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**Summary of Precipitation and
Streamflow for Potrero and
San Clemente Creeks in
Water-Year 2011**

**Santa Lucia Preserve
Monterey County, California**

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Executive Summary

The purpose of this annual report is to present precipitation and streamflow summaries for the 2011 water year (October 1, 2010 to September 30, 2011). In March 2007 CSU–Monterey Bay began hydrologic monitoring of Santa Lucia Preserve for the Santa Lucia Conservancy. This project is a continuation of monitoring begun by Balance Hydrologics as part of the permit requirements for land development. Discharge, temperature, and specific conductance are reported for two creeks on the Santa Lucia Preserve, Potrero Creek and San Clemente Creek. Precipitation records are reported from two locations, the San Clemente Dam and Santa Lucia Preserve golf course.

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1 Introduction

This report is a hydrologic data summary for Santa Lucia Preserve for Water Year 2011 (WY-11). Balance Hydrologics installed four continuously recording streamflow gages on Santa Lucia Preserve. These gages include two on Las Garzas Creek (Moore's Lake inflow and outflow, installed in 2001), one on Potrero Creek (installed in 2002), and one on San Clemente Creek (installed in 2002). Detailed information on gage installation, operation and individual gage sites is available in Balance Hydrologics (2002).

Operation of the Potrero Creek and San Clemente Creek streamflow gages was transferred to CSUMB Watershed Institute on June 21, 2007. Data summaries are presented for streamflow on Potrero and San Clemente Creeks and for precipitation on Santa Lucia Preserve and San Clemente Dam.

2 Precipitation Data

Precipitation data presented from the Santa Lucia golf course is from a Rain Bird weather station operated by Santa Lucia Preserve. Precipitation data recorded by California American Water Company at nearby San Clemente Dam are included for comparison.

At San Clemente Dam the total WY-11 rainfall was 24.73 inches (Table 1 and Figure 1), which represents above average precipitation at the Dam. Based on the 90-year San Clemente Dam precipitation record, the average rainfall is 21.47 inches. Using Log-Pearson Type-III analysis, rainfall at San Clemente Dam should be less than 24.73 once every 1.39 years on average (Figure 2).

The recorded rainfall at the Santa Lucia Preserve Golf Course in WY-11 was 36.83 inches (Table 2 and Figure 3), which is above the 10 year average, 28.44 inches. The short duration of the record at the golf course may not be representative of actual long term precipitation patterns. The Preserve golf course received approximately 12 more inches of rain than the nearby San Clemente Dam. The available data do not show a consistent relationship between total precipitation at the San Clemente Dam and total precipitation at

the golf course. During the 10 years of rain gage operation at the golf course, the golf course gage has recorded between 0.96 fewer inches and 12.10 more inches than the Dam gage, with an average difference of 7.33 inches and a standard deviation of 4.64 inches.

3 Streamflow, Temperature, and Conductance Data

The streamflow gaging stations on Potrero and San Clemente each consist of a Campbell CR10X data logger (powered by 10 or 20 watt solar panels), two Druck pressure transducers to measure water depth, Campbell specific conductance and water temperature probe, as well as staff plates for manual readings (Balance Hydrologics 2002). Data loggers record measurements of pressure, temperature, and conductance at 15-minute intervals.

In WY-11, streamflow gage data was downloaded to a laptop computer during monthly visits, at which time manual discharge measurements were also taken using standard hydrologic practices. A FlowTracker (SonTek handheld ADV) current velocity meter was used to measure discharge. A portable Parshall flume was used to measure discharge during the latter part of the dry season when flows became too low to use the FlowTracker meter.

3.1 Potrero Creek

The current gage station on Potrero Creek was installed April 29, 2002 and is located upstream of the T-11 well. In WY-11, Potrero Creek had a mean daily flow of 2.17 cfs, a maximum daily flow of 106.9 cfs, and a minimum daily flow of 0.04 cfs; the 7-day low flow was 0.05 cfs (Table 3). Mean daily streamflow and manual discharge measurements are plotted in Figure 4. Temperature and conductance data are presented in Tables 4 through 7, and in Figure 5.

3.2 San Clemente Creek

The current gage station on San Clemente Creek was installed April 30, 2002 and is located near the Santa Lucia Preserve property boundary. In WY-10, San Clemente Creek had a mean daily flow of 2.83 cfs, a maximum daily flow of 34.5 cfs, and a minimum daily flow of 0.15 cfs; the 7-day low flow was 0.24 cfs (Table 8). Mean daily streamflow and manual discharge measurements are plotted in Figure 6. Temperature and conductance data are presented in Tables 9 through 12, and in Figure 7.

