82630)	Molinate, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82671)	Myclo-butanil, water, filtered, recover-able, µg/L (61599)	Oxy-fluorfen, water, filtered, recover-able, µg/L (61600)	Pendi-methalin, water, filtered (0.7 micron glass fiber filter), recover-able, µg/L (82683)
10-12-2010 1215	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .012
11-04-2010 1615	< .012	< .01	< .008	.008	< .012	< .004	< .011	< .006	< .012
12-29-2010 1400	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .017
01-13-2011 1345	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .012
01-27-2011 1145	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .012
02-10-2011 1100	< .012	< .02	< .008	.011	< .012	< .004	< .010	< .006	< .012
02-25-2011 1045	< .012	< .01	< .008	.013	< .012	< .004	< .017	< .006	E .021
03-10-2011 1245	< .012	< .02	< .008	.012	< .012	< .004	.011	< .006	E .014
03-22-2011 1115	< .012	< .02	< .050	.008	< .012	< .004	< .019	< .006	.016
04-07-2011 1130	< .012	< .01	< .008	.009	< .012	< .004	< .015	< .006	E .013
04-28-2011 1130	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .012
05-17-2011 1030	< .012	< .01	< .008	.011	< .012	< .004	< .010	< .006	< .012
05-27-2011 0945	< .012	< .01	< .008	.012	< .012	< .004	< .015	< .006	< .012
06-16-2011 1000	< .012	< .01	< .008	< .020	< .012	< .004	< .012	< .006	< .012
06-28-2011 1215	< .012	< .01	< .008	< .020	< .012	< .004	< .010	< .006	< .012
07-15-2011 1230	< .012	< .01	< .008	.030	< .012	< .004	< .010	< .006	< .012
08-11-2011 1000	< .012	< .01	< .008	.025	< .012	< .004	< .010	< .006	< .012
09-01-2011 1230	< .012	< .01	< .008	.015	< .012	< .004	.010	< .006	< .012

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 10 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Phorate oxygen analog, water, filtered, recoverable, µg/L (61666)	Phorate, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82664)	Phosmet oxygen analog, water, filtered, recoverable, µg/L (61668)	Phosmet, water, filtered, recoverable, µg/L (61601)	Prometon, water, filtered, recoverable, µg/L (04037)	Prometryn, water, filtered, recoverable, µg/L (04036)	Propanil, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82679)	Propargite, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82685)	Propyzamide, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82676)
10-12-2010 1215	< .03	< .020	< .05	< .140	.013	< .006	< .010	< .02	< .004
11-04-2010 1615	< .03	< .020	< .05	< .140	.016	< .006	< .010	< .02	< .004
12-29-2010 1400	< .03	< .020	< .05	< .140	.014	< .006	< .010	< .02	< .004
01-13-2011 1345	< .03	< .020	< .05	< .140	.015	< .006	< .010	< .02	< .004
01-27-2011 1145	< .03	< .020	< .05	< .140	.013	< .006	< .010	< .02	< .004
02-10-2011 1100	< .03	< .020	< .05	< .140	.011	< .006	< .010	< .02	< .004
02-25-2011 1045	< .03	< .020	< .05	< .140	.012	< .006	< .010	< .02	< .004
03-10-2011 1245	< .03	< .020	< .05	< .140	.011	< .006	< .010	< .02	< .004
03-22-2011 1115	< .03	< .020	< .05	< .140	.012	< .006	< .010	< .02	< .004
04-07-2011 1130	< .03	< .020	< .05	< .140	.010	< .006	< .010	< .02	< .004
04-28-2011 1130	< .03	< .020	< .05	< .140	.013	< .006	< .010	< .02	< .004
05-17-2011 1030	< .03	< .020	< .05	< .140	.017	< .006	< .010	< .02	< .004
05-27-2011 0945	< .03	< .020	< .05	< .140	.016	< .006	< .010	< .02	< .010
06-16-2011 1000	< .03	< .020	< .05	< .140	.021	< .006	< .010	< .02	< .004
06-28-2011 1215	< .03	< .020	< .05	< .140	.013	< .006	< .010	< .02	< .004
07-15-2011 1230	< .03	< .020	< .05	< .140	.011	< .006	< .010	< .02	< .004
08-11-2011 1000	< .03	< .020	< .05	< .140	.010	< .006	< .010	< .02	< .004
09-01-2011 1230	< .03	< .020	< .05	< .140	.010	< .006	< .010	< .02	< .004

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 11 of 12

[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Simazine, water, filtered, recoverable, µg/L (04035)	Tebuthiuron, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82670)	Tefluthrin, water, filtered, recoverable, µg/L (61606)	Terbufos oxygen analog sulfone, water, filtered, recoverable, µg/L (61674)	Terbufos, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82675)	Terbuthylazine, water, filtered, recoverable, µg/L (04022)	Thiobencarb, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82681)	trans-Propiconazole, water, filtered, recoverable, µg/L (79847)	Tribuphos, water, filtered, recoverable, µg/L (61610)
10-12-2010 1215	.033	< .03	< .010	< .09	< .02	.03	< .016	< .01	< .018
11-04-2010 1615	.021	< .03	< .010	< .04	< .02	.02	< .016	< .01	< .018
12-29-2010 1400	.155	< .03	< .010	< .04	< .02	< .01	< .016	E .02	< .018
01-13-2011 1345	.063	< .03	< .010	< .04	< .02	.01	< .016	E .02	< .018
01-27-2011 1145	.049	< .03	< .010	< .04	< .02	.01	< .016	E .02	< .018
02-10-2011 1100	.042	< .03	< .010	< .04	< .02	.01	< .016	< .01	< .018
02-25-2011 1045	.109	< .03	< .010	< .04	< .02	.01	< .016	E .02	< .018
03-10-2011 1245	.056	< .03	< .010	< .04	< .02	.01	< .016	E .01	< .018
03-22-2011 1115	.047	< .03	< .010	< .04	< .02	< .01	< .016	E .02	< .018
04-07-2011 1130	.035	< .03	< .010	< .04	< .02	.01	< .016	E .02	< .018
04-28-2011 1130	.031	< .03	< .010	< .04	< .02	< .01	< .016	< .01	< .018
05-17-2011 1030	.032	< .03	< .010	< .04	< .02	.01	< .016	< .01	< .018
05-27-2011 0945	.038	< .03	< .010	< .04	< .02	< .01	< .016	< .01	< .018
06-16-2011 1000	.030	< .03	< .010	< .04	< .02	< .01	< .016	< .01	< .018
06-28-2011 1215	.027	< .03	< .010	< .04	< .02	.01	< .016	< .01	< .018
07-15-2011 1230	.033	< .03	< .010	< .04	< .02	.01	< .016	< .01	< .018
08-11-2011 1000	.022	< .03	< .010	< .04	< .02	.01	< .016	< .01	< .018
09-01-2011 1230	.021	< .03	< .010	< .04	< .02	< .01	< .016	< .01	< .018

11074000 Santa Ana River below Prado Dam, CA—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
Part 12 of 12
[%, percent; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; --, no data; <, less than; E, estimated]

Sample date-time	Trifluralin, water, filtered (0.7 micron glass fiber filter), recoverable, µg/L (82661)
10-12-2010 1215	< .018
11-04-2010 1615	< .018
12-29-2010 1400	< .018
01-13-2011 1345	< .018
01-27-2011 1145	< .018
02-10-2011 1100	< .018
02-25-2011 1045	< .018
03-10-2011 1245	< .018
03-22-2011 1115	< .018
04-07-2011 1130	< .018
04-28-2011 1130	< .018
05-17-2011 1030	< .018
05-27-2011 0945	< .018
06-16-2011 1000	< .018
06-28-2011 1215	< .018
07-15-2011 1230	< .018
08-11-2011 1000	< .018
09-01-2011 1230	< .018

11074000 Santa Ana River below Prado Dam, CA—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		October			November			December			January	
1	1,100	1,050	1,070	1,030	936	996	929	900	906	---	---	---
2	1,100	1,020	1,050	1,050	1,010	1,030	951	928	938	---	---	---
3	1,090	1,020	1,060	1,080	1,030	1,050	970	949	959	---	---	---
4	1,090	1,020	1,050	1,090	1,050	1,080	980	968	974	---	---	---
5	1,070	992	1,030	1,100	1,070	1,090	1,000	977	990	---	---	---
6	1,020	406	1,010	1,100	1,080	1,090	1,010	856	930	---	---	---
7	976	714	877	1,100	1,080	1,080	884	824	857	---	---	---
8	1,030	970	984	1,100	1,040	1,070	832	747	808	---	---	---
9	1,030	1,000	1,010	1,040	954	963	814	764	788	---	---	---
10	1,040	991	1,010	1,060	989	1,040	821	759	787	---	---	---
11	1,100	1,020	1,040	1,070	1,060	1,070	866	791	841	---	---	---
12	1,100	1,040	1,090	1,080	1,070	1,070	917	838	868	---	---	---
13	1,100	1,080	1,090	1,090	1,080	1,090	926	894	908	---	---	---
14	1,120	1,100	1,110	1,090	1,080	1,090	945	898	918	---	---	---
15	1,100	1,080	1,090	1,100	1,090	1,090	963	923	955	---	---	---
16	1,080	1,060	1,070	1,100	1,090	1,100	984	956	971	---	---	---
17	1,070	1,050	1,060	1,090	1,080	1,090	---	---	---	---	---	---
18	1,070	1,040	1,040	1,100	1,080	1,090	---	---	---	---	---	---
19	1,050	1,020	1,040	1,120	1,090	1,110	---	---	---	---	---	---
20	1,030	890	923	1,090	772	1,060	---	---	---	---	---	---
21	1,030	950	996	772	550	604	---	---	---	---	---	---
22	1,040	915	985	597	546	565	---	---	---	---	---	---
23	1,040	1,000	1,030	674	597	646	---	---	---	---	---	---
24	1,060	1,020	1,040	787	629	691	---	---	---	---	---	---
25	1,060	758	1,010	836	761	813	---	---	---	---	---	---
26	934	722	792	843	779	813	---	---	---	---	---	---
27	1,020	912	993	819	757	795	---	---	---	---	---	---
28	1,020	991	1,010	869	757	801	---	---	---	---	---	---
29	1,040	1,010	1,030	932	868	918	---	---	---	---	---	---
30	1,050	994	1,040	926	886	905	---	---	---	---	---	---
31	995	863	890	---	---	---	---	---	---	---	---	---
Max	1,120	1,100	1,110	1,120	1,090	1,110	---	---	---	---	---	---
Min	934	406	792	597	546	565	---	---	---	---	---	---

11074000 Santa Ana River below Prado Dam, CA—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

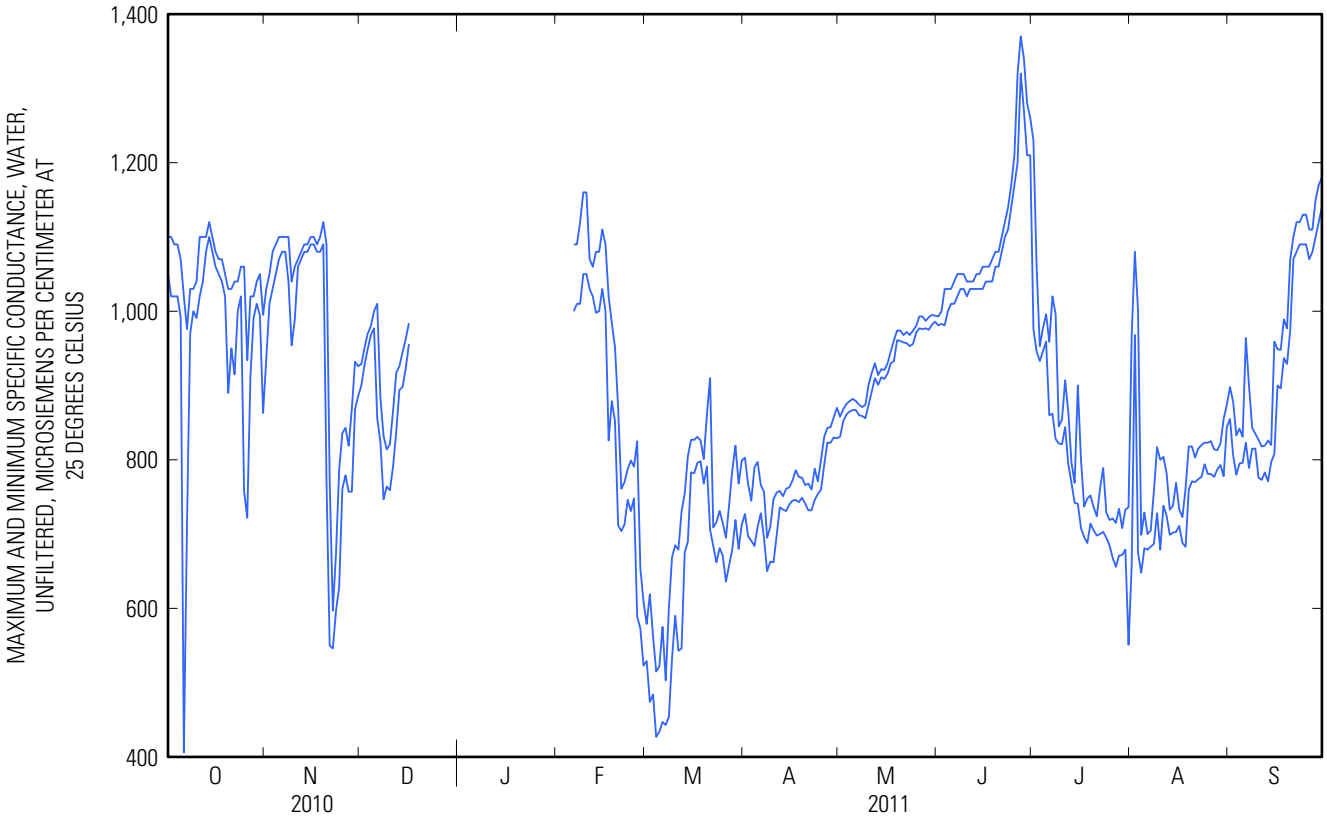
Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		February			March			April			May	
1	---	---	---	579	529	541	803	727	754	858	831	841
2	---	---	---	619	474	521	767	697	730	868	852	860
3	---	---	---	563	484	509	745	691	710	875	861	870
4	---	---	---	515	427	473	790	684	727	879	865	872
5	---	---	---	522	434	482	797	710	750	882	867	873
6	1,090	1,000	1,030	575	447	488	766	728	751	879	867	875
7	1,090	1,010	1,040	503	443	480	757	695	738	874	860	869
8	1,120	1,010	1,040	600	454	506	695	650	665	871	859	862
9	1,160	1,050	1,110	669	533	589	710	663	678	874	856	864
10	1,160	1,050	1,110	685	590	623	747	662	694	901	874	891
11	1,070	1,030	1,060	679	543	618	756	698	731	917	892	899
12	1,060	1,020	1,050	730	546	656	758	736	749	930	910	925
13	1,080	998	1,030	755	675	705	751	733	739	914	901	911
14	1,080	1,000	1,030	805	690	734	761	731	744	922	911	915
15	1,110	1,030	1,060	827	783	803	763	740	747	921	909	913
16	1,090	1,000	1,040	827	782	799	772	745	759	930	916	919
17	1,020	826	996	831	796	816	786	746	764	946	930	936
18	984	879	952	826	798	811	777	743	754	961	933	947
19	952	852	875	801	768	780	776	749	757	974	961	970
20	869	712	770	861	791	818	766	741	754	974	960	970
21	761	704	735	910	706	848	768	732	750	968	958	963
22	770	713	745	709	684	698	760	732	744	972	957	959
23	787	746	770	716	662	700	788	746	764	968	953	958
24	799	731	786	731	681	703	771	754	764	974	956	960
25	791	748	776	715	671	695	800	760	782	980	971	976
26	825	589	731	695	636	676	831	793	815	993	977	981
27	654	573	606	739	658	671	843	823	830	993	976	983
28	609	523	550	786	679	728	844	823	835	987	977	982
29	---	---	---	819	719	753	857	830	847	992	975	978
30	---	---	---	768	680	725	870	829	845	995	982	985
31	---	---	---	799	713	746	---	---	---	994	986	989
Max	---	---	---	910	798	848	870	830	847	995	986	989
Min	---	---	---	503	427	473	695	650	665	858	831	841

11074000 Santa Ana River below Prado Dam, CA—Continued

SPECIFIC CONDUCTANCE, WATER, UNFILTERED, MICROSIEMENS PER CENTIMETER AT 25 DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		June			July			August			September	
1	993	981	986	1,230	976	1,040	968	659	810	898	855	874
2	1,000	983	990	1,060	946	1,010	1,080	968	1,040	878	806	814
3	1,030	981	1,000	953	933	944	1,000	675	698	833	780	797
4	1,030	1,000	1,020	977	946	966	699	648	670	842	795	807
5	1,030	1,010	1,020	996	959	975	729	681	715	831	796	808
6	1,040	1,010	1,020	959	860	883	700	679	693	964	823	913
7	1,050	1,020	1,020	1,020	862	942	705	683	692	900	789	810
8	1,050	1,030	1,040	996	828	859	758	687	732	843	815	835
9	1,050	1,030	1,040	845	822	836	817	728	753	835	815	825
10	1,040	1,020	1,030	854	821	833	800	679	710	827	776	810
11	1,040	1,030	1,030	907	844	875	804	738	784	818	773	806
12	1,040	1,030	1,040	864	794	814	782	725	750	819	783	800
13	1,050	1,030	1,040	796	769	790	733	699	721	826	771	799
14	1,050	1,030	1,040	769	742	756	738	702	713	820	797	811
15	1,060	1,030	1,040	900	741	823	769	703	722	959	808	893
16	1,060	1,040	1,050	800	708	726	733	711	725	949	900	929
17	1,060	1,040	1,050	737	696	710	723	688	696	948	896	919
18	1,070	1,040	1,060	748	688	725	762	683	708	989	937	966
19	1,080	1,060	1,070	752	714	736	818	760	775	977	929	969
20	1,080	1,060	1,070	736	705	723	818	771	790	1,070	974	1,030
21	1,100	1,080	1,090	724	698	716	803	770	787	1,100	1,070	1,080
22	1,120	1,100	1,110	761	700	723	815	774	784	1,120	1,080	1,100
23	1,140	1,110	1,120	789	703	729	820	777	788	1,120	1,090	1,110
24	1,170	1,140	1,150	729	695	704	823	794	810	1,130	1,090	1,110
25	1,210	1,170	1,180	719	685	705	823	781	799	1,130	1,090	1,100
26	1,320	1,200	1,240	721	668	705	825	781	796	1,110	1,070	1,080
27	1,370	1,320	1,340	715	656	680	814	777	798	1,110	1,080	1,090
28	1,340	1,270	1,320	734	671	698	813	787	802	1,150	1,100	1,120
29	1,280	1,210	1,250	708	672	694	822	793	805	1,170	1,120	1,150
30	1,260	1,210	1,230	733	679	688	855	778	801	1,180	1,140	1,140
31	---	---	---	736	551	682	874	844	859	---	---	---
Max	1,370	1,320	1,340	1,230	976	1,040	1,080	968	1,040	1,180	1,140	1,150
Min	993	981	986	708	551	680	699	648	670	818	771	797