4 Limitations

Streamflow gage data are based on the stage–discharge relationship unique to each stream and gage location. This stage–discharge relationship (rating curve) for each gage has been developed over time by making manual discharge measurements at various ranges of flow and noting the water level (stage) at which a particular flow occurs. The rating curve for Potrero Creek was adjusted this year to reflect changes in the channel and is applicable to flows up to 46 cfs.

As more discharge measurements are made (particularly in the higher range of flows) the rating curves may change and it will be necessary to update the streamflow data to reflect these changes. For this reason, the streamflow data contained in this report should be considered provisional and caution should be exercised when using these data.

Only one discharge value has been reported for the month of September for the San Clemente Creek gage due to a malfunction that began on the 24th of August 2011.

The Potrero Creek gage also experienced some malfunctions during WY 11. A gap in gage data occurred from May 14 to May 28, and a malfunction in the temperature and specific conductance probe occurred from February 15 to June 20. Discharge values that occurred during these periods were estimated based on a linear equation between the two know points on either side of the data gap. It should be noted that total yield estimates calculated for Potrero creek are underestimates of reality due to some precipitation during the time when the gage was malfunctioning.

5 References

[Balance Hydrologics 2002]. Brown S, Porter S, Woyshner M, Hecht B. 2002. Hydrologic record for water year 2002: Las Garzas, Potrero, and San Clemente Creeks, Santa Lucia Preserve, Monterey County, California. 53 pp.

6 Tables

Table 1. Daily precipitation record and monthly totals, water year 2011
 San Clemente Dam, Monterey County, California

Record obtained from: California-American Water Company, Monterey District

Values are inches

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1				0.05								
2				1.52		0.01						
3				0.06								
4												
5			0.08									
6		0.01	0.46						1.25			
7	0.04					0.35	0.17					
8		0.25				0.04	0.12					
9			0.01				0.05	0.03				
10												
11			0.01									
12				0.04								
13												
14				0.07	0.02	0.02						
15			0.07		0.01							
16					1.04	0.03		0.27				
17			0.06		0.42			0.14				
18	0.16		0.34		1.74			0.39				
19			1.12		0.77	0.74	0.01	0.01				
20			0.57			2.47						
21			0.07		0.17	0.23	0.02					
22	0.04	1.57	0.43			T						
23	0.01	0.04	0.02			0.53						
24		0.12				0.83						
25	0.27	0.02	0.02		1.00	0.92						
26					0.09							
27			0.79			0.18						
28					0.05	0.03						
29		0.25	1.36					0.13	0.04			
30	0.10		0.01									
31			0.05	0.32								
Total	0.62	2.26	5.47	2.06	5.31	6.38	0.37	0.97	1.29	0.00	0.00	0.00
Annual Total			24.73									

Table 2. Daily precipitation record and monthly totals, water year 2011
 Santa Lucia Preserve Golf Course, Monterey County, California

Record obtained from: Santa Lucia Preserve

Values are inches

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1				1.01								
2				0.90		0.04						
3				0.01					1.50*			
4			0.05									
5			0.55	0.01								
6			0.08			0.13						
7		0.31				0.18	0.20					
8						0.05	0.05					
9			0.02									
10		0.01							0.01			
11				0.02				1.50*	0.03			
12				0.02			0.03		0.02			
13				0.06								
14			0.08	0.01	0.02	0.01						
15					0.07							
16					1.84	0.11						
17	0.10		0.42		2.11		0.01					
18			0.50		1.04	0.82	0.04					
19		0.05	1.07		0.74	1.04	0.05					
20		1.15	0.56		0.01	2.97						
21		0.79	0.56			0.22						
22	0.03	0.11	0.46			0.03						
23	0.12	0.08				1.31						
24	0.44	0.36	0.01		0.11	2.52						
25	0.02		1.24		2.34	0.20						
26			0.01		0.09	0.55						
27		0.48										
28			0.71			0.01			0.05			
29	0.04		1.31	0.01					0.05			
30	0.17		0.04	0.69								
31			0.05	0.01								
Total	0.92	3.34	7.72	2.75	8.37	10.19	0.38	1.50	1.66	0.00	0.00	0.00
Annual Total	36.83											

* Weather station down for repairs. Estimate.
 Note: Rainfall recorded on day of measuring.

Table 3. Mean daily flow, Potrero Creek, water year 2011
Santa Lucia Preserve, Monterey County, California

Values are cfs (unless otherwise noted)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.05	0.07	0.07	0.11	0.06	1.57	8.29	1.13	0.33	0.19	0.18	0.18
2	0.05	0.07	0.07	3.38	0.06	0.95	7.00	1.05	0.30	0.19	0.18	0.18
3	0.05	0.07	0.07	0.72	0.06	0.38	6.10	1.00	0.33	0.19	0.18	0.18
4	0.05	0.06	0.07	0.16	0.06	0.20	5.41	0.99	1.13	0.19	0.19	0.18
5	0.05	0.07	0.08	0.14	0.06	0.19	4.86	0.90	0.44	0.19	0.19	0.18
6	0.05	0.07	0.09	0.12	0.06	0.19	4.39	0.84	0.40	0.19	0.19	0.18
7	0.05	0.08	0.09	0.11	0.06	0.18	4.28	0.84	0.38	0.19	0.19	0.17
8	0.05	0.08	0.09	0.10	0.06	0.17	3.90	0.81	0.36	0.19	0.19	0.17
9	0.05	0.07	0.09	0.09	0.06	0.17	3.52	0.75	0.35	0.19	0.18	0.18
10	0.05	0.07	0.10	0.09	0.06	0.17	3.23	0.73	0.36	0.19	0.18	0.18
11	0.05	0.07	0.10	0.08	0.06	0.16	3.01	0.73	0.36	0.19	0.18	0.18
12	0.05	0.06	0.10	0.08	0.06	0.16	2.86	0.69	0.34	0.19	0.18	0.17
13	0.05	0.06	0.10	0.08	0.06	0.16	2.65	0.65	0.29	0.19	0.18	0.17
14	0.04	0.05	0.10	0.08	0.06	0.16	2.44	0.63	0.26	0.19	0.18	0.18
15	0.05	0.05	0.11	0.08	0.06	0.16	2.35	0.62	0.22	0.19	0.18	0.18
16	0.05	0.05	0.10	0.07	0.13	0.16	2.29	0.60	0.21	0.19	0.18	0.18
17	0.05	0.05	0.11	0.07	5.64	0.15	2.15	0.59	0.20	0.19	0.18	0.17
18	0.05	0.06	0.12	0.07	18.34	0.17	2.04	0.57	0.19	0.19	0.18	0.17
19	0.05	0.06	0.13	0.07	33.51	0.29	1.94	0.56	0.19	0.19	0.18	0.17
20	0.05	0.09	0.12	0.07	120.9	106.85	1.84	0.54	0.20	0.19	0.18	0.17
21	0.05	0.09	0.10	0.06	4.64	33.56	1.76	0.53	0.20	0.19	0.18	0.17
22	0.05	0.07	0.13	0.07	1.78	16.30	1.67	0.51	0.20	0.19	0.18	0.18
23	0.06	0.08	0.10	0.06	0.70	33.00	1.64	0.49	0.20	0.19	0.18	0.17
24	0.07	0.07	0.09	0.06	0.20	90.55	1.55	0.48	0.20	0.19	0.18	0.18
25	0.06	0.07	0.12	0.06	24.25	81.33	1.49	0.46	0.20	0.19	0.18	0.17
26	0.06	0.07	0.17	0.06	15.23	51.99	1.41	0.45	0.20	0.19	0.18	0.17
27	0.06	0.07	0.14	0.06	6.09	33.72	1.34	0.43	0.20	0.19	0.18	0.17
28	0.06	0.07	0.13	0.06	2.91	22.33	1.29	0.42	0.20	0.18	0.18	0.17
29	0.06	0.07	2.29	0.06		16.63	1.22	0.40	0.20	0.18	0.18	0.17
30	0.07	0.07	0.17	0.07		12.40	1.16	0.38	0.20	0.18	0.18	0.17
31	0.07		0.13	0.06		10.01		0.36		0.18	0.18	
Shaded cells are estimates of missing data												
Mean	0.05	0.07	0.18	0.21	4.52	16.59	2.97	0.65	0.29	0.19	0.18	0.18
Max Day	0.07	0.09	2.29	3.38	33.51	106.85	8.29	1.13	1.13	0.19	0.19	0.18
Min Day	0.04	0.05	0.07	0.06	0.06	0.15	1.16	0.36	0.19	0.18	0.18	0.17
Yield (ac-ft)	3.28	4.06	10.89	12.8	250.8	1020.3	176.7	39.92	17.47	11.61	11.19	10.43