11074000 Santa Ana River below Prado Dam, CA—Continued



11074000 Santa Ana River below Prado Dam, CA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		October			November			December			January	
1	24.0	22.7	23.3	18.4	17.2	18.0	11.6	10.8	11.3	---	---	---
2	24.6	23.6	24.1	18.9	17.6	18.3	11.7	11.2	11.5	---	---	---
3	24.0	23.0	23.5	19.4	18.1	18.8	11.6	11.1	11.4	---	---	---
4	23.1	20.9	22.2	19.6	18.7	19.2	11.5	11.2	11.3	---	---	---
5	20.9	18.9	19.7	19.7	18.9	19.2	11.9	11.2	11.4	---	---	---
6	19.2	18.0	19.0	19.3	18.5	18.9	12.6	11.7	12.3	---	---	---
7	19.9	18.2	19.1	18.9	18.2	18.4	13.0	12.4	12.8	---	---	---
8	19.8	18.7	19.3	18.8	17.9	18.2	13.2	12.9	13.0	---	---	---
9	20.5	19.1	19.8	17.9	16.0	17.4	13.0	12.8	12.9	---	---	---
10	21.1	19.8	20.4	16.3	15.3	15.8	13.3	12.8	13.0	---	---	---
11	21.7	20.6	21.1	15.7	14.8	15.2	13.5	13.0	13.3	---	---	---
12	22.3	20.9	21.6	15.0	14.2	14.6	14.1	13.4	13.8	---	---	---
13	21.9	20.9	21.6	15.1	14.2	14.9	14.6	13.8	14.2	---	---	---
14	22.3	21.3	21.8	15.8	14.8	15.6	14.4	13.9	14.1	---	---	---
15	22.3	21.3	21.5	16.3	15.6	15.8	14.3	13.9	14.2	---	---	---
16	21.3	20.8	21.1	16.2	15.5	15.7	14.5	14.0	14.2	---	---	---
17	20.8	20.1	20.6	16.7	15.5	16.5	---	---	---	---	---	---
18	20.2	19.9	20.0	16.9	16.3	16.5	---	---	---	---	---	---
19	20.1	19.6	19.9	16.6	16.3	16.5	---	---	---	---	---	---
20	20.0	19.6	19.8	17.0	16.0	16.7	---	---	---	---	---	---
21	19.7	19.3	19.4	16.0	14.8	15.6	---	---	---	---	---	---
22	19.5	18.9	19.3	15.1	14.4	14.6	---	---	---	---	---	---
23	19.5	18.9	19.4	14.4	13.7	14.2	---	---	---	---	---	---
24	19.7	19.3	19.5	13.9	13.4	13.7	---	---	---	---	---	---
25	20.7	19.7	20.0	13.7	12.8	13.5	---	---	---	---	---	---
26	19.9	18.7	19.5	12.8	12.3	12.5	---	---	---	---	---	---
27	18.9	18.1	18.6	12.4	12.1	12.3	---	---	---	---	---	---
28	18.4	17.4	17.9	12.2	11.8	12.0	---	---	---	---	---	---
29	18.0	17.0	17.6	12.0	11.4	11.8	---	---	---	---	---	---
30	18.1	17.1	17.8	11.4	11.0	11.2	---	---	---	---	---	---
31	18.1	17.3	17.8	---	---	---	---	---	---	---	---	---
Max	24.6	23.6	24.1	19.7	18.9	19.2	---	---	---	---	---	---
Min	18.0	17.0	17.6	11.4	11.0	11.2	---	---	---	---	---	---

11074000 Santa Ana River below Prado Dam, CA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

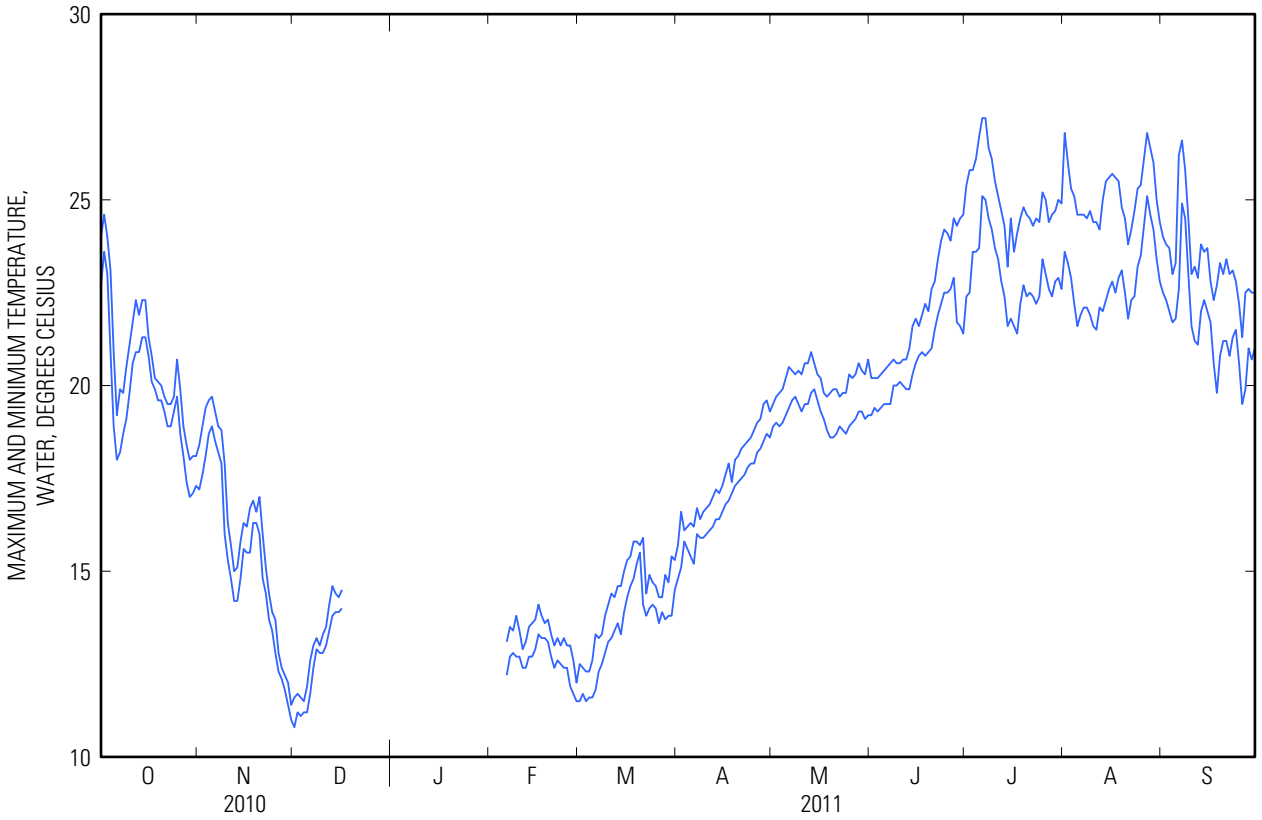
Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		February			March			April			May	
1	---	---	---	12.5	11.5	11.9	15.7	14.8	15.2	19.5	18.9	19.2
2	---	---	---	12.4	11.7	12.0	16.6	15.1	15.6	19.7	19.0	19.2
3	---	---	---	12.3	11.5	11.9	16.1	15.8	15.8	19.8	18.9	19.3
4	---	---	---	12.3	11.6	11.9	16.2	15.6	15.9	19.9	19.0	19.5
5	---	---	---	12.6	11.6	12.0	16.3	15.4	15.8	20.2	19.2	19.7
6	13.1	12.2	12.7	13.3	11.8	12.4	16.2	15.2	15.6	20.5	19.4	19.8
7	13.5	12.7	13.1	13.2	12.3	12.7	16.7	16.0	16.2	20.4	19.6	20.0
8	13.4	12.8	13.0	13.3	12.5	12.9	16.4	15.9	16.1	20.3	19.7	19.9
9	13.8	12.7	13.2	13.8	12.8	13.3	16.6	15.9	16.2	20.4	19.5	19.6
10	13.4	12.7	13.0	14.1	13.1	13.6	16.7	16.0	16.4	20.3	19.3	19.8
11	12.9	12.4	12.7	14.4	13.2	13.7	16.8	16.1	16.5	20.6	19.5	19.9
12	13.1	12.4	12.7	14.3	13.4	13.8	17.0	16.2	16.7	20.6	19.5	20.2
13	13.5	12.7	13.0	14.6	13.6	14.0	17.2	16.4	16.6	20.9	19.8	20.3
14	13.6	12.7	13.1	14.6	13.3	13.8	17.1	16.4	16.6	20.6	19.9	20.1
15	13.7	12.9	13.2	15.0	13.9	14.5	17.3	16.6	16.9	20.3	19.6	19.8
16	14.1	13.3	13.5	15.3	14.3	14.8	17.6	16.8	17.2	20.2	19.3	19.6
17	13.8	13.2	13.3	15.4	14.6	15.0	17.9	16.9	17.4	19.8	19.1	19.2
18	13.6	13.2	13.3	15.8	14.8	15.2	17.4	17.1	17.3	19.7	18.8	19.0
19	13.7	13.1	13.4	15.8	15.2	15.5	18.0	17.3	17.5	19.8	18.6	19.0
20	13.3	12.7	13.0	15.7	15.5	15.6	18.1	17.4	17.6	19.9	18.6	19.1
21	13.0	12.4	12.7	15.9	14.1	15.6	18.3	17.5	17.8	19.9	18.7	19.4
22	13.2	12.6	12.7	14.4	13.8	14.2	18.4	17.6	18.0	19.7	18.9	19.1
23	13.0	12.5	12.7	14.9	14.0	14.2	18.5	17.8	18.1	19.8	18.8	19.1
24	13.2	12.4	12.7	14.7	14.1	14.3	18.6	17.9	18.1	19.8	18.7	19.3
25	13.0	12.4	12.7	14.6	14.0	14.3	18.8	17.9	18.4	20.3	18.9	19.5
26	13.0	11.9	12.5	14.3	13.6	14.0	19.0	18.2	18.6	20.2	19.0	19.6
27	12.6	11.7	11.9	14.3	13.9	14.0	19.1	18.3	18.8	20.3	19.1	19.6
28	12.0	11.5	11.8	14.9	13.7	14.2	19.5	18.5	18.9	20.6	19.3	19.7
29	---	---	---	14.7	13.8	14.3	19.6	18.7	19.0	20.4	19.3	19.6
30	---	---	---	15.4	13.8	14.6	19.3	18.6	19.1	20.3	19.1	19.8
31	---	---	---	15.3	14.5	15.0	---	---	---	20.7	19.2	19.7
Max	---	---	---	15.9	15.5	15.6	19.6	18.7	19.1	20.9	19.9	20.3
Min	---	---	---	12.3	11.5	11.9	15.7	14.8	15.2	19.5	18.6	19.0

11074000 Santa Ana River below Prado Dam, CA—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Day	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median
		June			July			August			September	
1	20.2	19.2	19.8	25.4	22.4	23.6	26.8	23.6	24.8	24.0	22.5	23.0
2	20.2	19.4	19.8	25.8	22.5	24.0	26.0	23.3	25.0	23.8	22.3	23.0
3	20.2	19.3	19.7	25.8	23.6	24.6	25.3	22.9	24.9	23.7	22.0	23.1
4	20.3	19.4	19.9	26.1	23.6	24.6	25.1	22.2	24.2	23.0	21.7	22.3
5	20.4	19.5	20.0	26.7	23.7	25.0	24.6	21.6	23.9	23.3	21.8	22.5
6	20.5	19.5	19.8	27.2	25.1	25.9	24.6	21.9	23.9	26.2	22.6	23.5
7	20.6	19.5	20.2	27.2	25.0	25.9	24.6	22.1	23.9	26.6	24.9	25.6
8	20.7	20.0	20.1	26.4	24.5	25.4	24.5	22.1	23.9	25.8	24.5	25.2
9	20.6	20.0	20.1	26.1	24.2	25.0	24.7	21.9	23.7	24.5	23.0	23.7
10	20.6	20.1	20.4	25.5	23.7	24.8	24.4	21.6	23.6	23.0	21.6	22.6
11	20.7	20.0	20.3	25.1	23.4	24.0	24.4	21.5	23.3	23.2	21.2	21.7
12	20.7	19.9	20.2	24.7	22.8	23.9	24.2	22.1	23.4	22.9	21.1	22.3
13	21.0	19.9	20.5	24.3	22.4	23.6	25.0	22.0	23.8	23.8	22.0	22.9
14	21.6	20.3	20.8	23.2	21.6	22.8	25.5	22.3	24.2	23.6	22.3	23.0
15	21.8	20.6	21.1	24.5	21.8	22.5	25.6	22.6	24.5	23.7	22.0	22.7
16	21.6	20.8	21.1	23.6	21.6	23.2	25.7	22.8	24.5	22.8	21.7	22.1
17	21.9	20.9	21.4	24.1	21.4	23.1	25.6	22.5	24.6	22.3	20.6	21.4
18	22.2	20.8	21.5	24.5	22.2	24.2	25.5	22.9	24.7	22.7	19.8	21.3
19	22.0	20.9	21.5	24.8	22.7	24.4	24.8	23.1	24.0	23.3	20.8	22.5
20	22.6	21.0	21.6	24.6	22.4	24.1	24.5	22.5	23.4	23.0	21.2	22.5
21	22.8	21.5	22.1	24.5	22.5	23.9	23.8	21.8	22.9	23.4	21.2	22.3
22	23.4	21.9	22.6	24.3	22.4	23.8	24.2	22.3	23.3	23.0	20.8	22.2
23	23.9	22.2	23.0	24.5	22.2	23.8	24.7	22.4	23.4	23.1	21.3	22.6
24	24.2	22.5	23.1	24.4	22.4	24.0	25.3	23.2	24.0	22.8	21.5	22.4
25	24.1	22.5	23.2	25.2	23.4	24.6	25.4	23.5	24.5	22.2	20.6	21.5
26	23.9	22.6	23.2	25.0	23.0	24.6	26.1	24.3	24.9	21.3	19.5	20.8
27	24.5	22.9	23.3	24.4	22.6	23.9	26.8	25.1	25.5	22.5	19.9	21.0
28	24.3	21.7	23.2	24.6	22.4	23.8	26.4	24.6	25.6	22.6	21.0	22.1
29	24.5	21.6	22.9	24.7	22.8	24.1	26.0	24.2	25.1	22.5	20.7	21.8
30	24.6	21.4	23.0	25.0	22.9	24.1	25.0	23.4	24.4	22.5	21.0	21.8
31	---	---	---	24.9	22.6	24.4	24.4	22.8	23.5	---	---	---
Max	24.6	22.9	23.3	27.2	25.1	25.9	26.8	25.1	25.6	26.6	24.9	25.6
Min	20.2	19.2	19.7	23.2	21.4	22.5	23.8	21.5	22.9	21.3	19.5	20.8

11074000 Santa Ana River below Prado Dam, CA—Continued



11074000 Santa Ana River below Prado Dam, CA—Continued

SUSPENDED SEDIMENT DISCHARGE
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius]

Sample date-time	Discharge, instantaneous, ft³/s (00061)	Temperature, water, °C (00010)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
10-12-2010 1215…SS	76	22.0	69	14
11-04-2010 1615…SS	159	19.5	26	11
12-29-2010 1400…SS	2,190	13.0	149	881
01-13-2011 1345…SS	22	15.0	12	.71
01-27-2011 1145…SS	406	13.0	6	6.6
02-10-2011 1100…SS	385	13.0	6	6.2
02-25-2011 1045…SS	311	12.5	12	10
03-10-2011 1245…SS	395	13.9	19	20
03-22-2011 1115…SS	757	14.5	36	74
04-07-2011 1130…SS	311	16.5	14	12
04-28-2011 1130…SS	308	19.0	4	3.3
05-17-2011 1030…SS	170	19.0	10	4.6
05-27-2011 0945…SS	182	19.0	7	3.4
06-16-2011 1000…SS	321	21.0	18	16
06-28-2011 1215…SS	114	22.0	354	109
07-15-2011 1230…SS	161	22.5	139	60
08-11-2011 1000…SS	184	21.5	120	60

SS Suspended-sediment data determined from a sample collected and processed according to National Water-Quality Assessment (NAWQA) Program protocol.

11074000 Santa Ana River below Prado Dam, CA—Continued

CROSS SECTION ANALYSES
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 1 of 2

[%, percent; ft, feet; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; E, estimated]

Sample date-time	Barometric pressure, mm Hg (00025)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	Specific conduc-tance, water, unfiltered, µS/cm at 25 °C (00095)	Tempera-ture, water, °C (00010)	Depth to bottom at sample location, ft (81903)	Sampling depth, ft (00003)	Stream width, ft (00004)
07-15-2011 1244	750	8.0	94	7.8	891	22.6	E 2.20	1.00	31.0
07-15-2011 1245	750	8.0	94	7.8	893	22.6	E 2.20	2.00	31.0
07-15-2011 1247	750	8.0	94	7.8	893	22.6	E 2.20	1.00	31.0
07-15-2011 1248	750	8.0	94	7.8	894	22.6	E 2.20	2.00	31.0
07-15-2011 1249	750	7.9	93	7.8	895	22.6	E 2.50	1.00	31.0
07-15-2011 1250	750	8.0	94	7.8	895	22.6	E 2.50	2.00	31.0
07-15-2011 1251	750	8.0	94	7.8	896	22.6	E 2.50	1.00	31.0
07-15-2011 1252	750	8.0	94	7.8	895	22.6	21.0	2.00	31.0
07-15-2011 1253	750	8.0	94	7.8	896	22.7	E 2.50	1.00	31.0
07-15-2011 1254	750	8.0	94	7.8	899	22.7	E 2.50	2.00	31.0
09-16-2011 1217	--	--	--	--	904	22.1	1.07	.20	32.1
09-16-2011 1218	--	--	--	--	904	22.1	1.07	.80	32.1
09-16-2011 1219	--	--	--	--	904	22.1	1.74	.30	32.1
09-16-2011 1220	--	--	--	--	904	22.1	1.74	1.40	32.1
09-16-2011 1221	--	--	--	--	904	22.0	1.74	.30	32.1
09-16-2011 1222	--	--	--	--	904	22.0	1.74	1.40	32.1
09-16-2011 1223	--	--	--	--	903	22.0	1.75	.40	32.1
09-16-2011 1224	--	--	--	--	903	22.0	1.75	1.40	32.1
09-16-2011 1225	--	--	--	--	902	22.0	1.75	.40	32.1
09-16-2011 1226	--	--	--	--	902	22.0	1.75	1.40	32.1
09-16-2011 1227	--	--	--	--	901	22.0	1.75	.40	32.1
09-16-2011 1228	--	--	--	--	901	22.0	1.75	1.40	32.1
09-16-2011 1229	--	--	--	--	900	22.1	1.76	.40	32.1
09-16-2011 1230	--	--	--	--	900	22.1	1.76	1.40	32.1
09-16-2011 1231	--	--	--	--	903	22.2	.91	.20	32.1
09-16-2011 1232	--	--	--	--	903	22.1	.91	.70	32.1

Note: Instantaneous discharge at the mean time of cross-sectional measurements: July 15, 167 ft^3/s; Sept. 16, 120 ft^3/s.

11074000 Santa Ana River below Prado Dam, CA—Continued

CROSS SECTION ANALYSES
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 2 of 2

[%, percent; ft, feet; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data; E, estimated]

Sample date-time	Location in cross section, distance from left bank looking downstream, ft (00009)
07-15-2011 1244	3.00
07-15-2011 1245	3.00
07-15-2011 1247	9.00
07-15-2011 1248	9.00
07-15-2011 1249	15.0
07-15-2011 1250	15.0
07-15-2011 1251	21.0
07-15-2011 1252	21.0
07-15-2011 1253	27.0
07-15-2011 1254	27.0
09-16-2011 1217	2.00
09-16-2011 1218	2.00
09-16-2011 1219	6.00
09-16-2011 1220	6.00
09-16-2011 1221	10.0
09-16-2011 1222	10.0
09-16-2011 1223	14.0
09-16-2011 1224	14.0
09-16-2011 1225	18.0
09-16-2011 1226	18.0
09-16-2011 1227	22.0
09-16-2011 1228	22.0
09-16-2011 1229	26.0
09-16-2011 1230	26.0
09-16-2011 1231	30.0
09-16-2011 1232	30.0

Note: Instantaneous discharge at the mean time of cross-sectional measurements: July 15, 167 ft^3/s; Sept. 16, 120 ft^3/s.

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

Santa Ana River Basin

LOCATION.--Lat 33°58′07″, long 117°26′51″ referenced to North American Datum of 1927, in NE ¼ SW ¼ 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.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--March 1970 to current year.

REVISED RECORDS.--WDR CA-83-1: Drainage area.

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.

REMARKS.--Records poor. 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 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.

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.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft³/s and (or) maximum (*), from rating curve extended as explained above:

[e, estimated]

Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov 20	1815	1,550	8.40
Dec 21	0000	*49,100	*16.83
Feb 15	1745	e3,900	7.25
Feb 26	0600	e4,100	7.69
Mar 1	1615	e6,500	8.55
Mar 21	0330	e3,100	7.01

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11066460, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11066460.2011.pdf

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	59	61	72	e140	90	e2,050	546	70	67	56	59	e40
2	56	58	75	e133	81	e165	547	67	65	54	56	42
3	55	66	81	e160	82	e122	474	64	75	53	51	42
4	55	62	88	e120	80	e115	389	67	73	52	50	43
5	59	62	81	e118	77	e102	247	65	69	49	52	44
6	57	60	314	e111	75	e100	142	62	70	e50	50	46
7	57	65	97	e105	73	e105	78	56	71	e50	49	42
8	56	83	86	e103	73	e96	89	57	73	51	49	41
9	50	75	79	e102	69	e90	91	54	68	51	48	43
10	50	78	77	e101	70	e88	96	59	73	50	51	44
11	52	68	74	e100	69	e87	88	66	75	54	58	43
12	55	67	73	e100	e70	e84	88	68	77	53	46	44
13	54	67	75	97	e69	e83	82	67	74	55	44	43
14	e58	66	80	89	e71	e81	90	67	75	56	46	43
15	e60	65	76	91	e1,200	e81	90	60	68	55	43	46
16	e63	68	108	88	e150	e80	88	59	71	52	44	46
17	e65	67	90	97	e120	e80	86	68	74	52	39	48
18	e67	68	277	99	e130	e78	80	103	69	51	41	47
19	e75	68	3,080	100	e540	e79	80	74	71	50	40	46
20	e69	275	10,600	99	e318	e195	83	73	76	51	39	51
21	66	295	15,900	98	e81	e950	87	71	78	51	37	49
22	66	100	17,400	98	e79	e160	94	71	66	51	36	49
23	63	86	1,940	93	e82	e310	96	72	65	49	37	49
24	65	105	e600	92	e81	211	99	71	64	52	39	50
25	74	77	e450	95	e110	234	96	70	61	51	39	54
26	69	72	e470	92	e1,400	228	92	67	62	52	e39	52
27	66	72	e250	90	e135	201	86	68	58	51	38	52
28	64	78	e190	89	e120	199	77	71	60	52	37	53
29	62	74	e425	83	---	388	71	71	57	53	39	54
30	66	72	e240	135	---	454	66	70	58	51	39	53
31	65	---	e170	159	---	504	---	68	---	86	40	---
Total	1,898	2,580	53,618	3,277	5,595	7,800	4,418	2,096	2,063	1,644	1,375	1,399
Mean	61.2	86.0	1,730	106	200	252	147	67.6	68.8	53.0	44.4	46.6
Max	75	295	17,400	160	1,400	2,050	547	103	78	86	59	54
Min	50	58	72	83	69	78	66	54	57	49	36	40
Ac-ft	3,760	5,120	106,400	6,500	11,100	15,470	8,760	4,160	4,090	3,260	2,730	2,770

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1999, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	59.5	78.3	103	238	293	326	148	121	79.2	52.9	52.5	53.8
Max	194	259	292	1,839	1,411	1,806	604	666	351	145	233	129
(WY)	(1988)	(1984)	(1984)	(1993)	(1980)	(1995)	(1983)	(1983)	(1983)	(1983)	(1983)	(1976)
Min	20.5	21.2	23.3	24.7	23.1	23.7	23.1	22.3	20.2	16.8	17.9	18.0
(WY)	(1974)	(1975)	(1974)	(1972)	(1972)	(1972)	(1971)	(1972)	(1981)	(1981)	(1981)	(1974)

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

SUMMARY STATISTICS

	Water Years 1970 - 1999		
Annual mean	134		
Highest annual mean	416		1983
Lowest annual mean	29.0		1975
Highest daily mean	11,500	Mar 2	1983
Lowest daily mean	15	Sep 7	1980
Annual seven-day minimum	16	Jul 1	1981
Maximum peak flow	31,300	Feb 24	1998
Maximum peak stage	20.23	Mar 4	1978
Annual runoff (ac-ft)	97,140		
10 percent exceeds	209		
50 percent exceeds	63		
90 percent exceeds	23		

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2000 - 2011, BY WATER YEAR (WY)

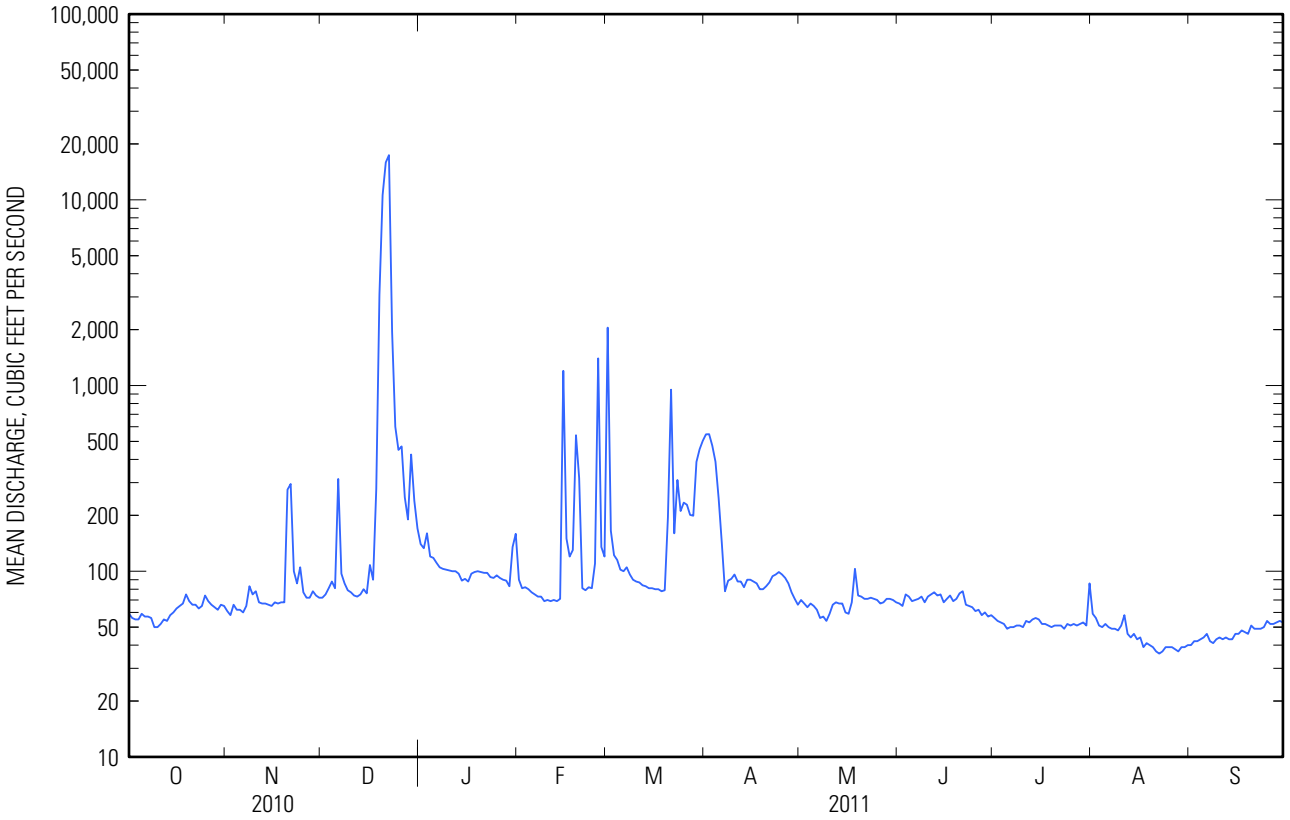
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	115	96.3	283	369	263	172	167	106	81.7	71.6	76.3	66.7
Max	498	141	1,730	2,350	755	498	500	314	192	137	201	86.6
(WY)	(2005)	(2003)	(2011)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)
Min	51.0	51.5	85.9	74.8	87.9	74.8	56.2	48.1	53.0	51.5	44.4	39.3
(WY)	(2010)	(2010)	(2000)	(2009)	(2002)	(2009)	(2009)	(2009)	(2010)	(2008)	(2009)	(2009)

SUMMARY STATISTICS

[e, estimated]

	Calendar Year 2010		Water Year 2011		Water Years 2000 - 2011	
Annual total	105,029		87,763			
Annual mean	288		240		155	
Highest annual mean					491	2005
Lowest annual mean					79.9	2007
Highest daily mean	17,400	Dec 22	17,400	Dec 22	e22,000	Jan 11, 2005
Lowest daily mean	42	May 31	36	Aug 22	35	Aug 30, 2009
Annual seven-day minimum	46	May 26	38	Aug 21	38	Aug 21, 2011
Maximum peak flow			49,100	Dec 21	49,100	Dec 21, 2010
Maximum peak stage			16.83	Dec 21	16.83	Dec 21, 2010
Annual runoff (ac-ft)	208,300		174,100		112,600	
10 percent exceeds	185		192		161	
50 percent exceeds	66		71		81	
90 percent exceeds	51		46		55	

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



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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970 to current year.
CHEMICAL DATA: Water years 1970 to current year.
SPECIFIC CONDUCTANCE: Water years 1970-78, 1999-2000.
WATER TEMPERATURE: Water years 1999-2000.
SEDIMENT DATA: Water years 1999-2000.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, no data]

Sample date-time	Temperature, air, °C (00020)	Discharge, instantaneous, ft³/s (00061)	Specific conductance, water, unfiltered, µS/cm at 25 °C (00095)	Temperature, water, °C (00010)	Dissolved solids dried at 180 °C, water, filtered, mg/L (70300)
10-08-2010 1105	21.1	58	966	19.9	600
10-20-2010 1245	22.0	70	970	21.6	602
11-05-2010 1125	25.4	64	1,020	20.1	631
11-19-2010 1230	14.1	71	972	17.7	589
12-03-2010 0955	13.2	72	953	14.9	599
01-13-2011 1330	21.9	91	865	19.6	542
01-19-2011 1400	21.9	106	939	21.3	581
03-24-2011 0930	16.1	180	609	12.4	367
04-20-2011 1105	21.9	85	857	22.7	531
04-28-2011 1500	24.9	83	870	29.2	556
05-25-2011 1215	25.7	66	939	28.4	562
05-31-2011 1245	25.6	66	909	28.3	546
06-20-2011 1210	27.8	86	877	29.9	528
06-28-2011 1345	31.3	54	1,010	32.4	624
07-08-2011 1135	24.2	50	1,010	31.3	640
07-29-2011 1100	25.3	54	1,130	26.6	709
08-22-2011 1410	32.8	36	1,060	32.1	652
09-29-2011 1310	--	51	1,020	29.5	--

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

Santa Ana River Basin

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 mi^2.

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.--Records poor. 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 ft^3/s, Jan. 11, 2005, gage height, 9.04 ft, current site and datum, from rating curve extended above 5,930 ft^3/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.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and (or) maximum (*), from rating curve extended as explained above:

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov 20	1500	1,620	4.78
Dec 19	2200	6,620	5.95
Dec 20	2115	18,300	7.41
Dec 22	0800	*27,800	*8.35
Jan 30	2115	1,400	4.69
Feb 15	1530	4,040	5.50
Feb 19	0230	1,120	4.51
Feb 26	0715	2,960	5.21
Mar 1	1415	6,470	5.91
Mar 21	0100	2,700	4.99
Mar 23	2215	3,120	5.13
Mar 29	1330	1,220	4.50

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11059300, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11059300.2011.pdf

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	e0.00	e0.38	e1.6	15	4.4	2,300	785	65	e0.00	e0.00	e0.00	e0.00
2	e0.00	e0.56	e1.2	21	3.7	96	822	61	e0.00	e0.00	e0.00	e0.00
3	e0.00	e0.32	1.5	78	3.8	e49	976	27	e0.00	e0.00	e0.00	e0.00
4	e0.00	e0.13	1.8	15	3.7	e40	443	22	e0.00	e0.00	e0.00	e0.00
5	e0.00	0.00	8.2	12	3.7	e38	256	19	e0.00	e0.00	e0.00	e0.00
6	0.05	0.00	74	9.4	3.8	e37	96	17	e0.00	e0.00	e0.00	e0.00
7	e0.00	e0.51	3.0	8.7	3.4	e50	23	16	e0.00	e0.00	e0.00	e0.00
8	e0.00	19	1.5	8.6	3.2	24	23	18	e0.00	e0.00	e0.00	e0.00
9	e0.00	e1.1	1.5	7.1	2.7	18	39	21	e0.00	e0.00	e0.00	e0.00
10	e0.00	e0.90	1.3	5.8	3.3	17	19	21	e0.00	e0.00	e0.00	e0.00
11	e0.00	e0.59	1.3	4.0	3.8	16	17	18	e0.00	e0.00	e0.00	e0.00
12	e0.00	e1.2	1.4	4.0	4.1	12	14	12	e0.00	e0.00	e0.00	e0.00
13	e0.00	e2.1	1.6	4.2	4.5	10	15	11	e0.00	e0.00	e0.00	e0.00
14	e0.00	e3.2	1.8	4.1	16	8.6	18	14	e0.00	e0.00	e0.00	e0.00
15	e0.00	e0.95	1.3	3.3	1,030	8.7	12	15	e0.00	e0.00	e0.00	e0.00
16	e0.00	e1.4	10	3.6	110	8.4	13	14	e0.00	e0.00	e0.00	e0.00
17	e0.00	e1.1	6.6	3.2	86	7.7	9.5	2.6	e0.00	e0.00	e0.00	e0.00
18	e0.00	e0.90	42	3.2	81	7.5	16	36	e0.00	e0.00	e0.00	e0.00
19	1.0	e0.70	1,260	3.7	454	9.0	43	19	e0.00	e0.00	e0.00	e0.00
20	0.21	146	4,930	3.2	265	80	56	2.2	e0.00	e0.00	e0.00	e0.00
21	0.13	88	4,640	3.3	18	812	64	9.3	e0.00	e0.00	e0.00	e0.00
22	e0.05	8.1	10,100	3.0	11	100	86	5.9	e0.00	e0.00	e0.00	e0.00
23	0.00	1.5	1,130	2.8	9.6	265	99	12	e0.00	e0.00	e0.00	e0.00
24	0.00	2.4	430	2.8	9.3	134	112	14	e0.00	e0.00	e0.00	e0.00
25	1.0	1.3	235	2.5	9.1	168	112	7.9	e0.00	e0.00	e0.00	e0.00
26	e0.80	1.3	302	2.8	1,120	87	104	0.64	e0.00	e0.00	e0.00	e0.00
27	e0.70	1.3	82	2.6	62	68	92	e0.00	e0.00	e0.00	e0.00	e0.00
28	e0.60	16	42	2.7	56	155	81	e0.00	e0.00	e0.00	e0.00	e0.00
29	e0.55	4.2	264	2.7	---	628	75	e0.00	e0.00	e0.00	e0.00	e0.00
30	e0.50	2.3	79	154	---	793	67	e0.00	e0.00	e0.00	e0.00	e0.00
31	e0.45	---	23	83	---	842	---	e0.00	---	e0.00	e0.00	---
Total	6.04	307.44	23,678.6	479.3	3,385.1	6,888.9	4,587.5	480.54	0.00	0.00	0.00	0.00
Mean	0.19	10.2	764	15.5	121	222	153	15.5	0.00	0.00	0.00	0.00
Max	1.0	146	10,100	154	1,120	2,300	976	65	0.00	0.00	0.00	0.00
Min	0.00	0.00	1.2	2.5	2.7	7.5	9.5	0.00	0.00	0.00	0.00	0.00
Ac-ft	12	610	46,970	951	6,710	13,660	9,100	953	0.00	0.00	0.00	0.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1954, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	.88	3.47	20.9	23.7	20.6	37.4	27.2	11.3	2.39	.93	.87	.63
Max	3.35	21.3	117	109	72.2	183	237	145	31.2	9.87	8.37	6.32
(WY)	(1942)	(1945)	(1946)	(1943)	(1945)	(1943)	(1941)	(1941)	(1941)	(1940)	(1940)	(1939)
Min	.000	.007	.000	1.90	2.41	1.70	1.14	.14	.000	.000	.000	.000
(WY)	(1951)	(1952)	(1951)	(1948)	(1942)	(1951)	(1951)	(1942)	(1950)	(1950)	(1942)	(1948)

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

SUMMARY STATISTICS

	Water Years 1939 - 1954	
Annual mean	12.7	
Highest annual mean	56.6	1941
Lowest annual mean	.78	1951
Highest daily mean	2,350	Jan 23, 1943
Lowest daily mean	.00	Jun 19, 1940
Annual seven-day minimum	.00	Sep 10, 1940
Maximum peak flow	7,600	Jan 23, 1943
Maximum peak stage	6.50	Jan 23, 1943
Annual runoff (ac-ft)	9,190	
10 percent exceeds	16	
50 percent exceeds	1.0	
90 percent exceeds	.00	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1995, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	33.9	43.3	77.4	158	232	253	132	103	63.9	40.8	36.8	34.6
Max	117	191	469	1,327	2,096	1,279	742	707	339	162	160	75.0
(WY)	(1984)	(1984)	(1967)	(1993)	(1980)	(1980)	(1980)	(1983)	(1983)	(1969)	(1983)	(1983)
Min	12.4	13.2	14.8	13.2	11.6	10.6	12.5	9.35	13.0	9.08	9.97	9.93
(WY)	(1968)	(1972)	(1970)	(1972)	(1968)	(1972)	(1972)	(1967)	(1971)	(1967)	(1967)	(1967)

SUMMARY STATISTICS

	Water Years 1967 - 1995	
Annual mean	100	
Highest annual mean	441	1980
Lowest annual mean	17.2	1968
Highest daily mean	14,800	Feb 25, 1969
Lowest daily mean	6.4	Jul 13, 1967
Annual seven-day minimum	8.1	Sep 16, 1967
Maximum peak flow	28,000	Feb 25, 1969
Maximum peak stage	11.90	Feb 25, 1969
Annual runoff (ac-ft)	72,490	
10 percent exceeds	165	
50 percent exceeds	35	
90 percent exceeds	14	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	17.5	31.2	29.8	101	253	48.0	55.4	110	31.2	9.13	18.4	22.6
Max	38.1	56.2	42.6	230	729	114	190	430	116	20.9	66.1	75.8
(WY)	(1996)	(1997)	(1998)	(1997)	(1998)	(1998)	(1998)	(1998)	(1998)	(1999)	(1998)	(1998)
Min	4.97	11.0	16.5	22.2	7.57	0.10	0.00	0.00	0.00	0.00	0.00	0.00
(WY)	(1998)	(1998)	(1999)	(1999)	(1997)	(1997)	(1997)	(1996)	(1996)	(1996)	(1996)	(1996)

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

SUMMARY STATISTICS

	Water Years 1996 - 1999	
Annual mean	59.4	
Highest annual mean	152	1998
Lowest annual mean	15.9	1999
Highest daily mean	5,050	Feb 24, 1998
Lowest daily mean	0.00	Mar 22, 1996
Annual seven-day minimum	0.00	Mar 22, 1996
Maximum peak flow	21,100	Feb 23, 1998
Maximum peak stage	7.70	Feb 23, 1998
Annual runoff (ac-ft)	43,010	
10 percent exceeds	138	
50 percent exceeds	7.5	
90 percent exceeds	0.00	