Water Year 2011 Annual Summary			yr	day	cfs
Mean Daily Flow	2.17	cfs	1992	7/10	0.02
Max. Daily Flow	106.9	cfs	1993	7/21	0.04
Min. Daily Flow	0.04	cfs	1994	8/14	0.02
7-Day Low Flow	0.05	cfs	1995	9/19	0.02
Total Yield	1569	ac-ft	2002	8/8	0.01
Normalized Yield	0.47	ac-ft/ac	2003	8/23	0.01
			2004	8/27	0.00
			2005	9/30	0.05
			2006	9/17	0.06
			2007	9/6	<.01
			2008	9/2	0.02
			2009	9/3	0.13
			2010	8/24	0.08

Approximate date and value of first minimum daily mean flow near the end of each water year.

Table 4. Mean Daily Water Temperature (°C)
Potrero Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	13.33	11.04	14.68	17.51	23.82					13.55	13.61	13.20
2	13.38	11.85	10.97	17.54	17.82					13.28	13.53	12.76
3	13.40	12.16	11.89	17.49	17.35					13.21	13.72	13.11
4	13.43	12.31	13.29	16.56	17.25					13.06	13.98	13.31
5	13.16	12.58	14.87	16.02	17.95					12.90	14.10	13.41
6	12.63	12.57	16.69	16.08	18.90					13.25	13.97	12.78
7	12.59	12.44	15.46	16.21	19.26					13.44	13.92	12.82
8	12.21	12.34	15.09	16.98	18.73					13.39	13.76	12.98
9	12.08	11.15	16.27	17.07	17.91					13.24	13.58	12.90
10	12.33	11.73	16.96	15.80	17.64					13.15	13.55	13.07
11	12.79	10.68	16.71	16.36	17.60					13.35	13.81	13.59
12	13.02	9.93	15.23	17.48	17.78					13.34	13.78	13.54
13	12.81	10.18	14.14	17.34	17.64					13.62	13.33	13.40
14	12.70	10.62	14.21	18.22	18.81					13.35	12.92	13.46
15	12.57	11.42	14.51	18.13						13.36	12.65	13.53
16	12.91	11.43	13.03	18.34						13.65	13.17	13.61
17	12.52	10.55	13.96	18.76						13.94	13.24	13.53
18	12.68	10.62	15.02	18.47						13.06	13.30	12.76
19	12.27	11.25	15.99	18.28						13.56	13.49	12.93
20	12.61	9.65	15.67	17.73						13.36	13.67	12.89
21	12.97	9.88	14.48	17.37					13.17	13.59	13.95	12.71
22	12.95	10.67	14.98	17.58					12.90	13.77	14.00	12.97
23	12.68	10.99	15.14	17.91					13.13	13.83	13.36	12.81
24	13.77	9.69	13.70	17.52					12.75	14.06	13.53	13.24
25	14.16	8.53	13.81	17.55					12.78	14.15	13.82	13.68
26	12.36	8.38	13.65	17.79					13.05	13.90	13.93	13.41
27	11.16	11.89	14.51	17.67					13.29	13.66	13.83	12.89
28	11.27	12.40	15.32	17.30					12.94	13.77	13.50	13.36
29	11.90	11.13	17.48	18.39					13.43	14.06	13.45	13.33
30	12.40	10.53	15.46	19.28					13.10	14.36	13.62	13.89
31	11.93		16.04	18.72						14.33	13.64	
Mean Day	12.68	11.02	14.81	17.53	18.46				13.05	13.57	13.60	13.20
Max Day	14.16	12.58	17.48	19.28	23.82				13.43	14.36	14.10	13.89
Min Day	11.16	8.38	10.97	15.80	17.25				12.75	12.90	12.65	12.71