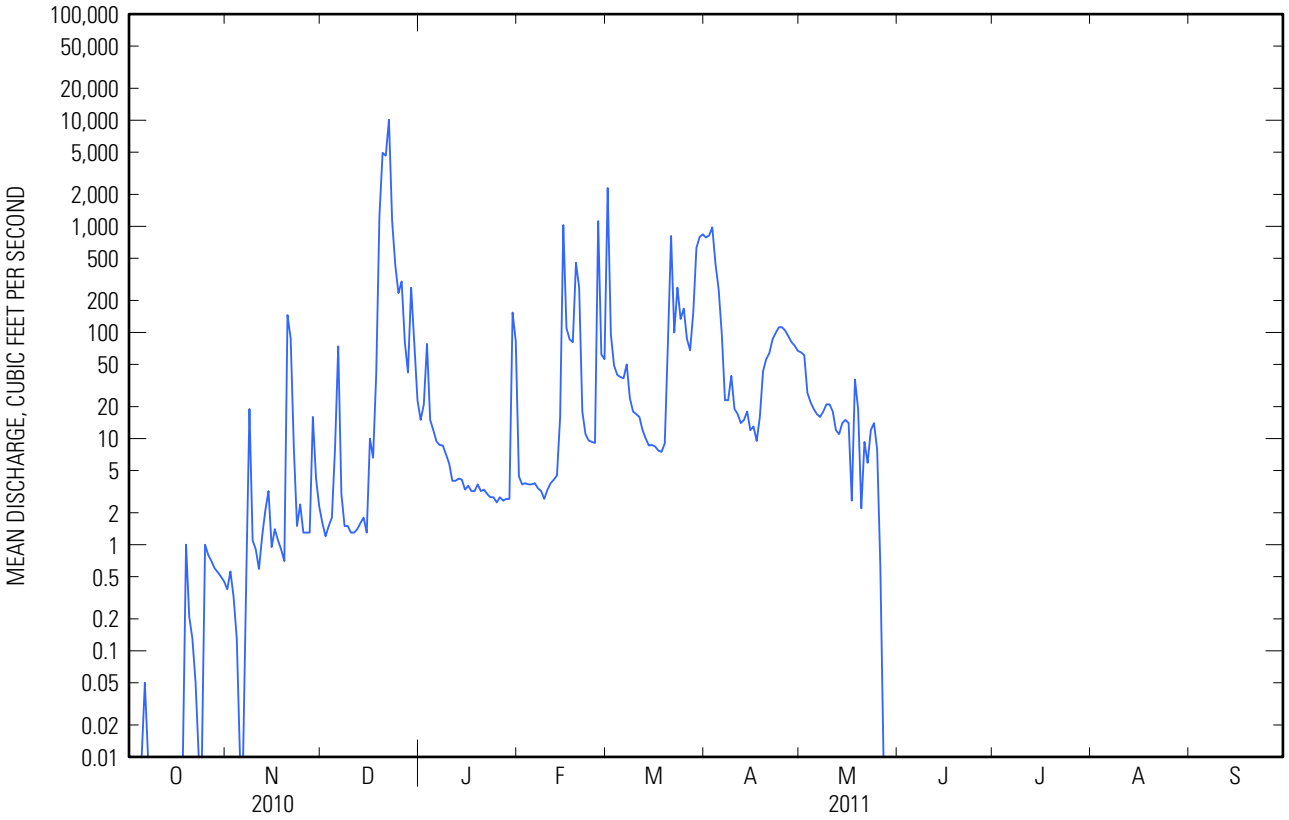
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2000 - 2011, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	21.8	12.3	96.4	143	106	74.4	73.4	32.5	9.65	7.34	8.90	4.50
Max	200	39.7	764	1,185	376	398	351	247	112	52.9	102	40.6
(WY)	(2005)	(2003)	(2011)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)	(2005)
Min	0.00	0.67	1.16	0.00	0.82	4.10	0.04	0.00	0.00	0.00	0.00	0.00
(WY)	(2003)	(2001)	(2001)	(2003)	(2002)	(2008)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 2000 - 2011	
Annual total	38,497.31		39,813.42			
Annual mean	105		109		49.1	
Highest annual mean					265	2005
Lowest annual mean					1.70	2002
Highest daily mean	10,100	Dec 22	10,100	Dec 22	12,500	Jan 11, 2005
Lowest daily mean	0.00	May 4	0.00	Oct 1	0.00	May 14, 2000
Annual seven-day minimum	0.00	May 4	0.00	Oct 7	0.00	Sep 11, 2000
Maximum peak flow			27,800	Dec 22	35,700	Jan 11, 2005
Maximum peak stage			8.35	Dec 22	9.04	Jan 11, 2005
Annual runoff (ac-ft)	76,360		78,970		35,550	
10 percent exceeds	65		96		69	
50 percent exceeds	0.60		1.4		1.2	
90 percent exceeds	0.00		0.00		0.00	

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



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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968-72, 1983-86, 1988 to current year.
CHEMICAL ANALYSES: Water years 1969 (partial-record station), 1970-72.
SPECIFIC CONDUCTANCE: Water years 1968-72.
WATER TEMPERATURE: Water years 1968, 1983.
SEDIMENT DATA: Water years 1983-86, 1988 to current year.

PERIOD OF DAILY RECORD.--October 1982 to September 1983.
WATER TEMPERATURE: November 1982 to September 1983.
SUSPENDED-SEDIMENT DISCHARGE: October 1982 to September 1983.

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 1 of 2

[ft³/s, cubic feet per second; mg/L, milligrams per liter; mm, millimeters; °C, degrees Celsius; A, average]

Sample date-time	Discharge, instantaneous, ft³/s (00061)	Temperature, water, °C (00010)	Suspended sediment, fall diameter (deionized water), percent smaller than 0.002 mm (70337)	Suspended sediment, fall diameter (deionized water), percent smaller than 0.004 mm (70338)	Suspended sediment, fall diameter (deionized water), percent smaller than 0.008 mm (70339)	Suspended sediment, fall diameter (deionized water), percent smaller than 0.016 mm (70340)	Suspended sediment, fall diameter (deionized water), percent smaller than 0.031 mm (70341)	Suspended sediment, sieve diameter, percent smaller than 0.0625 mm (70331)	Suspended sediment, sieve diameter, percent smaller than 0.125 mm (70332)
12-03-2010 0830	2.0	6.9	--	--	--	--	--	93	--
12-03-2010 0832	2.0	6.9	--	--	--	--	--	88	--
12-03-2010 0834	2.0	6.9	--	--	--	--	--	A 91	--
12-19-2010 1226	284	9.7	--	--	--	--	--	24	28
12-29-2010 0820	92	9.8	28	28	34	41	47	53	72
12-29-2010 0821	92	9.8	27	27	33	38	44	50	68
12-29-2010 0822	92	9.8	A 27	A 28	A 33	A 40	A 45	A 51	A 70

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

Part 2 of 2

[ft³/s, cubic feet per second; mg/L, milligrams per liter; mm, millimeters; °C, degrees Celsius; A, average]

Sample date-time	Suspended sediment, sieve diameter, percent smaller than 0.25 mm (70333)	Suspended sediment, sieve diameter, percent smaller than 0.5 mm (70334)	Suspended sediment, sieve diameter, percent smaller than 1 mm (70335)	Suspended sediment, sieve diameter, percent smaller than 2 mm (70336)	Suspended sediment concentration, mg/L (80154)	Suspended sediment discharge, tons per day (80155)
12-03-2010 0830	--	--	--	--	50	.27
12-03-2010 0832	--	--	--	--	62	.33
12-03-2010 0834	--	--	--	--	A 56	A .30
12-19-2010 1226	36	71	96	100	833	638
12-29-2010 0820	93	99	100	--	1,630	405
12-29-2010 0821	92	99	100	--	1,900	472
12-29-2010 0822	A 92	A 99	A 100	--	A 1,770	A 439

11072100 Temescal Creek above Main Street, at Corona, CA

Santa Ana River Basin

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 mi^2, excludes 768 mi^2 above Lake Elsinore.

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.--Records fair above 500 ft^3/s and poor below. 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 FOR PERIOD OF RECORD.--Maximum discharge, 5,290 ft^3/s, Dec. 22, 2010, gage height, 7.27 ft, from rating curve extended above 305 ft^3/s, on basis of step-backwater analysis; minimum daily, 0.27 ft^3/s, Sept. 25, 1981.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 8,850 ft^3/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.

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11072100, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11072100.2011.pdf

11072100 Temescal Creek above Main Street, at Corona, CA—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	1.8	2.5	2.9	51	20	69	96	15	9.5	5.1	3.8	2.6
2	4.9	2.6	2.5	96	20	63	86	14	6.9	5.4	5.3	3.0
3	3.4	2.9	3.1	94	30	61	66	12	6.5	5.2	6.6	3.0
4	3.0	2.8	4.2	43	42	63	49	11	8.5	5.1	4.6	3.1
5	4.1	2.6	26	40	47	67	37	14	8.2	11	5.0	5.1
6	3.8	2.6	75	48	49	67	31	11	8.9	4.5	5.2	3.0
7	5.0	3.0	5.2	73	50	70	30	9.6	7.1	4.0	5.3	3.2
8	2.3	4.9	2.9	83	55	69	31	11	6.7	3.9	4.6	3.4
9	2.7	3.4	3.5	83	60	69	38	15	8.8	3.7	4.7	2.9
10	2.7	3.3	3.4	78	62	87	31	14	8.7	4.0	3.5	2.7
11	2.5	3.1	2.9	81	65	109	31	18	4.4	3.8	3.5	2.7
12	2.7	2.7	3.1	79	66	110	35	10	6.4	4.4	3.6	2.7
13	3.0	3.6	3.6	73	58	105	39	11	11	4.2	3.8	3.1
14	3.1	3.5	3.8	68	49	95	41	8.9	16	4.2	3.7	3.6
15	3.6	4.4	4.4	69	47	85	41	12	16	4.5	3.7	2.7
16	3.5	4.6	24	70	63	76	39	9.0	14	4.1	3.7	3.5
17	3.6	5.8	32	67	40	74	37	14	14	4.0	3.6	3.1
18	11	5.6	65	64	97	74	36	45	14	4.5	3.2	3.5
19	28	6.5	301	65	229	78	36	12	15	4.3	3.6	3.5
20	4.3	65	580	61	144	214	37	11	15	4.0	3.5	3.2
21	3.1	38	985	59	78	327	34	12	15	4.6	3.4	3.8
22	2.7	3.7	2,870	60	66	111	34	11	13	5.4	3.3	3.8
23	2.3	3.2	647	58	59	168	35	14	9.1	4.4	2.6	4.7
24	3.0	7.4	263	54	55	115	33	12	8.1	4.2	2.6	3.7
25	5.7	2.5	181	47	72	119	31	11	8.4	4.4	2.7	3.9
26	2.3	2.4	163	41	427	78	26	11	8.4	7.6	3.0	3.9
27	2.2	2.2	90	36	96	72	22	11	8.0	3.7	3.2	3.5
28	1.8	4.6	76	34	75	73	18	10	6.6	4.5	2.7	3.7
29	2.2	2.9	313	25	---	85	17	12	6.8	4.5	2.6	3.8
30	15	2.5	92	56	---	92	15	13	7.1	4.4	3.2	3.6
31	2.6	---	62	23	---	96	---	11	---	46	2.9	---
Total	141.9	204.8	6,890.5	1,879	2,221	3,041	1,132	405.5	296.1	187.6	116.7	102.0
Mean	4.58	6.83	222	60.6	79.3	98.1	37.7	13.1	9.87	6.05	3.76	3.40
Max	28	65	2,870	96	427	327	96	45	16	46	6.6	5.1
Min	1.8	2.2	2.5	23	20	61	15	8.9	4.4	3.7	2.6	2.6
Ac-ft	281	406	13,670	3,730	4,410	6,030	2,250	804	587	372	231	202

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1990, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	7.62	15.1	23.8	23.0	14.5	40.9	13.1	12.0	9.35	7.15	6.45	6.99
Max	16.1	55.9	126	116	25.5	237	39.3	43.7	30.0	10.9	13.4	11.3
(WY)	(1986)	(1981)	(1981)	(1981)	(1981)	(1983)	(1983)	(1983)	(1983)	(1985)	(1990)	(1985)
Min	2.36	4.67	2.53	7.01	7.42	6.26	4.02	3.77	1.12	1.20	1.79	1.09
(WY)	(1985)	(1987)	(1982)	(1989)	(1982)	(1990)	(1989)	(1982)	(1982)	(1982)	(1982)	(1981)

11072100 Temescal Creek above Main Street, at Corona, CA—Continued

SUMMARY STATISTICS

	Water Years 1981 - 1990	
Annual mean	12.4	
Highest annual mean	33.7	1981
Lowest annual mean	6.10	1987
Highest daily mean	1,720	Mar 1, 1983
Lowest daily mean	.27	Sep 25, 1981
Annual seven-day minimum	.56	Sep 23, 1981
Maximum peak flow	4,720	Mar 1, 1983
Maximum peak stage	11.67	Mar 1, 1983
Annual runoff (ac-ft)	8,990	
10 percent exceeds	27	
50 percent exceeds	6.1	
90 percent exceeds	2.7	

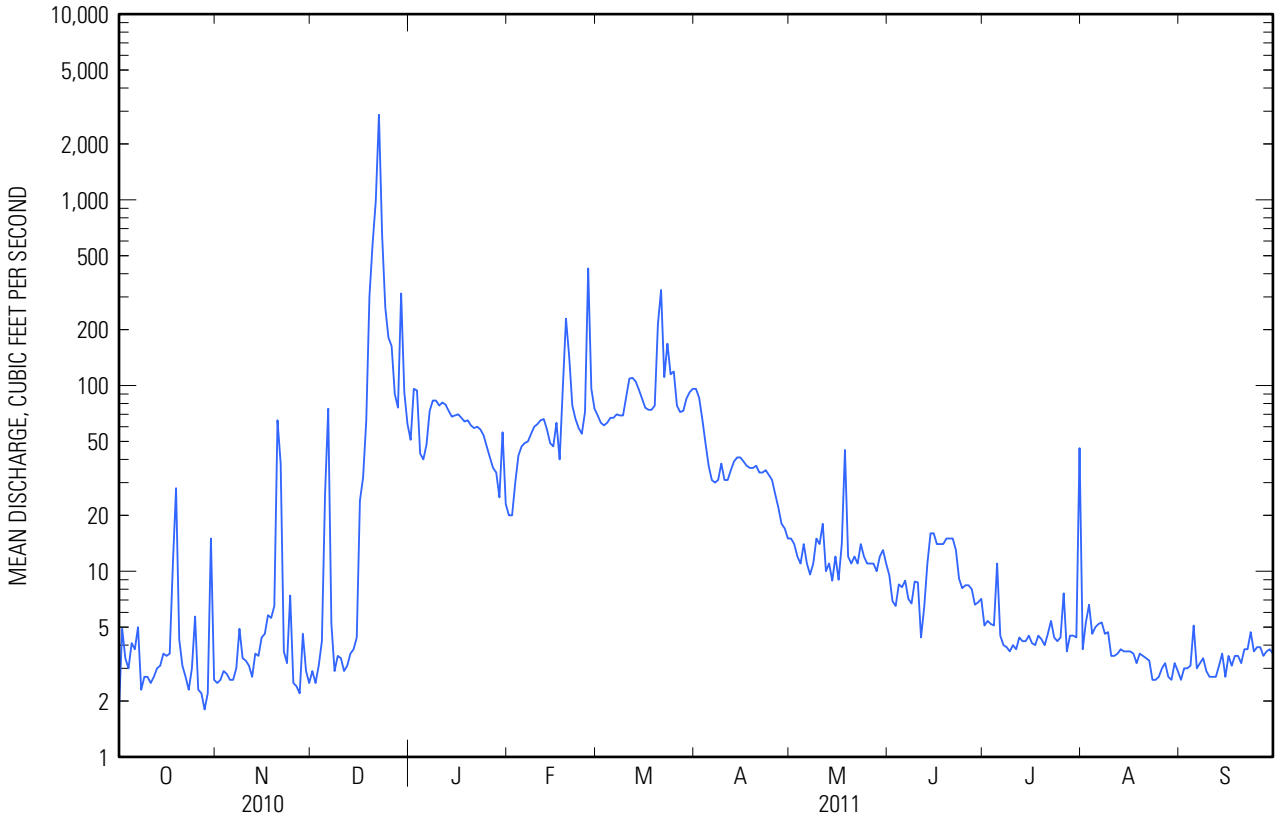
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 2011, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	14.5	17.6	31.5	61.9	94.6	63.6	37.8	20.5	12.4	10.7	10.2	10.7
Max	52.5	58.2	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	4.22	4.66	9.35	10.7	10.5	5.19	2.89	3.24	3.25	3.56	2.79	2.38
(WY)	(2009)	(2010)	(1999)	(2003)	(2002)	(2001)	(1991)	(1992)	(2003)	(1994)	(2010)	(2010)

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1991 - 2011	
Annual total	15,857.0		16,618.1			
Annual mean	43.4		45.5		31.8	
Highest annual mean					104	2005
Lowest annual mean					12.5	2004
Highest daily mean	2,870	Dec 22	2,870	Dec 22	2,870	Dec 22, 2010
Lowest daily mean	1.5	Sep 25	1.8	Oct 1	0.34	Jul 3, 1992
Annual seven-day minimum	1.6	Sep 25	2.7	Oct 31	0.89	Jan 13, 1992
Maximum peak flow			5,290	Dec 22	5,290	Dec 22, 2010
Maximum peak stage			7.27	Dec 22	7.27	Dec 22, 2010
Annual runoff (ac-ft)	31,450		32,960		23,060	
10 percent exceeds	77		83		63	
50 percent exceeds	3.8		10		12	
90 percent exceeds	2.5		2.9		3.6	

11072100 Temescal Creek above Main Street, at Corona, CA—Continued



11073495 Cucamonga Creek near Mira Loma, CA

Santa Ana River Basin

LOCATION.--Lat 33°58′58″, long 117°35′55″ referenced to North American Datum of 1927, in SW ¼ NE ¼ 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 mi^2.

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.--Records fair above 100 ft^3/s and poor below. 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 ft^3/s, Oct. 20, 2004, gage height, 6.58 ft, from rating curve extended above 617 ft^3/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, 1.3 ft^3/s, May 28, 2010.