Table 5. Maximum Daily Water Temperature (°C)
Potrero Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	13.58	12.23	11.13	18.20	19.31					13.92	14.26	13.74
2	13.52	12.42	11.65	18.48	18.90					13.79	13.97	13.34
3	13.52	12.58	12.60	18.18	17.87					13.93	13.96	13.45
4	13.50	12.74	14.34	17.46	17.93					13.72	14.19	13.52
5	13.44	12.78	15.89	16.51	18.88					13.35	14.36	13.71
6	13.17	12.78	16.91	16.61	19.74					13.77	14.21	13.36
7	12.79	12.72	16.56	16.68	21.51					13.80	14.06	13.49
8	12.68	12.72	15.85	17.52	19.44					13.77	14.03	13.30
9	12.47	12.00	16.85	17.53	18.66					13.55	14.01	13.20
10	12.75	12.09	17.12	16.58	18.15					13.49	13.95	13.48
11	13.23	11.61	17.10	17.22	18.25					13.66	14.14	13.89
12	13.28	10.57	16.35	17.83	18.36					13.54	13.92	13.88
13	13.20	10.87	14.99	18.10	18.27					13.82	13.63	13.69
14	12.90	11.42	14.65	18.61	20.19					13.58	13.54	13.60
15	12.94	11.94	14.70	18.59						13.71	13.31	13.64
16	13.12	11.88	14.04	18.80						14.09	13.66	13.76
17	12.71	11.32	14.51	19.25						14.24	13.64	13.77
18	12.95	10.98	15.49	19.02						13.76	13.58	13.34
19	12.67	11.54	16.56	18.79						14.05	13.71	13.40
20	12.92	11.46	16.37	18.49						13.83	13.95	13.33
21	13.19	11.11	15.40	17.79					14.01	13.98	14.22	13.12
22	13.26	11.05	15.41	18.32					13.59	14.18	14.36	13.20
23	13.21	11.38	15.39	18.36					13.85	14.19	13.95	13.17
24	14.52	10.91	14.62	18.17					13.34	14.37	14.00	13.46
25	14.52	9.05	14.51	18.15					13.08	14.50	14.18	14.07
26	13.41	8.85	14.49	18.24					13.64	14.19	14.19	13.79
27	12.07	12.60	15.36	18.11					13.87	14.01	14.17	13.49
28	12.21	12.66	16.30	17.85					13.64	14.14	13.88	13.87
29	12.31	12.06	18.37	19.10					13.81	14.39	13.71	13.82
30	12.81	10.99	16.67	19.84					13.94	14.68	13.80	14.10
31	12.55		16.55	19.72						14.55	13.94	
Mean Day	13.08	11.64	15.38	18.13	18.96				13.68	13.95	13.95	13.57
Max Day	14.52	12.78	18.37	19.84	21.51				14.01	14.68	14.36	14.10
Min Day	12.07	8.85	11.13	16.51	17.87				13.08	13.35	13.31	13.12

Table 6. Minimum Daily Water Temperature °C
Potrero Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	13.13	11.03	10.05	16.28	18.64					11.92	13.33	13.17
2	13.20	11.23	10.47	16.32	17.17					12.59	13.06	11.96
3	13.29	11.65	11.47	17.01	16.83					12.39	13.43	12.74
4	13.36	11.83	12.60	16.04	16.64					12.27	13.80	13.06
5	12.90	12.30	13.34	15.62	17.29					12.23	13.89	13.18
6	12.27	12.29	15.38	15.66	18.24					12.69	13.67	12.01
7	12.29	12.15	14.82	15.77	18.61					13.02	13.83	12.14
8	11.78	12.03	14.58	16.70	18.16					12.96	13.48	12.54
9	11.67	10.47	15.85	16.62	17.29					12.94	13.15	12.59
10	11.98	11.45	16.86	15.32	17.04					12.79	13.15	12.68
11	12.43	9.96	16.36	15.88	16.96					13.04	13.55	13.38
12	12.70	9.08	14.75	17.23	17.14					13.13	13.65	13.12
13	12.47	9.47	13.59	16.80	16.98					13.48	12.93	12.93
14	12.17	9.93	13.93	17.85	17.82					13.19	12.20	13.34
15	12.17	10.93	14.07	17.57						13.04	11.75	13.43
16	12.73	10.93	12.33	17.83						13.25	12.75	13.46
17	12.33	9.84	13.51	18.33						13.66	12.67	13.22
18	12.49	10.20	14.53	17.93						12.10	12.91	12.03
19	11.67	10.99	14.16	17.74						12.93	13.31	12.42
20	12.28	7.56	15.37	17.15						12.63	13.41	12.32
21	12.80	8.29	13.73	16.83					12.19	13.29	13.77	12.02
22	12.72	10.28	13.72	16.97					11.92	13.36	13.68	12.59
23	12.20	10.67	14.66	17.32					12.58	13.49	12.55	12.27
24	13.06	9.07	13.03	16.90					12.21	13.75	13.00	13.05
25	13.44	8.11	13.11	16.94					12.48	13.80	13.44	13.43
26	11.68	7.94	12.81	17.20					12.54	13.61	13.67	12.96
27	10.30	8.58	13.77	17.09					12.81	13.21	13.48	12.16
28	10.53	12.11	14.63	16.69					12.10	13.33	12.95	12.84
29	11.32	10.63	14.98	17.85					13.04	13.75	13.18	12.78
30	12.08	10.07	14.67	18.74					12.07	14.11	13.44	13.71
31	11.35		15.53	18.05						14.15	13.36	
Mean Day	12.28	10.37	13.96	16.98	17.49				12.39	13.10	13.24	12.78
Max Day	13.44	12.30	16.86	18.74	18.64				13.04	14.15	13.89	13.71
Min Day	10.30	7.56	10.05	15.32	16.64				11.92	11.92	11.75	11.96

Table 7. Mean Daily Specific Conductance (umhos/cm @ 25 °C)
Potrero Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	966.58	925.48	850.75	346.60	662.29					763.29	847.78	844.26
2	972.54	924.52	854.43	330.56	656.79					805.47	828.82	847.10
3	970.67	927.64	859.33	265.61	653.89					816.01	830.33	847.18
4	967.07	928.75	849.81	247.65	651.35					817.48	836.16	847.48
5	962.86	931.66	837.72	317.69	652.35					821.79	808.47	849.79
6	958.63	937.94	816.51	324.61	653.33					824.34	806.23	854.70
7	956.30	943.42	812.81	282.62	649.86					823.10	812.40	858.53
8	953.60	947.93	811.36	346.19	646.07					801.18	805.79	860.26
9	952.74	947.32	817.67	431.84	641.09					796.61	808.04	859.98
10	952.88	948.34	823.82	459.34	639.35					796.72	811.59	861.70
11	953.71	945.57	830.25	485.99	638.74					793.47	826.60	860.39
12	953.78	941.14	846.18	510.92	638.45					806.19	813.96	863.89
13	953.66	937.50	854.86	535.28	637.23					823.57	814.63	866.00
14	972.38	933.89	858.41	565.91	640.88					830.77	818.32	864.36
15	1033.29	931.32	859.55	592.00						817.96	821.82	861.17
16	1001.09	931.38	855.48	613.70						796.35	823.50	863.89
17	978.34	933.67	858.75	632.90						819.45	824.22	867.56
18	966.07	938.19	862.35	645.76						772.47	823.82	872.60
19	962.19	943.69	863.55	655.88						770.83	822.94	876.36
20	960.22	986.82	853.26	661.99						773.30	824.08	878.00
21	962.40	978.71	850.43	667.84					705.82	771.83	826.00	878.71
22	961.93	941.03	856.74	674.11					717.24	771.78	827.32	877.08
23	959.66	935.59	853.99	678.34					722.82	774.25	832.16	877.98
24	961.85	932.38	861.03	671.84					727.72	775.39	833.58	872.66
25	953.72	929.64	882.09	667.99					730.08	778.05	834.84	872.69
26	946.47	928.13	746.34	666.22					733.44	781.97	834.13	876.18
27	943.60	863.34	614.25	665.42					737.04	809.03	836.68	882.15
28	944.22	863.33	632.78	665.01					741.53	843.53	839.54	884.13
29	945.16	852.20	341.17	670.64					739.29	840.26	839.96	884.78
30	939.93	845.75	248.23	673.40					748.66	843.30	840.11	882.69
31	931.60		290.99	669.06						825.22	841.60	
Mean Day	961.3	928.5	776.0	536.2	647.3				730.4	802.7	825.7	866.5
Max Day	1033.3	986.8	882.1	678.3	662.3				748.7	843.5	847.8	884.8
Min Day	931.6	845.8	248.2	247.7	637.2				705.8	763.3	805.8	844.3

Table 8. Mean daily flow, San Clemente Creek, water year 2011
Santa Lucia Preserve, Monterey County, California