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11073495, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11073495.2011.pdf

11073495 Cucamonga Creek near Mira Loma, CA—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	13	29	34	44	23	32	42	19	12	25	21	7.6
2	14	21	36	94	48	29	36	7.5	18	38	8.0	7.6
3	19	10	41	116	33	37	41	5.5	19	28	13	10
4	14	12	42	46	12	28	40	12	25	32	18	13
5	20	12	91	e48	17	31	36	5.8	26	37	31	16
6	155	23	176	51	42	38	33	5.4	28	15	48	14
7	24	19	42	54	21	64	26	10	20	14	48	8.6
8	14	31	42	58	14	77	25	17	18	22	48	5.5
9	17	15	42	63	19	67	26	12	20	31	48	6.9
10	17	14	44	61	23	54	25	14	34	31	46	14
11	12	18	42	66	21	42	24	13	26	39	47	22
12	11	18	47	64	25	45	16	12	33	33	48	21
13	6.6	24	41	62	35	53	16	8.8	26	20	48	12
14	17	25	29	61	33	41	15	13	20	13	48	17
15	21	20	36	58	34	42	7.9	33	20	15	48	15
16	28	26	67	63	171	43	8.6	17	18	15	47	15
17	31	23	118	55	107	44	12	40	29	29	45	16
18	38	22	244	60	206	48	8.7	66	39	18	32	27
19	45	46	1,930	54	203	69	12	30	41	8.2	15	24
20	40	338	2,040	42	92	618	12	19	31	11	17	21
21	43	164	1,500	30	61	435	17	18	29	9.2	18	25
22	43	46	2,500	31	60	85	17	21	36	11	14	18
23	48	48	282	37	49	146	19	17	24	16	7.3	25
24	45	47	98	30	54	62	32	11	29	14	6.1	30
25	70	48	88	36	250	209	19	17	27	21	9.6	42
26	50	48	115	37	884	50	20	21	30	12	7.0	35
27	42	47	48	19	44	57	12	24	19	11	6.4	29
28	34	51	46	17	34	55	11	19	27	14	8.2	23
29	29	39	188	14	---	59	10	18	17	12	7.8	27
30	53	34	52	86	---	57	12	19	21	21	7.5	31
31	41	---	50	31	---	47	---	19	---	70	12	---
Total	1,054.6	1,318	10,151	1,588	2,615	2,764	631.2	564.0	762	685.4	827.9	578.2
Mean	34.0	43.9	327	51.2	93.4	89.2	21.0	18.2	25.4	22.1	26.7	19.3
Max	155	338	2,500	116	884	618	42	66	41	70	48	42
Min	6.6	10	29	14	12	28	7.9	5.4	12	8.2	6.1	5.5
Ac-ft	2,090	2,610	20,130	3,150	5,190	5,480	1,250	1,120	1,510	1,360	1,640	1,150

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1977, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	.021	1.15	1.55	18.2	4.65	1.91	1.35	.065	.001	.000	.000	.11
Max	.19	6.07	7.91	149	30.7	7.94	13.1	.54	.007	.000	.000	1.03
(WY)	(1972)	(1971)	(1972)	(1969)	(1969)	(1969)	(1969)	(1977)	(1969)	(1968)	(1968)	(1976)
Min	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	(1969)	(1969)	(1970)	(1975)	(1972)	(1972)	(1968)	(1968)	(1968)	(1968)	(1968)	(1968)

11073495 Cucamonga Creek near Mira Loma, CA—Continued

SUMMARY STATISTICS

	Water Years 1968 - 1977	
Annual mean	2.73	
Highest annual mean	16.8	1969
Lowest annual mean	.16	1976
Highest daily mean	2,600	Jan 25, 1969
Lowest daily mean	.00	Feb 1, 1968
Annual seven-day minimum	.00	Feb 1, 1968
Maximum peak flow	9,100	Jan 25, 1969
Maximum peak stage	7.08	Jan 25, 1969
Annual runoff (ac-ft)	1,980	
10 percent exceeds	.10	
50 percent exceeds	.00	
90 percent exceeds	.00	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1984, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	3.49	11.3	7.69	34.1	65.0	46.3	12.1	3.43	.48	.37	1.47	1.08
Max	11.1	27.9	24.7	149	216	205	63.4	19.8	2.30	1.22	6.99	3.45
(WY)	(1984)	(1983)	(1984)	(1983)	(1980)	(1983)	(1983)	(1983)	(1983)	(1983)	(1983)	(1983)
Min	.091	.002	.006	1.67	1.29	2.44	.056	.063	.008	.019	.009	.011
(WY)	(1981)	(1980)	(1980)	(1984)	(1984)	(1984)	(1981)	(1979)	(1979)	(1981)	(1979)	(1979)

SUMMARY STATISTICS

	Water Years 1979 - 1984	
Annual mean	17.5	
Highest annual mean	53.4	1983
Lowest annual mean	1.51	1981
Highest daily mean	2,530	Mar 1, 1983
Lowest daily mean	.00	Feb 6, 1979
Annual seven-day minimum	.00	Feb 6, 1979
Maximum peak flow	16,100	Feb 27, 1983
Maximum peak stage	7.85	Feb 27, 1983
Annual runoff (ac-ft)	12,700	
10 percent exceeds	10	
50 percent exceeds	.13	
90 percent exceeds	.01	

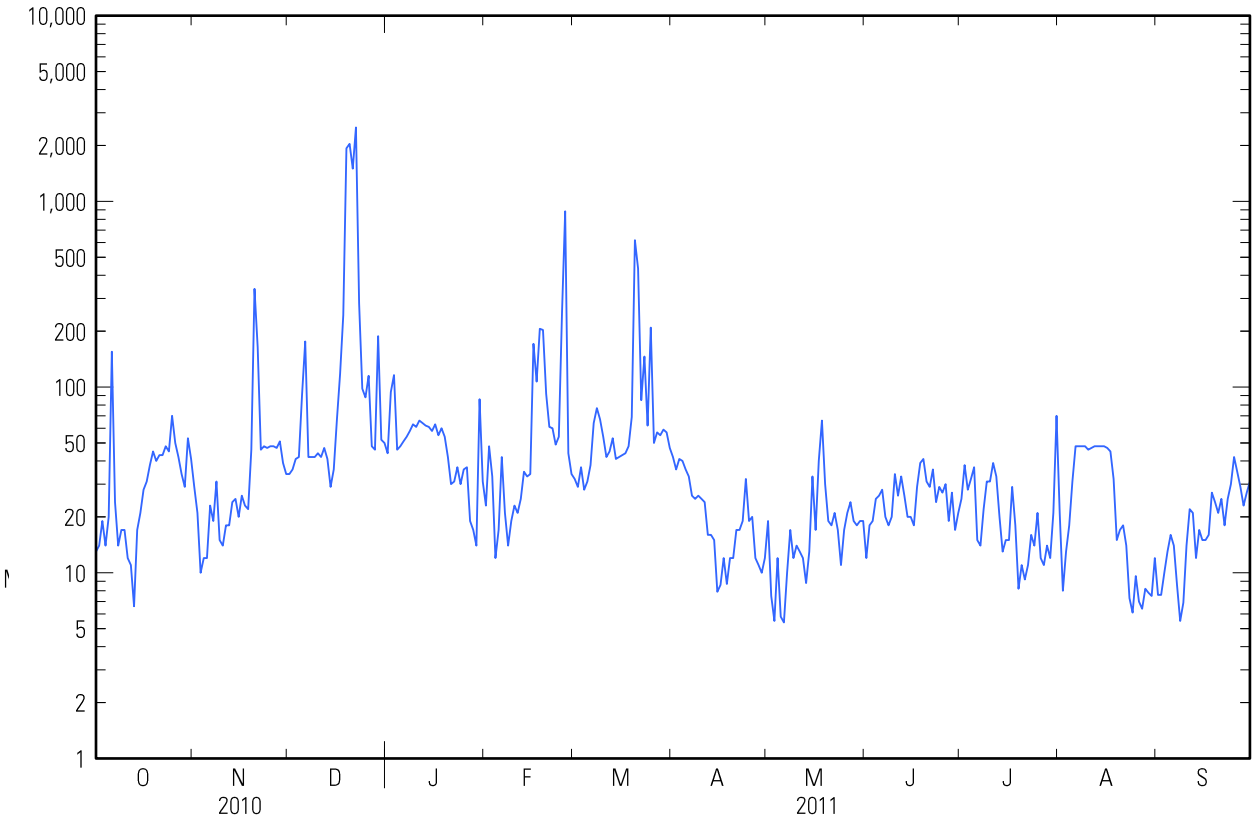
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1986 - 2011, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	45.5	44.7	67.0	93.5	111	67.9	48.2	37.3	34.8	32.6	32.4	35.8
Max	223	102	327	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	20.4	23.4	21.0	26.1	34.9	25.3	20.5	11.2	7.23	5.41	13.6	16.4
(WY)	(1987)	(1989)	(1987)	(1989)	(1989)	(1988)	(1987)	(2010)	(2010)	(2010)	(2010)	(1988)

11073495 Cucamonga Creek near Mira Loma, CA—Continued

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1986 - 2011	
Annual total	27,133.5		23,539.3			
Annual mean	74.3		64.5		53.9	
Highest annual mean					137	2005
Lowest annual mean					26.6	1987
Highest daily mean	2,500	Dec 22	2,500	Dec 22	5,200	Jan 9, 2005
Lowest daily mean	1.3	May 28	5.4	May 6	1.3	May 28, 2010
Annual seven-day minimum	3.5	Jul 24	7.5	Aug 23	3.5	Jul 24, 2010
Maximum peak flow			11,700	Dec 22	17,300	Oct 20, 2004
Maximum peak stage			5.63	Dec 22	6.58	Oct 20, 2004
Annual runoff (ac-ft)	53,820		46,690		39,060	
10 percent exceeds	81		67		62	
50 percent exceeds	21		29		36	
90 percent exceeds	5.6		12		20	



11073360 Chino Creek at Schaefer Avenue, near Chino, CA

Santa Ana River Basin

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 mi^2.

SURFACE-WATER RECORDS

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

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

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.--Records rated good. 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 year, the California Water Project released 12,190 acre-ft to the basin, though a portion of this total bypassed San Antonio Creek and was not recorded at this station. See schematic diagram of Santa Ana River Basin available from the California Water Science Center.

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

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Jan. 25, 1969, reached a stage of 9.23 ft, present datum, discharge, 9,200 ft^3/s, on basis of contracted-opening measurement at site 6.1 mi downstream.

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 11073360, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/11073360.2011.pdf

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	14	0.71	0.51	1.0	1.3	1.2	1.00	0.91	0.95	33	11	56
2	0.72	0.63	0.58	26	1.2	0.99	0.91	1.0	0.89	43	68	66
3	0.67	0.57	0.55	15	1.1	3.1	0.85	1.00	0.82	38	126	66
4	0.72	0.61	0.54	1.2	1.00	0.86	0.87	1.0	0.74	32	111	61
5	1.2	0.59	25	1.0	1.1	0.89	0.87	1.0	0.75	41	83	51
6	16	0.56	51	0.97	2.8	0.89	0.80	1.1	0.96	46	66	51
7	0.90	0.54	0.76	0.93	1.6	2.8	1.0	0.93	0.82	43	61	65
8	0.88	8.3	0.62	0.94	0.92	1.4	0.75	0.93	0.76	66	45	60
9	0.66	0.57	0.59	0.91	0.84	0.91	0.82	1.0	0.79	68	46	62
10	0.77	0.54	0.59	1.0	0.84	0.97	1.1	1.1	0.78	57	44	62
11	0.85	0.50	0.63	1.5	1.0	0.97	0.77	0.99	0.82	60	42	64
12	0.69	0.54	0.58	1.1	0.86	0.90	0.80	1.1	0.84	74	54	65
13	0.74	0.54	0.57	1.1	0.85	0.94	0.78	1.1	0.86	90	54	62
14	0.66	0.52	0.59	1.1	0.87	1.1	0.82	0.95	0.84	88	55	53
15	0.67	0.54	0.58	1.1	0.89	1.0	0.86	4.3	0.78	78	47	32
16	0.67	0.55	13	1.1	46	1.0	0.92	1.0	0.78	108	57	40
17	1.0	0.57	34	1.2	1.1	0.87	0.92	1.5	0.75	109	59	32
18	0.76	0.56	103	1.3	124	0.82	0.82	21	0.78	102	57	27
19	4.4	0.56	599	1.2	41	3.2	0.87	1.1	0.76	102	56	15
20	1.8	125	571	1.2	7.6	268	0.83	1.1	0.89	105	57	1.3
21	7.4	51	360	1.2	1.8	133	0.86	1.0	0.67	100	62	2.8
22	0.77	0.69	863	1.2	1.2	1.3	0.88	0.89	0.70	100	64	1.3
23	0.71	0.61	94	1.2	1.5	49	1.0	0.94	0.69	90	64	1.3
24	0.71	1.5	1.7	1.2	0.93	2.2	0.96	0.95	0.77	101	66	0.92
25	8.0	0.53	47	1.2	102	108	1.0	0.93	0.71	107	65	0.95
26	0.92	0.51	43	1.3	327	1.3	1.1	0.98	0.72	104	65	0.93
27	0.63	0.73	1.5	1.2	1.4	1.0	1.0	0.97	0.72	110	66	0.96
28	0.62	1.6	1.8	1.3	1.1	0.99	1.2	0.83	0.74	109	66	0.97
29	0.63	0.51	139	1.2	---	1.0	0.98	1.00	0.72	108	66	0.91
30	25	0.51	1.7	22	---	1.3	0.96	0.86	26	102	52	0.93
31	0.70	---	1.4	1.6	---	1.1	---	0.89	---	103	48	---
Total	94.85	201.69	2,957.79	95.45	673.80	593.00	27.30	54.35	48.80	2,517	1,883	1,003.27
Mean	3.06	6.72	95.4	3.08	24.1	19.1	0.91	1.75	1.63	81.2	60.7	33.4
Max	25	125	863	26	327	268	1.2	21	26	110	126	66
Min	0.62	0.50	0.51	0.91	0.84	0.82	0.75	0.83	0.67	32	11	0.91
Ac-ft	188	400	5,870	189	1,340	1,180	54	108	97	4,990	3,730	1,990

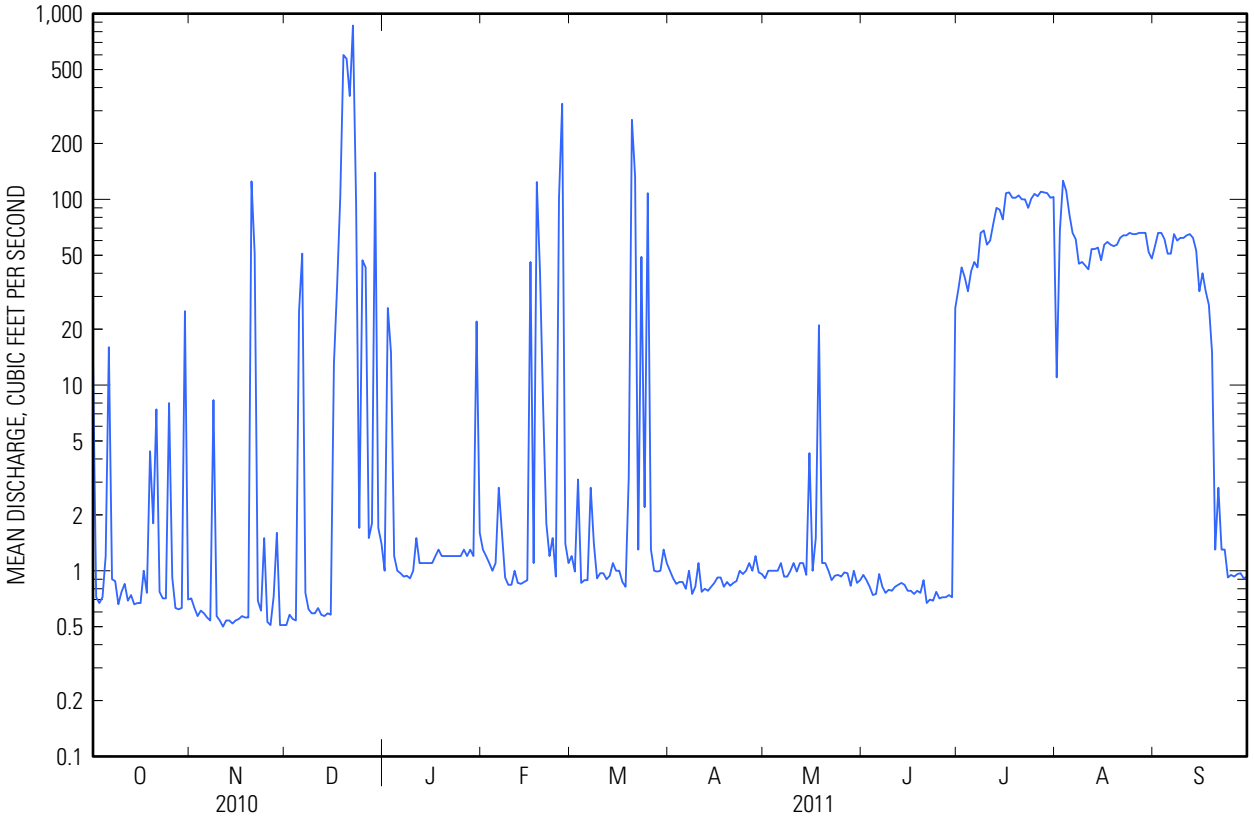
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2011, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	16.3	15.3	25.8	35.0	38.6	25.5	9.25	11.6	15.6	17.9	15.5	13.4
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	0.06	0.23	0.53	0.55	0.33	0.30	0.14	0.22	0.06	0.07	0.14	0.13
(WY)	(1978)	(1978)	(1970)	(1972)	(1972)	(1972)	(1977)	(1973)	(1977)	(1977)	(1976)	(1977)

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

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1970 - 2011	
Annual total	6,775.94		10,150.30			
Annual mean	18.6		27.8		19.9	
Highest annual mean					92.4	1974
Lowest annual mean					2.81	2007
Highest daily mean	863	Dec 22	863	Dec 22	2,060	Mar 1, 1978
Lowest daily mean	0.27	Aug 1	0.50	Nov 11	0.00	May 21, 1977
Annual seven-day minimum	0.32	Jul 27	0.53	Nov 10	0.02	Oct 28, 1977
Maximum peak flow			4,960	Dec 22	12,700	Feb 27, 1983
Maximum peak stage			7.73	Dec 22	10.32	Feb 27, 1983
Annual runoff (ac-ft)	13,440		20,130		14,420	
10 percent exceeds	7.9		76		65	
50 percent exceeds	0.93		1.1		1.3	
90 percent exceeds	0.53		0.63		0.44	



APPENDIX B

DAILY PRECIPITATION DATA
FOR SAN BERNARDINO

WATER YEAR 2010-11

TABLE B-1

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

	2010			2011								
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0.27	0	0	0	0	0	0	0	0
3	0	0	0	0.10	0	0	0	0	0	0	0	0
4	0	0	0	0.01	0	0	0	0	0	0	0	0
5	0	0	0.34	0	0	0	0	0	0	0	0	0
6	0.08	0	0.21	0	0	0.05	0	0	0.02	0	0	0
7	0	0	0.01	0	0	0.05	0.02	0	0	0	0	0
8	0	0.56	0	0	0	0	0.12	0.02	0	0	0	0
9	0	0	0	0	0	0	0	0.04	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0.07	0	0	0	0
16	0	0	0.43	0	0.49	0	0	0	0	0	0	0
17	0	0	0.40	0	0	0	0	0.02	0	0	0	0
18	0.03	0	0.30	0	0.45	0	0.01	0.30	0	0	0	0
19	0.06	0	3.06	0	0.81	0	0	0	0	0	0	0
20	0.07	0.72	2.87	0	0.04	0.55	0.01	0	0	0	0	0
21	0.07	0.25	2.02	0	0	0.97	0	0	0	0	0	0
22	0	0	3.19	0	0	0	0	0	0	0	0	0
23	0	0.06	0	0	0	0.37	0	0	0	0	0	0
24	0	0	0	0	0	0	0.01	0	0	0	0	0
25	0.27	0	0.18	0	0.38	0.33	0	0	0	0	0	0
26	0	0	0.07	0	1.27	0.01	0	0	0	0	0	0
27	0	0.11	0	0	0	0.04	0	0	0	0	0	0
28	0	0.02	0	0	0	0	0	0	0	0	0	0
29	0	0	0.36	0		0	0	0	0	0	0	0
30	0.06	0	0	0.64		0	0	0	0	0	0	0
31	0		0	0		0		0		0.23	0	
Total	0.64	1.72	13.44	1.02	3.44	2.37	0.17	0.45	0.02	0.23	0.00	0.00

Total Rainfall = 23.50 Inches

131% of average of 17.98 inches per year

APPENDIX C

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

WATER YEAR 2010-11

SINCE 1933

ORANGE COUNTY WATER DISTRICT

ORANGE COUNTY'S GROUNDWATER AUTHORITY

March 30, 2012

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

Subject: Review of Fiscal Year 2010-11 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, 2011. 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 and Savings 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

NOTES TO FINANCIAL STATEMENTS

JUNE 30, 2011

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%

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, 2011 consisted of the following:

Bank of America:	$13,039

All cash is fully insured by the FDIC.

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

JUNE 30, 2011

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM CASH TRANSACTIONS

JUNE 30, 2011

ASSETS

Cash in Bank Account	$ 13,039

LIABILITIES AND NET ASSETS

Total Net Assets	$ 13,039

SANTA ANA RIVER WATERMASTER

STATEMENT OF REVENUE AND EXPENSES ARISING FROM CASH TRANSACTIONS

FOR THE PERIOD JULY 1, 2010 - JUNE 30, 2011

	Actual	Budget	Variance - Favorable (Unfavorable)	
REVENUE COLLECTED:				
Water District Contributions				
Orange County Water District	$ 5,600	$ 5,600	0	
Inland Empire Utilities Agency	2,800	2,800	0	
Western Municipal Water District	2,800	2,800	0	
San Bernardino Valley Municipal Water District	2,800	2,800	0	
TOTAL REVENUE COLLECTED	$ 14,000	$ 14,000	$ -	
EXPENSES PAID:				
Professional Engineering Services	$ 10,180	$ 12,500	2,320	(A)
Administrative Expenses:				
Auditing Services				
Reproduction of Annual Report	881	1,500	619	(A)
Bank service charges				
	$ 11,061	$ 14,000	$ 2,939	
CHANGE IN NET ASSETS	$ 2,939			
NET ASSETS - BEGINNING OF THE YEAR	$ 10,100			
NET ASSETS - END OF THE YEAR	$ 13,039			

(A) Expenses represent 2010-11 year of payments to OCWD and WMWD.

APPENDIX D

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS

WATER YEAR 2010-11

There was no discharge of HGMP water to Santa Ana River in the Bunker Hill area during the 2010-11 water year.

APPENDIX E

WATER QUALITY AND DISCHARGE OF WATER RELEASED BY MWDSC TO SAN ANTONIO CREEK NEAR UPLAND (CONNECTION OC-59), TO HAVEN AVENUE STORM DRAIN (CONNECTION CB-11) AND TO SAN SEVAINE CHANNEL (CONNECTION CB-18)

WATER YEAR 2010-11

TABLE E-1

NONTRIBUTARY WATER FROM OC-59
MONTHLY TOTALS
WATER YEAR 2010-11
(acre-feet)

Month	Released at OC-59 for OCWD	12-Hour Delay [1]	Evaporative Losses [2]	Calculated Flow at Prado
2010				
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
2011				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	50	25	3	22
July	4,827	4,751	135	4,615
August	3,669	3,723	126	3,597
September	1,902	1,949	81	1,868
Total	10,447.6	10,448	346	10,102

(1) Released nontributary water is delayed 12 hours to reflect the estimated travel time between OC-59 and Prado Dam.

(2) Monthly evaporative losses calculated per the procedures referenced in the Twelfth Annual Watermaster Report, Appendix C and shown in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
JUNE 2011
(cfs)

Day	Released at OC-59 for OCWD	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	25	13	11
Total (cfs-days)	25	13	11
(AF)	50	25	22

(1) Reflects the monthly evapotrative loss listed in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
JULY 2011
(cfs)

Day	Released at OC-59 for OCWD	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	31	28	27
2	42	37	36
3	37	40	39
4	30	34	33
5	39	35	34
6	44	42	41
7	41	43	42
8	65	53	52
9	67	66	64
10	56	62	60
11	58	57	56
12	70	64	62
13	86	78	76
14	84	85	83
15	73	79	77
16	103	88	86
17	104	104	101
18	97	101	98
19	98	98	95
20	100	99	96
21	96	98	95
22	96	96	94
23	86	91	89
24	96	91	89
25	102	99	96
26	101	102	99
27	107	104	101
28	107	107	104
29	107	107	104
30	101	104	101
31	102	102	99
Total (cfs-days)	2,434	2,395	2,327
(AF)	4,827	4,751	4,616

(1) Reflects the monthly evapotrative loss listed in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
AUGUST 2011
(cfs)

Day	Released at OC-59 for OCWD	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	8	55	53
2	66	37	36
3	125	96	92
4	109	117	113
5	82	96	92
6	65	74	71
7	60	63	61
8	43	52	50
9	43	43	42
10	42	43	41
11	40	41	40
12	53	47	45
13	53	53	51
14	54	54	52
15	45	50	48
16	56	51	49
17	58	57	55
18	56	57	55
19	55	56	54
20	56	56	54
21	61	59	57
22	63	62	60
23	63	63	61
24	65	64	62
25	64	65	63
26	64	64	62
27	65	65	63
28	65	65	63
29	65	65	63
30	51	58	56
31	47	49	48
Total (cfs-days)	1,850	1,877	1,813
(AF)	3,669	3,723	3,597

(1) Reflects the monthly evapotrative loss listed in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
SEPTEMBER 2011
(cfs)

Day	Released at OC-59 for OCWD	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	55	51	49
2	65	60	58
3	65	65	63
4	60	63	60
5	49	55	52
6	49	49	47
7	64	57	54
8	59	62	59
9	61	60	58
10	61	61	59
11	63	62	60
12	64	64	61
13	55	60	57
14	51	53	51
15	29	40	39
16	38	34	32
17	29	34	32
18	24	27	26
19	12	18	17
20	0	6	6
21	1	1	1
22	0	1	1
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
Total (cfs-days)	959	982	942
(AF)	1,902	1,949	1,868

(1) Reflects the monthly evapotrative loss listed in Table E-3.

TABLE E-3
EVAPORATIVE LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2010-11
SUM OF ALL CHANNEL REACHES
(acre-feet)

Month	State Water Released with 12-hour delay	Rialto Pipeline to Los Serranos Road	Los Serranos to Prado Dam w/o vegetation	Los Serranos to Prado Dam w/ vegetation	Total Evaporative Losses	Percent of Monthly Release
2010						
October	0	0	0	0	0	0%
November	0	0	0	0	0	0%
December	0	0	0	0	0	0%
2011						
January	0	0	0	0	0	0%
February	0	0	0	0	0	0%
March	0	0	0	0	0	0%
April	0	0	0	0	0	0%
May	0	0	0	0	0	0%
June	25	1	2	0	3	13%
July	4,751	51	65	19	135	2.8%
August	3,723	48	62	16	126	3.4%
September	1,949	25	43	13	81	4.2%
Total	10,448	125	172	49	346	

Percent of Annual Releases = 3.3%

TABLE E-3.1
EVAPORATIVE LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2010-11
RIALTO PIPELINE TO LOS SERRANOS ROAD

Month	State Water Released with 12-hour delay (AF)	Days of Evaporation	Historic Pan Evaporation (in) [a]	Computed Evaporation Losses[b]	
				(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]
2010					
October	0	0	---	0	0%
November	0	0	---	0	0%
December	0	0	---	0	0%
2006					
January	0	0	---	0	0%
February	0	0	---	0	0%
March	0	0	---	0	0%
April	0	0	---	0	0%
May	0	0	---	0	0%
June	25	1	8.52	1	5.3%
July	4,751	31	10.90	51	1.1%
August	3,723	31	10.32	48	1.3%
September	1,949	20	7.95	25	1.3%

(a) Average from Riverside Citrus Experimental Station from 1956-57 through 1972-73.
(b) Evaporative losses=[4]/(days/month)x[3]x(Pan Factor of 1.0)x(area of 56.1 acres)x(1 foot/12 inches)

TABLE E-3.2
EVAPORATIVE LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2010-11
LOS SERRANOS ROAD TO PRADO DAM (AREA WITHOUT VEGETATION COVER)

Month	State Water Released with 12-hour delay (AF)	Days of Evapotrans-piration[a]	Evaporation (in) [b]	Average Wetted Area (acre)[c]	Computed Evaporation Losses[d]	
					(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]
2010						
October	0	0	---	0	0	0%
November	0	0	---	0	0	0%
December	0	0	---	0	0	0%
2011						
January	0	0	---	0	0	0%
February	0	0	---	0	0	0%
March	0	0	---	0	0	0%
April	0	0	---	0	0	0%
May	0	0	---	0	0	0%
June	25	1	8.52	72	2	6.8%
July	4,751	31	10.90	72	65	1.4%
August	3,723	31	10.32	72	62	1.7%
September	1,949	27	7.95	72	43	2.2%

(a) Period of delivery plus 7 days after stoppage of delivery.
(b) Average from Riverside Citrus Experimental Station from 1956-57 through 1972-73.
(c) Equals 1/2 of 144 acres if the maximum flow rate of the month is less than 200 cfs and 1/2 of 369 acres if the maximum flow rate is greater or equal to 200 cfs.
(d) Evaporative losses=[3]x[4]/(days/month)x[5]x(1 foot/12 inches)

TABLE E-3.3
EVAPORATIVE LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2010-11
LOS SERRANOS ROAD TO PRADO DAM (AREA WITH VEGETATION COVER)

Month	State Water Released with 12-hour delay (AF)	Days of Evaporation[a]	Historic Pan Evaporation (in)[b]	Evapotrans-piration (in)[c]	Average Wetted Area (acre)[d]	Computed Evaporative Losses[e]	
						(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
2010							
October	0	0	---	---	0	0	0%
November	0	0	---	---	0	0	0%
December	0	0	---	---	0	0	0%
2011							
January	0	0	---	---	0	0	0%
February	0	0	---	---	0	0	0%
March	0	0	---	---	0	0	0%
April	0	0	---	---	0	0	0%
May	0	0	---	---	0	0	0%
June	25	1	8.52	6.96	72	0	1.2%
July	4,751	31	10.90	7.76	72	19	0.4%
August	3,723	31	10.32	7.65	72	16	0.4%
September	1,949	27	7.95	5.48	72	13	0.7%

(a) Period of delivery plus 7 days after stoppage of delivery.
(b) Average from Riverside Citrus Experimental Station from 1956-57 through 1972-73.
(c) From UCR Station #44
(d) Equals 1/2 of 144 acres if the maximum flow rate of the month is less than 200 cfs and 1/2 of 369 acres if the maximum flow rate is greater or equal to 200 cfs.
(e) Evaporative losses=[3]x([4]-[5])/(days/month)x[6]x(1 foot/12 inches)

TABLE E-4

CALCULATION OF WEIGHTED TDS OF
OC-59 RELEASES

WATER YEAR 2010-11

Month	Released at OC-59 for OCWD (acre-feet)	TDS at Release[1] (mg/L)	Flow X TDS at Release	Calculated OC-59 Flow at Prado (acre-feet)
2010				
October	0	-	0	0
November	0	-	0	0
December	0	-	0	0
2011				
January	0	-	0	0
February	0	-	0	0
March	0	-	0	0
April	0	-	0	0
May	0	-	0	0
June	50	124	6,212	22
July	4,827	135	651,659	4,615
August	3,669	151	553,959	3,597
September	1,902	151	287,172	1,868
Total	10,448		1,499,001	10,102

At Discharge: Flow-weighted TDS = $\frac{1,499,001}{10,448}$ = 143 mg/L

At Prado: Flow-weighted TDS = $\frac{1,499,001}{10,102}$ = 148 mg/L

(1) TDS values from monthly analyses of State Water Project water for Devil Canyon.

TABLE E-5

NONTRIBUTARY WATER FROM CB-11 AND CB-18
MONTHLY TOTALS
WATER YEAR 2010-11
(acre-feet)

Month	Released for OCWD from CB-11	Released for OCWD from CB-18	CB-11 12-Hour Delay [1]	CB-18 12-Hour Delay [1]	Evaporation Losses [2]	Calculated Flow at Prado
2010						
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December	0	0	0	0	0	0
2011						
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	0	0	0	0	0	0
May	0	0	0	0	0	0
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	960	864	960	864	52	1,772
September	0	0	0	0	0	0
Total	960	864	960	864	52	1,772

(1) Released nontributary water is delayed 12 hours to reflect the estimated travel time between the turnout and Prado Dam.

(2) Monthly evaporative losses calculated per the procedures described in Appendix E-9.

TABLE E-6

NONTRIBUTARY WATER FROM CB-11 AND CB-18
AUGUST 2011
(cfs)

Day	Released for OCWD from CB-11	Released for OCWD from CB-18	CB-11 with 12-Hour Delay	CB-18 with 12-Hour Delay	Evaporation Losses CB-11	Evaporation Losses CB-18	Calculated Flow At Prado Dam [1]
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	10.9	0	5.5	0	0	5.3
5	24.1	29.2	12.0	20.0	0.3	0.6	31.2
6	36.3	25.6	30.2	27.4	0.9	0.8	55.9
7	36.2	24.0	36.2	24.8	1.1	0.7	59.3
8	36.4	27.4	36.3	25.7	1.1	0.7	60.2
9	36.4	25.7	36.4	26.5	1.1	0.7	61.1
10	36.2	25.4	36.3	25.6	1.1	0.7	60.1
11	36.3	26.9	36.3	26.2	1.1	0.7	60.7
12	37.8	27.9	37.1	27.4	1.1	0.8	62.6
13	39.0	28.3	38.4	28.1	1.1	0.8	64.6
14	38.9	28.6	38.9	28.5	1.1	0.8	65.5
15	37.5	27.6	38.2	28.1	1.1	0.8	64.4
16	37.9	26.5	37.7	27.0	1.1	0.7	62.9
17	38.1	27.1	38.0	26.8	1.1	0.7	62.9
18	13.1	26.8	25.6	26.9	0.7	0.7	51.1
19	0	26.4	6.6	26.6	0.2	0.7	32.2
20	0	21.2	0	23.8	0	0.7	23.1
21	0	0	0	10.6	0	0	10.3
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0
(cfs-days)	484	436	484	436	14	12	894
(AF)	960	864	960	864	28	24	1,772

[1] Reflects the monthly evaporation loss listed in Table E-7.

TABLE E-7
EVAPORATION LOSSES OF STATE PROJECT WATER FROM CB-11 AND CB-18
WATER YEAR 2010-11

Month	Released with 12-hour delay		Days of Evaporation		Hist. Avg. Evaporation[a]	Computed Evaporation Losses CB-11[b]	CB-18[c]	(% of release)
	CB-11	CB-18	CB-11 [1]	CB-18 [2]	(in) [3]	(AF) [4]	(AF) [5]	[6]
2011								
July	0	0	0	0	--	--	--	--
August	960	864	14	17	10.32	28	24	2.84%
September	0	0	0	0	--	--	--	--

(a) Historical average Pan Evaporation for given month from Riverside Citrus Experimental Station.
(b) Evaporation losses=[1]/(days/month)x[3]x(Pan Factor of 1.0)x(area of 71.9 acres)x(1 foot/12 inches)
(c) Evaporation losses=[2]/(days/month)x[3]x(Pan Factor of 1.0)x(area of 50.7 acres)x(1 foot/12 inches)

TABLE E-8
CALCULATION OF WEIGHTED TDS OF
STATE PROJECT WATER RELEASES TO CB-11 AND CB-18
WATER YEAR 2010-11

Month	Released at CB-11 and CB-18 for OCWD (acre-feet)	TDS at Release[1] (mg/L)	Flow X TDS at Release	Calculated CB-11 and CB-18 Flow at Prado (acre-feet)
2011				
July	0	-	0	0
August	1,824	151	275,445	1,772
September	0	-	0	0

At Prado:

$$\text{Flow-weighted TDS} = \frac{275{,}445}{1{,}772} = 155 \text{ mg/L}$$

1. TDS value from monthly analyses of State Water Project water for Devil Canyon.

TABLE E-9
CALCULATION OF EVAPORATION LOSSES OF STATE PROJECT WATER DISCHARGES AT CONNECTIONS CB-11 AND CB-18
AUGUST 2011
WATER YEAR 2010-11

Orange County Water District (OCWD) purchased State Water Project (SWP) from the Metropolitan Water District of Orange County (MWDOC) from June 30th to September 21st of 2011. Normally SWP water is delivered through turnout OC-59. During August 2011 construction at the Ramona Avenue bridge over Chino Creek channel, through which OC-59 water travels to OCWD, prevented delivery of the requested water flow rate. For that period it was necessary to reduce the OC-59 flow to Chino Creek, and SWP water for OCWD was supplemented by delivery through Inland Empire Utility Agency (IEUA) Chino Basin connections, CB-11 and CB-18.

CB-11 discharges into the underground Haven Avenue Storm Drain at Banyon Street and Haven Avenue in Rancho Cucamonga. After 2 miles Haven Storm Drain enters the concrete-lined Deer Creek channel, which merges into the concrete-lined Cucumonga Creek channel after about another 4 miles. These discharges comingle with IEUA discharges to Cucamonga Creek from its Regional Water Recycling Palnt No. 1 south of the 60 freeway. The discharged water then flows 8½ miles in Cucamonga Creek before that creek flows into the unlined Mill Creek channel. After 4 miles Mill Creek merges into the unlined Chino Creek within the Prado Reservoir. About 1½ mile after reaching Chino Creek, the water flows into the Santa Ana River just above Prado reservoir. During CB-11 use by OCWD, IEUA did not divert any SWP flows or dry weather flows from these channels into its recharge sites.

Turnout CB-18 discharges to the concrete-lined San Sevaine Channel near Liberty Parkway in Fontana. The discharged water then flows approximately 10 miles to where it enters the unlined Santa Ana River channel between Van Buren and Interstate 15. During CB-18 use by OCWD, IEUA did not divert any SWP flows or dry weather flows from these channels into its recharge sites.

The Santa Ana River Watermaster calculates evaporative losses of non-tributary water deliveries that flow into the Santa Ana River. It is necessary to know the surface area that the water covers in order to calculate evaporative losses. The method used to calculate losses of CB-11 and CB-18 water was similar to the method used for OC-59 deliveries. Observations were made of the OC-59 delivery channels when the method was developed to determine whether the channel was lined or unlined, the width of the wetted area at different flow volumes, and whether or not there was vegetation in the unlined portion of channels. Unfortunately, observations made during the CB-11 and CB-18 deliveries were limited to observing the flow at the point where the water reached the Santa Ana River.

CB-11 and CB-18 channel segment widths and lengths were obtained from the San Bernardino County website *San Bernardino County Facility Tracking Map Drainage*

CB-11 and CB-18 channel segment widths and lengths were obtained from the San Bernardino County website *San Bernardino County Facility Tracking Map Drainage Course Reaches – Width of Bottom*, or when unavailable from the website, were measured on Google Earth. No observations were made of the wetted width of the SWP water in the channels during delivery, so the wetted width was calculated from historical flow gauge records from USGS Station 11073495, Cucamonga Creek near Mira Loma (north of Merrill) and observations of Google Earth air photos taken from 2007 through 2011 at that location.

CB-11 Delivery

The entire channel from where CB-11 water was discharged to Mill Creek near Hellman Avenue is a lined channel. Downstream of Hellman, the Mill Creek channel is unlined. Vegetation blocks the view of the channel in the air photos and prevented channel width measurements, but shortly after Hellman the channel appears to narrow. What could be seen of the channel was wetted in all the photos, and it is assumed that the addition of SWP water to the flow of the channel would not have caused additional losses over that from the ambient flow in that reach. South of the 60 Freeway, Cucamonga Creek channel is generally wetted by discharges from IEUA's Regional Water Recycling Plant No. 1 into Cucamonga Creek.

Daily average flow records were obtained for the USGS gage on Cucamonga Creek at Merrill St. Google Earth air photos with enough resolution to be useful were available for several dates between 2007 and 2011. The 2007 photos were useful only in determining that flow covered the channel bottom at flow rates of 52 and 68 cfs. The channel width near the gage was measured at 75 feet on the photos. Flow volume for the days photos were taken was plotted versus the wetted width of the channel on those days, and a trendline was added. The point on the trendline that correlated with the average CB-11 flow during the August discharge (35 cfs) was estimated to be the wetted width of the channel for the period of flow, as shown in Figure 1.

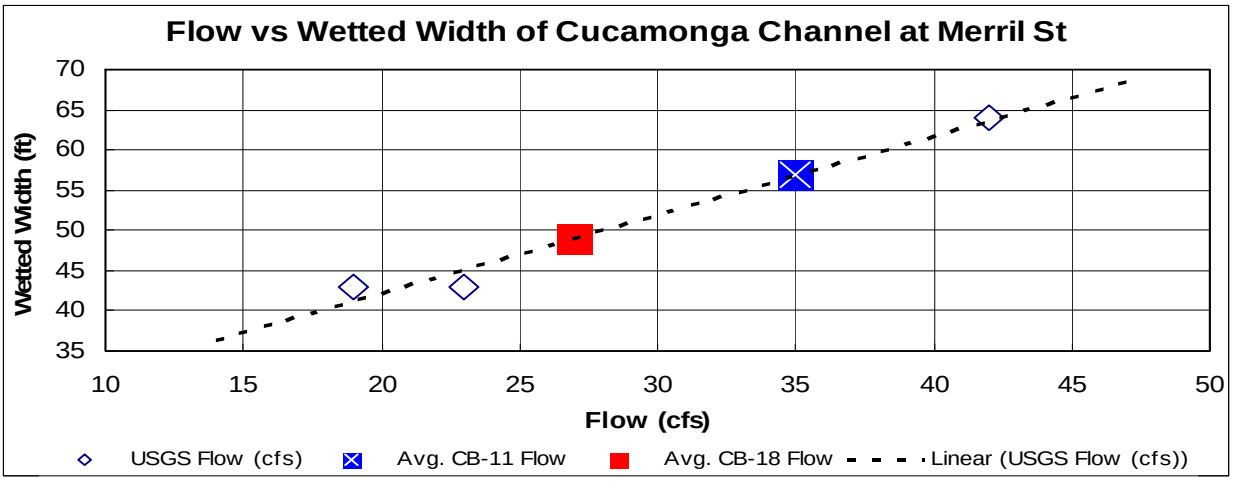


Figure 1. Wetted width of Cucamonga Creek Channel at USGS Cucamonga Creek near Mira Loma gauge at different flow volumes.