Values are cfs (unless otherwise noted)												
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		0.37	0.55	4.45	2.45	9.64	8.57	2.43	1.89	0.66	0.41	0.24
2		0.37	0.54	15.15	2.35	9.05	8.02	2.37	1.82	0.64	0.38	0.23
3		0.37	0.53	8.69	2.31	8.32	7.36	2.32	1.84	0.62	0.37	0.23
4		0.36	0.53	6.70	2.29	7.74	6.94	2.35	2.89	0.59	0.39	0.23
5		0.36	0.58	5.66	2.27	7.29	6.26	2.29	2.41	0.59	0.37	0.22
6		0.37	0.76	5.00	2.24	7.03	5.68	2.18	2.23	0.59	0.33	0.22
7		0.40	0.70	4.44	2.21	7.63	5.38	2.11	2.13	0.54	0.34	0.22
8		0.40	0.69	4.02	2.18	6.87	5.17	2.13	1.86	0.48	0.31	0.22
9		0.39	0.72	3.47	2.14	6.50	4.66	2.15	1.79	0.48	0.30	0.21
10		0.39	0.63	3.30	2.12	6.18	4.36	2.08	1.65	0.48	0.31	0.21
11		0.38	0.57	3.21	2.09	5.92	4.20	2.07	1.67	0.52	0.31	0.21
12		0.34	0.56	3.12	2.07	5.66	4.09	2.00	1.67	0.56	0.30	0.20
13		0.31	0.55	3.06	2.06	5.45	4.14	2.01	1.57	0.56	0.26	0.20
14		0.31	0.55	3.02	2.09	5.34	3.96	2.03	1.59	0.51	0.25	0.20
15	0.30	0.31	0.56	2.93	2.12	5.16	3.52	2.14	1.72	0.53	0.26	0.19
16	0.30	0.31	0.55	2.86	6.60	5.14	3.34	2.07	1.65	0.51	0.24	0.19
17	0.32	0.30	0.59	2.81	12.31	4.90	3.32	2.23	1.61	0.50	0.22	0.19
18	0.33	0.31	0.86	2.75	17.26	5.61	3.27	2.69	1.60	0.48	0.23	0.19
19	0.33	0.31	1.56	2.69	18.14	8.60	3.22	2.35	1.50	0.50	0.25	0.18
20	0.31	0.39	1.68	2.63	13.53	34.54	3.00	2.16	1.05	0.49	0.25	0.18
21	0.32	0.51	1.30	2.59	10.96	15.70	2.88	2.12	0.79	0.46	0.24	0.18
22	0.33	0.39	1.81	2.56	9.27	11.59	2.80	2.08	0.77	0.46	0.25	0.17
23	0.34	0.42	1.21	2.50	8.25	17.74	2.78	2.06	0.67	0.46	0.26	0.17
24	0.36	0.46	1.03	2.46	7.51	31.32	2.75	2.05	0.66	0.47	0.26	0.17
25	0.37	0.49	1.57	2.43	21.04	24.68	2.70	2.01	0.69	0.48	0.26	0.17
26	0.35	0.51	1.81	2.40	15.00	21.55	2.66	2.00	0.71	0.44	0.25	0.17
27	0.35	0.58	1.28	2.36	12.05	18.01	2.61	1.93	0.68	0.42	0.25	0.16
28	0.35	0.68	1.17	2.33	10.57	14.71	2.59	1.93	0.68	0.41	0.25	0.16
29	0.35	0.58	12.27	2.32		12.09	2.56	1.84	0.68	0.41	0.25	0.16
30	0.38	0.56	6.60	2.72		10.07	2.51	1.85	0.66	0.43	0.24	0.15
31	0.37		4.92	2.62		8.97		1.85		0.44	0.24	
Shaded cells are estimates of missing data												
Mean	0.34	0.41	1.59	3.78	6.98	11.26	4.18	2.12	1.44	0.51	0.28	0.19
Max Day	0.38	0.68	12.27	15.15	21.04	34.54	8.57	2.69	2.89	0.66	0.41	0.24
Min Day	0.30	0.30	0.53	2.32	2.06	4.90	2.51	1.84	0.66	0.41	0.22	0.15
Yield (ac-ft)	11.47	24.24	97.63	232.5	387.7	692.2	248.5	130.6	85.5	31.11	17.48	11.51

Water Year 2010 Annual Summary			yr	day	cfs	
Mean Daily Flow	2.83	cfs	1991	9/17	0.03	
Max. Daily Flow	34.5	cfs	1992	8/27	0.06	
Min. Daily Flow	0.15	cfs	1993	8/27	0.10	
7-Day Low Flow	0.24	cfs	1994	7/16	0.04	
Total Yield	1971	ac-ft	1995	9/29	0.14	Approximate date and value of first minimum daily mean flow near the end of each water year.
Normalized Yield	0.60	ac-ft/ac	2002	8/25	0.01	
			2003	9/14	0.03	
			2004	8/27	0.02	
			2005	9/30	0.11	
			2006	9/23	0.17	
			2007	8/4	0.03	
			2008	8/26	0.07	
			2009	9/4	0.03	
			2010	9/5	0.01	
			2011	9/23	0.17	