Table of Prior Cucamonga Creek Flow Data and Channel Coverage from Google Earth
(Channel width at gage = 75 ft)

Date	USGS Flow (cfs)	Estimated Width of Channel Wetted by SWP Flow
04/12/2007*	68	75 (flow covered channel bottom; data not used)
10/22/2007*	52	75 (flow covered channel bottom; data not used)
06/19/2009	19	43
11/14/2009	23	43
03/07/2011	42	64
Avg. CB-11 Flow	35	57 (from graph)
Avg. CB-18 Flow	27	49 (from graph)

It was assumed that no losses occurred in the Haven Storm Drain portion of the CB-11 delivery channel, which is underground, or the portion of Cucamonga Creek that flows underground beneath Chino airport. The remainder of the channel through which CB-11 water was delivered was divided into three sections based on channel width:

1. The Deer Creek channel, average width 23 feet.
2. Cucamonga Ck channel from Deer Creek to below the 60 Freeway, average width 66 feet.
3. The 60 Freeway to Hellman Avenue, average width 80 feet.

CB-11 flow averaged 35 cfs for the 14 days of discharge in August. That correlated with a wetted width of 57 feet on the graph (Figure 1), so a wetted width of 57 feet was used in the 3rd section of the channel. In the 2nd section of the channel, it was assumed that the wetted width would have been the lesser of 57 feet or the width of the channel. In the 1st section of the channel it was assumed that the CB-11 flow covered the entire channel bottom because the channel width is less than the wetted width estimated at the gauge.

Wetted area for each segment was calculated from wetted width multiplied by the length of the segments. The length of the portion of the channel that was an underground storm drain and where the channel flows beneath Chino Airport were not included in the area calculation. Wetted area for Sections 1, 2, and 3 were calculated as 15.3, 15.6, and 41.0 acres, respectfully, for a total wetted area of 71.9 acres that was subject to evaporation.

CB-18 Delivery

CB-18 discharged to the San Sevaine channel, which has no gauge at which to measure wetted width. Therefore, wetted width was estimated by using the CB-11 flow graph (Figure 1). Average flow for the 17 day period of CB-18 discharge was 27 cfs, which correlates to a wetted width of 49 feet on the flow graph. San Sevaine channel widths for the upper 6 miles of channel above Philadelphia Street were obtained from

the San Bernardino County website *San Bernardino County Facility Tracking Map Drainage Course Reaches – Width of Bottom*. In the portion from Philadelphia Street to the Santa Ana River the widths were measured on Google Earth. Width varied from approximately 20 feet in the upper section to 45 in the lower section. Since the width of wetted bottom had been estimated to be 49 feet, it is assumed that the entire channel bottom was wetted, and that area, 50.7 acres, was subject to evaporation.

Both delivery channels have unmeasured dry weather flows, which IEUA normally diverts to percolation ponds. Since OCWD was receiving SWP water through the channels, IEUA did not divert any of the dry weather flow during the period of delivery. The dry weather flow was not accounted for in the calculating the loss of SWP water. Should OCWD have SWP water delivered through these turnouts in the future, the dry weather flow in the channels should be quantified prior to such delivery, and should be considered in calculating the losses.

Method

The formula for calculating evaporative losses from a lined channel for OC-59 was used to calculate the losses for CB-11 and CB-18:

> Evaporation losses = (Days of Evaporation/Days in the Month) X (Historic Average Evaporation) X (Pan Factor of 1.0) X (Area) X (1 foot/12 inches)

Where:

- Days of Evaporation = the days of flow in the channel
- Days in the month of August = 31
- Historic Average Evaporation = the average pan evaporation at Riverside Citrus Experimental Station for the period of record for the month of August
- The Area = the area of wetted channel calculated for the CB-11 and CB-18 delivery channels, 71.9 and 50.7 acres, respectively.

The above formula yielded a loss of 27.9 acre-feet of the CB-11 water and 23.9 acre-feet of the CB-18 water, or 2.84% of the total water discharged.

APPENDIX F

WATER QUALITY AND DISCHARGE FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN

WATER YEAR 2010-11

There was no discharge of Arlington Desalter water to the Arlington Valley Drain for Orange County Water District during the 2010-11 water year.

APPENDIX G

WATER QUALITY AND DISCHARGE FROM THE SAN JACINTO WATERSHED

WATER YEAR 2010-11

TABLE G-1

SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2010-11
JANUARY 2011

Day	[1] Temescal Creek Flow	[2] Temescal Creek Base Flow	[3] Scalped Storm Flow	[4] EMWD Discharge to Temescal Creek	[5] San Jacinto Watershed Outflow At Prado	[6] Santa Ana River Flow Lost to the Ocean	[7] San Jacinto Outflow Recharged by OCWD
1	51	10	41	0	0	4,780	0
2	96	11	85	0	0	4,780	0
3	94	11	83	1	0	880	0
4	43	12	31	47	0	2,340	0
5	40	12	4	65	24	2,360	0
6	48	12	0	65	36	2,310	0
7	73	13	0	66	60	2,420	0
8	83	13	0	58	70	2,570	0
9	83	14	0	62	69	2,610	0
10	78	14	0	73	64	2,520	0
11	81	14	0	58	67	2,650	0
12	79	15	0	44	64	2,610	0
13	73	15	0	56	58	141	0
14	68	15	0	65	53	0	53
15	69	16	0	58	53	10	43
16	70	16	0	48	54	4	50
17	67	16	0	60	51	0	51
18	64	17	0	57	48	0	48
19	65	17	0	48	48	0	48
20	61	17	0	58	44	0	44
21	59	17	0	56	42	0	42
22	60	18	0	59	42	0	42
23	58	18	0	0	40	0	40
24	54	18	0	0	36	0	36
25	47	19	0	0	28	0	28
26	41	19	0	6	22	0	22
27	36	19	0	0	17	0	17
28	34	20	0	0	15	0	15
29	25	20	0	0	5	0	5
30	56	20	36	0	0	0	0
31	23	20	3	0	0	0	0
Total (cfs)	1,879	487	282	1,111	1,109	32,985	583.2
(acre-feet)	3,727	967	560	2,203	2,200	65,425	1,157

TABLE G-1 (continued)

SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2010-11
FEBRUARY 2011

Day	[1] Temescal Creek Flow	[2] Temescal Creek Base Flow	[3] Scalped Storm Flow	[4] EMWD Discharge to Temescal Creek	[5] San Jacinto Watershed Outflow At Prado	[6] Santa Ana River Flow Lost to the Ocean	[7] San Jacinto Outflow Recharged by OCWD
1	20	20.0	0	68	0	0	0
2	20	20.0	0	64	0	0	0
3	30	21.0	0	49	9	0	9
4	42	21.2	0	55	21	0	21
5	47	21.4	0	64	26	0	26
6	49	21.6	0	61	27	0	27
7	50	21.8	0	48	28	0	28
8	55	22.0	0	56	33	0	33
9	60	22.2	0	49	38	0	38
10	62	22.4	0	49	40	0	40
11	65	22.6	0	37	42	0	42
12	66	22.8	0	0	43	0	43
13	58	23.0	0	0	35	0	35
14	49	23.2	0	0	26	0	26
15	47	23.4	0	0	24	0	24
16	63	23.6	20	0	20	66	0
17	40	23.8	0	0	16	80	0
18	97	24.0	60	0	13	90	0
19	229	24.2	195	0	10	230	0
20	144	24.4	112	0	8	380	0
21	78	24.6	48	0	5	340	0
22	66	24.8	38	0	3	330	0
23	59	25.0	32	1	2	245	0
24	55	25.2	29	0	1	0	1
25	72	25.4	47	0	0	9	0
26	427	25.6	401	0	0	1,930	0
27	96	25.8	70	0	0	1,560	0
28	75	26.0	49	0	0	1,110	0
Total (cfs)	2,221	651	1,100	599	470	6,370	393
(acre-feet)	4,405	1,291	2,182	1,189	932	12,635	779

TABLE G-1 (continued)

SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2010-11
MARCH 2011

Day	[1] Temescal Creek Flow	[2] Temescal Creek Base Flow	[3] Scalped Storm Flow	[4] EMWD Discharge to Temescal Creek	[5] San Jacinto Watershed Outflow At Prado	[6] Santa Ana River Flow Lost to the Ocean	[7] San Jacinto Outflow Recharged by OCWD
1	69	26.1	43	0	0	460	0
2	63	26.2	37	0	0	400	0
3	61	26.3	35	0	0	40	0
4	63	26.4	37	0	0	0	0
5	67	26.5	41	0	0	0	0
6	67	26.6	40	0	0	0	0
7	70	26.7	43	26	0	30	0
8	69	26.8	42	26	0	180	0
9	69	26.9	29	26	13	280	0
10	87	27.0	34	25	26	260	0
11	109	27.1	56	23	26	145	0
12	110	27.2	57	4	25	40	0
13	105	27.3	54	5	24	20	4
14	95	27.4	54	11	14	0	14
15	85	27.5	53	11	5	0	5
16	76	27.6	40	12	8	0	8
17	74	27.7	35	12	11	0	11
18	74	27.8	35	22	11	0	11
19	78	27.9	38	44	12	0	12
20	214	28.0	169	61	17	180	0
21	327	28.0	266	60	33	340	0
22	111	28.0	30	60	53	207	0
23	168	28.0	80	80	60	492	0
24	115	28.0	27	50	60	420	0
25	119	28.0	21	69	70	556	0
26	78	28.0	0	69	50	356	0
27	72	28.0	0	75	44	315	0
28	73	28.0	0	60	45	200	0
29	85	28.0	0	62	57	190	0
30	92	28.0	0	63	64	230	0
31	96	28.0	0	53	68	340	0
Total (cfs)	3,041	849	1,396	1,007	796	5,681	65
(acre-feet)	6,032	1,684	2,768	1,998	1,580	11,268	128

TABLE G-1 (continued)

SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2010-11
APRIL 2011

Day	[1] Temescal Creek Flow	[2] Temescal Creek Base Flow	[3] Scalped Storm Flow	[4] EMWD Discharge to Temescal Creek	[5] San Jacinto Watershed Outflow At Prado	[6] Santa Ana River Flow Lost to the Ocean	[7] San Jacinto Outflow Recharged by OCWD
1	96	28	0	0	68	186	0
2	86	28	0	0	58	218	0
3	66	28	0	0	38	238	0
4	49	28	0	0	21	206	0
5	37	28	0	0	9	25	0
6	31	28	0	0	3	0	3
7	30	28	2	0	0	0	0
8	31	28	3	5	0	0	0
9	38	28	10	7	0	0	0
10	31	28	0	2	3	0	3
11	31	27	0	28	4	0	4
12	35	27	0	8	8	0	8
13	39	27	0	14	12	0	12
14	41	27	0	8	14	0	14
15	41	27	0	8	15	0	15
16	39	26	0	7	13	0	13
17	37	26	0	8	11	0	11
18	36	26	0	8	10	0	10
19	36	25	0	9	11	0	11
20	37	25	0	9	12	0	12
21	34	25	0	12	9	0	9
22	34	24	0	7	10	0	10
23	35	24	0	7	11	0	11
24	33	24	0	0	9	0	9
25	31	24	0	0	7	0	7
26	26	26	0	0	0	0	0
27	22	22	0	0	0	0	0
28	18	18	0	0	0	0	0
29	17	17	0	0	0	0	0
30	15	15	0	0	0	0	0
Total (cfs)	1,132	761	15	146	356	873	162
(acre-feet)	2,245	1,509	30	290	706	1,732	321

TABLE G-1 (continued)

SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2010-11

1. USGS measured flow of Temescal Creek above Main St. at Corona, which can be found in Appendix A.

2. Temescal base flow was assumed to be the flow present when there are no sources of non-tributary flow and there has been no precipitation to cause storm flow.

3. Temescal Creek flow attributed to storm events.

4. Eastern Municipal Water District wastewater discharge to Temescal Creek at Wasson Canyon.

5. Flow in Temescal Creek at Corona attributed to EMWD discharge of wastewater to Temescal Creek.

6. Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently percolates approximately 20 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 20 cfs was used for "Santa Ana River Flow Lost to the Ocean."

7. When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-2

SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2010-11

MONTHLY TOTALS

Month	EMWD Discharge to Temescal Creek	San Jacinto Watershed Outflow At Prado	Santa Ana River Flow Lost to the Ocean	San Jacinto Outflow Recharged By OCWD
2010				
October	0	0	14	0
November	0	0	50	0
December	0	0	35,956	0
2011				
January	1,111	1,109	32,985	583
February	599	470	6,370	393
March	1,007	796	5,681	65
April	146	356	873	162
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
Total (cfs)	2,864	2,732	81,929	1,202
(acre-feet)	5,680	5,418	162,504	2,385

TABLE G-3

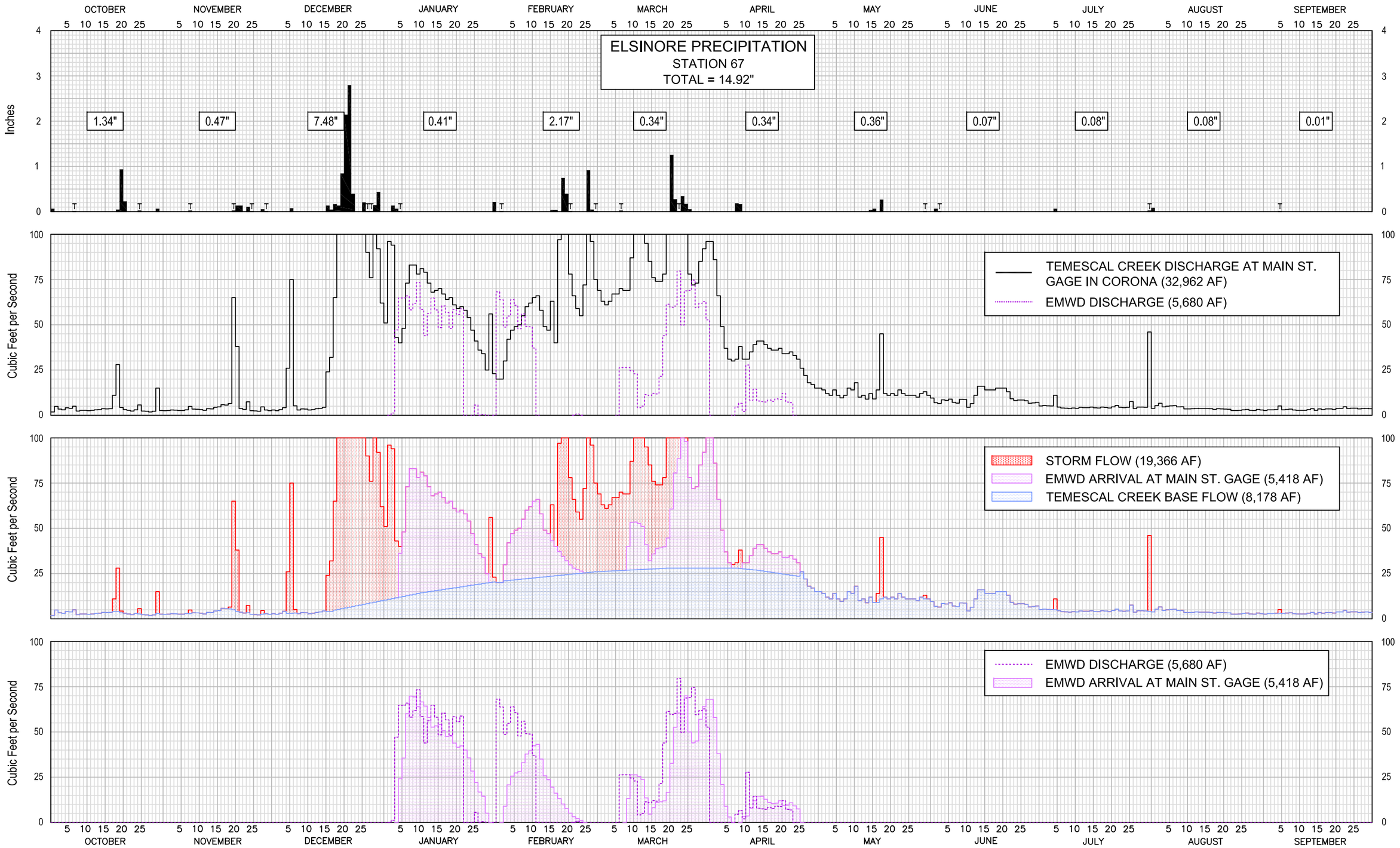
SUMMARY OF FLOW-WEIGHTED AVERAGE TDS
OF SAN JACINTO WATERSHED DISCHARGE
CALCULATED TO REACH PRADO RESERVOIR
WATER YEAR 2010-11

Month	EMWD Discharge to Temescal Creek (acre-feet) [1]	EMWD Discharge TDS (mg/L) [2]	San Jacinto Watershed Outflow At Prado (acre-feet)	EMWD Flow at Prado Reservoir x TDS
2010				
October	0	---	0	0
November	0	---	0	0
December	0	---	0	0
2011				
January	2,203	665	2,200	1,464,995
February	1,189	670	932	796,630
March	1,998	702	1,580	1,402,596
April	290	730	706	211,818
May	0	---	0	0
June	0	---	0	0
July	0	---	0	0
August	0	---	0	0
September	0	---	0	0
Total	5,680		5,418	3,876,039

Flow-weighted TDS at Discharge [3] = 682 mg/L

Flow-weighted TDS of San Jacinto Watershed Outflow At Prado [4] = 715 mg/L

(1) Actual EMWD discharge to Temescal Creek at Wasson Canyon.
(2) Monthly Average TDS of EMWD Surface Water Discharge to Wasson Canyon.
(3) Water quality for EMWD discharge at Wasson Canyon =
(Sum of Monthly Discharge Volume X Discharge TDS)/Total Discharge Volume.
(4) Water quality for EMWD discharge arriving at Prado reservoir =
(Sum of Volume Arriving at Prado X Discharge TDS)/Sum of Monthly Volume Arriving at Prado



DISCHARGE OF TEMESCAL CREEK AT MAIN STREET IN CORONA, EMWD DISCHARGE, AND ELSINORE PRECIPITATION
WATER YEAR 2010-11

APPENDIX H

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

WATER YEAR 2010-11

TABLE H-1

WATER QUALITY SAMPLES BELOW PRADO DAM
WATER YEAR 2010-11

Date	EC (microsiemens/cm)	TDS (mg/L)	Source
10/5/10	1,090	670	OCWD
10/12/10	1,110	666	USGS
10/28/10	1,020	608	USGS
11/2/10	1,040	642	OCWD
11/8/10	1,090	635	USGS
11/29/10	933	563	USGS
12/14/10	931	560	OCWD
12/17/10	970	593	USGS
1/4/11	362	226	OCWD
1/20/11	971	593	USGS
2/1/11	570	356	OCWD
2/5/11	1,010	644	USGS
2/24/11	790	483	USGS
3/8/11	510	334	OCWD
3/9/11	595	367	USGS
4/1/11	745	441	USGS
4/7/11	728	406	USGS
4/12/11	770	450	OCWD
4/21/11	742	427	USGS
5/2/11	862	509	USGS
5/10/11	935	564	OCWD
5/17/11	944	576	USGS
6/3/11	1,010	614	USGS
6/14/11	1,060	668	OCWD
6/21/11	1,100	675	USGS
7/1/11	1,030	596	USGS
7/6/11	937	620	OCWD
7/18/11	702	436	USGS
8/1/11	829	523	USGS
8/2/11	1,100	660	OCWD
8/9/11	755	438	OCWD
8/13/11	713	420	USGS
8/16/11	744	436	OCWD
8/23/11	793	466	OCWD
8/30/11	789	474	OCWD
9/1/11	861	513	USGS
9/6/11	973	564	OCWD
9/16/11	904	570	USGS
9/26/11	1,140	692	OCWD

TABLE H-2

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

OCTOBER 2010

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	101	1,072	657	66,357
2	96	1,059	649	62,304
3	100	1,058	649	64,900
4	105	1,053	645	67,725
5	118	1,026	629	74,222
6	245	706	433	106,085
7	158	854	523	82,634
8	118	991	607	71,626
9	115	1,012	620	71,300
10	119	1,009	618	73,542
11	119	1,048	642	76,398
12	100	1,088	667	66,700
13	102	1,091	669	68,238
14	94	1,113	682	64,108
15	94	1,085	665	62,510
16	109	1,069	655	71,395
17	116	1,059	649	75,284
18	123	1,045	641	78,843
19	138	1,041	638	88,044
20	177	932	571	101,067
21	179	996	611	109,369
22	176	977	599	105,424
23	167	1,028	630	105,210
24	162	1,042	639	103,518
25	179	944	579	103,641
26	169	807	495	83,655
27	147	986	604	88,788
28	144	1,007	617	88,848
29	143	1,026	629	89,947
30	144	1,037	636	91,584
31	148	900	552	81,696
Total	4,205			2,544,962

Monthly Flow-weighted TDS = 605 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

NOVEMBER 2010

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	158	993	609	96,222
2	167	1,033	633	105,711
3	164	1,053	645	105,780
4	159	1,075	659	104,781
5	152	1,086	666	101,232
6	148	1,088	667	98,716
7	145	1,085	665	96,425
8	141	1,070	656	92,496
9	144	969	594	85,536
10	144	1,038	636	91,584
11	144	1,067	654	94,176
12	145	1,075	659	95,555
13	143	1,086	666	95,238
14	141	1,089	668	94,188
15	141	1,090	668	94,188
16	140	1,097	672	94,080
17	140	1,085	665	93,100
18	140	1,092	669	93,660
19	142	1,104	677	96,134
20	137	1,033	633	86,721
21	108	618	379	40,932
22	110	568	348	38,280
23	136	647	397	53,992
24	176	708	434	76,384
25	216	812	498	107,568
26	219	811	497	108,843
27	219	792	485	106,215
28	219	806	494	108,186
29	217	913	560	121,520
30	242	904	554	134,068
Total	4,007			2,811,511

Monthly Flow-weighted TDS = 702 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

DECEMBER 2010

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	269	908	557	149,833
2	247	938	575	142,025
3	224	959	588	131,712
4	224	975	598	133,952
5	224	992	608	136,192
6	231	934	573	132,363
7	248	852	522	129,456
8	270	799	490	132,300
9	240	790	484	116,160
10	229	789	484	110,836
11	226	837	513	115,938
12	224	873	535	119,840
13	249	906	555	138,195
14	261	922	565	147,465
15	259	953	584	151,256
16	187	970	595	111,265
17	91	---	---	---
18	135	---	---	---
19	1,200	---	---	---
20	3,200	---	---	---
21	4,360	---	---	---
22	4,960	---	---	---
23	2,700	---	---	---
24	2,670	---	---	---
25	2,670	---	---	---
26	2,410	---	---	---
27	165	---	---	---
28	106	---	---	---
29	1,880	---	---	---
30	5,010	---	---	---
31	4,920	---	---	---
Total	40,289			2,098,788

Monthly Flow-weighted TDS[3]= 551 mg/L

1. TDS = EC x 0.612970 2. EC data missing 12/17/2010-12/31/2010

3. Flow data for period of missing EC is excluded in the Monthly Flow-weighted TDS calculation.

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

JANUARY 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	4,810	---	---	---
2	4,140	---	---	---
3	1,040	---	---	---
4	3,170	---	---	---
5	3,190	---	---	---
6	3,170	---	---	---
7	3,220	---	---	---
8	3,230	---	---	---
9	3,230	---	---	---
10	3,240	---	---	---
11	3,230	---	---	---
12	2,590	---	---	---
13	97	---	---	---
14	342	---	---	---
15	357	---	---	---
16	357	---	---	---
17	357	---	---	---
18	267	---	---	---
19	132	---	---	---
20	184	---	---	---
21	136	---	---	---
22	357	---	---	---
23	345	---	---	---
24	135	---	---	---
25	402	---	---	---
26	410	---	---	---
27	393	---	---	---
28	346	---	---	---
29	311	---	---	---
30	311	---	---	---
31	339	---	---	---
Total	40,846 [2]			0

Monthly Flow-weighted TDS[3]= na mg/L

1. TDS = EC x 0.612970 2. EC data missing 1/01/2011-1/31/2011

3. Flow-weighted TDS could not be calculated.

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

FEBRUARY 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	357	---	---	---
2	369	---	---	---
3	350	---	---	---
4	321	---	---	---
5	322	---	---	---
6	324	1,034	634	205,416
7	340	1,045	641	217,940
8	333	1,049	643	214,119
9	322	1,108	679	218,638
10	385	1,106	678	261,030
11	396	1,053	645	255,420
12	399	1,046	641	255,759
13	403	1,034	634	255,502
14	406	1,038	636	258,216
15	398	1,064	652	259,496
16	374	1,049	643	240,482
17	353	963	590	208,270
18	335	950	582	194,970
19	510	874	536	273,360
20	884	780	478	422,552
21	974	735	451	439,274
22	979	745	457	447,403
23	601	770	472	283,672
24	327	782	479	156,633
25	311	774	474	147,414
26	2,120	708	434	920,080
27	2,350	608	373	876,550
28	1,440	556	341	491,040
Total	16,626 [2]			7,503,236

Monthly Flow-weighted TDS[3]= 492 mg/L

1. TDS = EC x 0.612970 2. EC data missing 2/01/2011-2/05/2011

3. Flow data for period of missing EC is excluded in the Monthly Flow-weighted TDS calculation.

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

MARCH 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	567	544	333	188,811
2	492	550	337	165,804
3	272	515	316	85,952
4	270	472	289	78,030
5	269	482	295	79,355
6	269	496	304	81,776
7	339	478	293	99,327
8	392	511	313	122,696
9	392	592	363	142,296
10	392	632	387	151,704
11	342	616	378	129,276
12	277	656	402	111,354
13	239	705	432	103,248
14	126	743	455	57,330
15	216	806	494	106,704
16	239	801	491	117,349
17	251	817	501	125,751
18	266	810	497	132,202
19	277	782	479	132,683
20	281	828	508	142,748
21	352	827	507	178,464
22	661	696	427	282,247
23	753	696	427	321,531
24	810	708	434	351,540
25	916	698	428	392,048
26	757	673	413	312,641
27	543	677	415	225,345
28	303	734	450	136,350
29	360	759	465	167,400
30	710	726	445	315,950
31	807	749	459	370,413
Total	13,140			5,408,325

Monthly Flow-weighted TDS = 412 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

APRIL 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	778	755	463	360,214
2	814	733	449	365,486
3	814	714	438	356,532
4	615	724	444	273,060
5	296	745	457	135,272
6	252	750	460	115,920
7	310	733	449	139,190
8	311	668	409	127,199
9	310	684	419	129,890
10	308	699	428	131,824
11	306	727	446	136,476
12	304	748	459	139,536
13	299	740	454	135,746
14	294	743	455	133,770
15	290	750	460	133,400
16	287	759	465	133,455
17	286	766	470	134,420
18	288	754	462	133,056
19	285	760	466	132,810
20	282	753	462	130,284
21	310	749	459	142,290
22	323	746	457	147,611
23	314	765	469	147,266
24	310	764	468	145,080
25	307	780	478	146,746
26	305	814	499	152,195
27	305	831	509	155,245
28	307	834	511	156,877
29	308	847	519	159,852
30	309	847	519	160,371
Total	10,827			4,991,073

Monthly Flow-weighted TDS = 461 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

MAY 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	311	843	517	160,787
2	313	861	528	165,264
3	310	869	533	165,230
4	305	872	535	163,175
5	301	874	536	161,336
6	298	875	536	159,728
7	295	869	533	157,235
8	291	863	529	153,939
9	242	864	530	128,260
10	239	892	547	130,733
11	258	899	551	142,158
12	232	920	564	130,848
13	279	910	558	155,682
14	256	916	561	143,616
15	258	914	560	144,480
16	206	920	564	116,184
17	169	938	575	97,175
18	181	947	580	104,980
19	195	970	595	116,025
20	197	967	593	116,821
21	193	963	590	113,870
22	185	962	590	109,150
23	180	959	588	105,840
24	175	962	590	103,250
25	171	976	598	102,258
26	179	983	603	107,937
27	180	984	603	108,540
28	178	982	602	107,156
29	179	982	602	107,758
30	182	986	604	109,928
31	202	989	606	122,412
Total	7,140			4,011,755
		Monthly Flow-weighted TDS =	562	mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

JUNE 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	234	986	604	141,336
2	232	991	607	140,824
3	225	1,005	616	138,600
4	228	1,015	622	141,816
5	231	1,021	626	144,606
6	234	1,023	627	146,718
7	236	1,028	630	148,680
8	237	1,039	637	150,969
9	257	1,036	635	163,195
10	280	1,028	630	176,400
11	269	1,030	631	169,739
12	265	1,036	635	168,275
13	299	1,038	636	190,164
14	319	1,037	636	202,884
15	321	1,043	639	205,119
16	324	1,048	642	208,008
17	327	1,050	644	210,588
18	330	1,061	650	214,500
19	330	1,067	654	215,820
20	330	1,074	658	217,140
21	329	1,093	670	220,430
22	328	1,109	680	223,040
23	329	1,125	690	227,010
24	313	1,148	704	220,352
25	313	1,185	726	227,238
26	302	1,244	763	230,426
27	250	1,346	825	206,250
28	120	1,311	804	96,480
29	125	1,249	766	95,750
30	116	1,235	757	87,812
Total	8,033			5,330,169

Monthly Flow-weighted TDS = 664 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

JULY 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	149	1,069	655	97,595
2	140	1,008	618	86,520
3	146	943	578	84,388
4	131	966	592	77,552
5	126	978	599	75,474
6	138	891	546	75,348
7	119	940	576	68,544
8	147	872	535	78,645
9	156	835	512	79,872
10	163	836	512	83,456
11	148	879	539	79,772
12	176	815	500	88,000
13	185	788	483	89,355
14	194	756	463	89,822
15	175	817	501	87,675
16	204	729	447	91,188
17	212	713	437	92,644
18	212	721	442	93,704
19	194	734	450	87,300
20	191	722	443	84,613
21	189	712	436	82,404
22	188	729	447	84,036
23	182	737	452	82,264
24	190	706	433	82,270
25	193	703	431	83,183
26	189	697	427	80,703
27	188	680	417	78,396
28	190	703	431	81,890
29	195	690	423	82,485
30	188	695	426	80,088
31	340	641	393	133,620
Total	5,538			2,642,806

Monthly Flow-weighted TDS = 477 mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

AUGUST 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	228	771	473	107,844
2	116	1,038	636	73,776
3	202	725	444	89,688
4	214	670	411	87,954
5	207	711	436	90,252
6	225	691	424	95,400
7	220	692	424	93,280
8	202	727	446	90,092
9	190	767	470	89,300
10	206	716	439	90,434
11	188	781	479	90,052
12	210	748	459	96,390
13	214	719	441	94,374
14	213	717	439	93,507
15	210	730	447	93,870
16	206	725	444	91,464
17	215	702	430	92,450
18	203	710	435	88,305
19	166	788	483	80,178
20	168	791	485	81,480
21	166	787	482	80,012
22	153	791	485	74,205
23	146	796	488	71,248
24	139	811	497	69,083
25	131	800	490	64,190
26	132	799	490	64,680
27	130	795	487	63,310
28	135	802	492	66,420
29	134	807	495	66,330
30	129	813	498	64,242
31	123	859	527	64,821
Total	5,521			2,558,631
		Monthly Flow-weighted TDS =	463	mg/L

1. TDS = EC x 0.612970

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2010-11

SEPTEMBER 2011

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	123	875	536	65,928
2	127	820	503	63,881
3	133	797	489	65,037
4	134	814	499	66,866
5	139	813	498	69,222
6	130	903	554	72,020
7	138	817	501	69,138
8	128	832	510	65,280
9	125	825	506	63,250
10	135	806	494	66,690
11	151	804	493	74,443
12	151	801	491	74,141
13	146	802	492	71,832
14	142	810	497	70,574
15	124	892	547	67,828
16	122	925	567	69,174
17	124	924	566	70,184
18	124	964	591	73,284
19	125	960	588	73,500
20	100	1,027	630	63,000
21	97	1,085	665	64,505
22	98	1,101	675	66,150
23	93	1,110	680	63,240
24	97	1,109	680	65,960
25	98	1,099	674	66,052
26	102	1,085	665	67,830
27	91	1,094	671	61,061
28	70	1,123	688	48,160
29	58	1,148	704	40,832
30	64	1,149	704	45,056
Total	3,489			1,964,118

Monthly Flow-weighted TDS = 563 mg/L

1. TDS = EC x 0.612970

TABLE H-3

ANNUAL SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM

WATER YEAR 2010-11

Month	Monthly Flow (1) (cfs-days)	Monthly Flow-weighted TDS (1) (mg/L)	Monthly Flow x TDS
2010			
October	4,205	605	2,544,025
November	4,007	702	2,812,914
December	3,812	551	2,098,788
2011			
January	na	na	---
February	15,264	492	7,503,236
March	13,140	412	5,413,680
April	10,827	461	4,991,247
May	7,140	562	4,012,680
June	8,033	664	5,333,912
July	5,538	477	2,641,626
August	5,521	463	2,556,223
September	3,489	563	1,964,307
Total	80,976 (1)		41,872,638
Yearly Flow-weighted TDS (1) =		517	

1. Prado Outflow Total and Flow Weighted TDS exclude days when EC data was missing.

APPENDIX I

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

WATER YEAR 2010-11

PREPARED BY

JOHN V. ROSSI

TABLE I-1

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

WATER YEAR 2010-11

MONTH	Discharge (acre -feet)	TDS (mg/L)	Discharge xTDS
2010			
October	189	760	143,640
November	184	736	135,424
December	197	788	155,236
2011			
January	188	788	148,144
February	170	768	130,560
March	189	744	140,616
April	183	760	139,080
May	188	792	148,896
June	181	778	140,818
July	188	772	145,136
August	194	804	155,976
September	186	804	149,544
Total	2,237		1,733,070

$$\text{Flow-weighted TDS} = \frac{1{,}733{,}070}{2{,}237} = 775 \text{ mg/L}$$

APPENDIX J

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

WATER YEAR 2010-11

PREPARED BY

JOHN V. ROSSI

TABLE J-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2010-11

	Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data		Ratio	Average
2010	10/6/10	1,073	642	C of R		0.60	
	10/8/10	966	600	USGS		0.62	
	10/13/10	1,059	651	C of R		0.61	
	10/19/10	1,055	646	C of R		0.61	
	10/20/10	970	602	USGS	*	0.62	
	10/27/10	1,041	631	C of R		0.61	634
	11/3/10	1,043	624	C of R		0.60	
	11/5/10	1,020	631	USGS		0.62	
	11/10/10	1,007	611	C of R	*	0.61	
	11/17/10	1,049	638	C of R		0.61	
	11/19/10	972	569	USGS		0.59	
	11/24/10	804	483	C of R	*	0.60	616
	12/1/10	1,042	627	C of R		0.60	
	12/3/10	953	599	USGS		0.63	
	12/8/10	1,013	624	C of R	*	0.62	
	12/15/10	1,037	634	C of R		0.61	620
2011	1/7/11	1,032	630	C of R		0.61	
	1/11/11	999	622	C of R		0.62	
	1/13/11	865	542	USGS		0.63	
	1/18/11	1,051	646	C of R		0.61	
	1/19/11	939	581	USGS		0.62	
	1/25/11	1,036	647	C of R		0.62	611

* Data not used in determining monthly averages; storm flow.
C of R City of Riverside
USGS U.S. Geological Survey

TABLE J-1 (continued)

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2010-11

	Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data		Ratio	Average
2011	2/1/11	993	626	C of R		0.63	
	2/7/11	1,058	672	C of R		0.64	
	2/15/11	763	476	C of R	*	0.62	
	2/22/11	844	523	C of R	*	0.62	649
	3/1/11	362	256	C of R	*	0.71	
	3/7/11	920	572	C of R	*	0.62	
	3/15/11	994	618	C of R		0.62	
	3/23/11	851	523	C of R	*	0.61	
	3/24/11	609	367	USGS	*	0.60	
	3/31/11	422	276	C of R	*	0.65	618
	4/6/11	779	482	C of R	*	0.62	
	4/13/11	1,146	710	C of R		0.62	
	4/20/11	1,102	696	C of R		0.63	
	4/20/11	857	531	USGS		0.62	
	4/28/11	870	556	USGS		0.64	623
	5/4/11	1,200	756	C of R		0.63	
	5/11/11	1,114	701	C of R		0.63	
	5/18/11	937	602	C of R	*	0.64	
	5/25/11	1,125	707	C of R		0.63	
	5/25/11	939	562	USGS		0.60	
	5/31/11	909	546	USGS		0.60	654

* Data not used in determining monthly averages; storm flow.
C of R City of Riverside
USGS U.S. Geological Survey

TABLE J-1 (continued)

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2010-11

	Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Average
2011	6/1/11	1,147	725	C of R	0.63	
	6/8/11	1,120	728	C of R	0.65	
	6/15/11	1,135	730	C of R	0.64	
	6/20/11	877	528	USGS	0.60	
	6/22/11	1,130	722	C of R	0.64	
	6/28/11	1,010	624	USGS	0.62	
	6/29/11	1,150	720	C of R	0.63	682
	7/6/11	1,163	733	C of R	0.63	
	7/8/11	1,010	640	USGS	0.63	
	7/12/11	1,145	740	C of R	0.65	
	7/20/11	1,147	744	C of R	0.65	
	7/27/11	1,163	751	C of R	0.65	
	7/28/11	1,130	709	USGS	0.63	720
	8/3/11	1,127	702	C of R	0.62	
	8/10/11	1,153	738	C of R	0.64	
	8/17/11	1,168	731	C of R	0.63	
	8/24/11	1,147	727	C of R	0.63	
	8/31/11	1,157	734	USGS	0.63	726
	9/1/11	1,060	652	USGS	0.62	
	9/7/11	1,157	738	C of R	0.64	
	9/14/11	1,153	752	C of R	0.65	
	9/21/11	1,131	725	C of R	0.64	
	9/28/11	1,154	726	C of R	0.63	
	9/29/11	1,020	632	USGS	0.62	704

* Data not used in determining monthly averages; storm flow.
C of R City of Riverside
USGS U.S. Geological Survey

TABLE J-2

ANNUAL SUMMARY OF FLOW-WEIGHTED TDS AT RIVERSIDE NARROWS
WATER YEAR 2010-11

	Month	Stream Flow [1] (acre-feet)	Monthly Average TDS [2] (mg/L)	Monthly Flow x TDS
2010	October	3,670	634	2,326,780
	November	3,977	616	2,449,832
	December	4,752	620	2,946,240
2011	January	5,421	611	3,312,231
	February	4,086	649	2,651,814
	March	4,481	618	2,769,258
	April	4,327	623	2,695,721
	May	4,036	654	2,639,544
	June	4,092	682	2,790,744
	July	3,194	720	2,299,680
	August	2,705	726	1,963,830
	September	2,775	704	1,953,600
	Total Stream Flow	47,516		30,799,274

$$\text{Flow-weighted TDS} = \frac{30{,}799{,}274}{47{,}516} = 648 \text{ mg/L}$$

(1) USGS measured flow minus storm flow.

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

APPENDIX K

WMWD TRANSFER PROGRAM WATER DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS

WATER YEAR 2010-11

There was no discharge of WMWD Transfer Program water to the Santa Ana River above Riverside Narrows during the 2010-11 water year.