Table 9. Mean Daily Water Temperature °C
San Clemente Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		8.95	8.86	8.10	7.60	9.95	10.81	11.17	13.24	14.84	14.04	
2		10.61	6.85	9.44	6.50	9.93	11.84	11.19	10.61	15.62	14.25	
3		11.22	7.89	8.66	6.36	9.73	10.64	11.34	10.55	16.12	14.00	
4		11.60	8.72	7.65	6.57	9.21	11.00	12.13	11.97	15.69	14.23	
5		11.71	9.44	7.00	7.70	9.75	11.22	13.25	11.95	15.94	14.29	
6		11.68	9.61	7.34	8.55	10.83	10.51	12.54	12.44	16.94	14.09	
7		11.53	8.24	7.49	8.52	10.17	9.84	11.67	12.79	16.81	14.06	
8		11.31	8.21	7.79	7.57	10.19	8.68	11.25	12.79	15.86	13.69	
9		10.04	10.00	6.87	6.30	10.01	8.98	11.02	12.76	14.75	13.59	
10		10.50	10.54	5.64	6.19	10.13	9.95	10.66	12.68	13.83	13.81	
11		9.28	10.51	7.15	6.23	9.63	9.93	11.39	12.21	14.11	13.71	
12		8.39	9.79	8.45	6.57	9.37	10.02	11.43	12.99	14.24	13.59	
13		8.54	9.19	8.30	6.56	9.78	9.74	11.30	13.35	14.60	14.10	
14		9.06	9.71	9.05	8.25	11.41	9.56	10.76	13.97	13.46	14.11	
15	13.55	9.98	9.52	8.86	9.09	10.89	10.45	10.13	14.71	13.69	14.18	
16	13.27	9.91	7.43	9.34	8.77	11.44	11.56	9.88	13.72	14.15	13.93	
17	12.65	8.96	9.00	9.96	7.49	9.36	12.24	10.43	12.95	14.49	13.92	
18	12.42	8.70	10.49	9.12	8.33	8.69	12.25	10.54	13.41	13.99	13.96	
19	12.23	9.49	11.15	8.66	7.98	8.74	12.79	10.83	14.17	14.75	13.99	
20	11.93	9.15	9.66	7.83	8.16	9.26	12.05	11.10	14.86	15.12	14.04	
21	12.37	8.41	9.06	7.72	8.18	9.36	11.96	11.41	15.61	14.89	14.22	
22	12.26	8.18	9.88	8.10	7.61	9.25	10.42	11.44	15.75	14.65	14.06	
23	11.70	8.28	9.13	8.26	8.32	9.61	10.76	11.08	14.63	14.46	14.32	13.85
24	13.08	6.64	7.91	7.65	8.53	9.41	11.52	11.24	13.58	14.56	14.35	
25	12.65	5.08	8.68	7.92	8.67	9.75	11.08	10.87	13.40	14.26		
26	10.64	5.04	8.02	8.07	7.43	10.24	11.13	11.03	13.62	14.24		
27	9.61	6.27	7.37	7.94	7.29	10.08	10.56	11.09	13.85	14.03		
28	10.13	7.39	7.73	7.47	7.77	10.55	10.82	11.66	14.12	14.78		
29	10.53	5.83	9.31	7.94		10.39	10.29	11.34	13.81	15.16		
30	10.91	5.57	7.37	8.90		11.23	9.93	11.50	13.47	15.16		
31	10.30		8.19	7.78		12.16		10.36		15.02		
Mean Day	11.8	8.9	8.9	8.1	7.6	10.0	10.8	11.2	13.3	14.8	14.0	13.9
Max Day	13.6	11.7	11.1	10.0	9.1	12.2	12.8	13.2	15.8	16.9	14.3	13.9
Min Day	9.6	5.0	6.9	5.6	6.2	8.7	8.7	9.9	10.5	13.5	13.6	13.9

Table 10. Maximum Daily Water Temperature °C
San Clemente Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		11.07	6.89	9.44	7.90	9.22	14.54	12.84	11.45	16.33	15.61	
2		11.51	7.76	9.74	7.30	11.18	12.65	13.39	11.89	17.11	15.45	
3		12.08	8.49	9.28	7.09	10.75	12.31	13.40	11.61	17.68	15.02	
4		12.45	9.15	8.63	7.67	10.74	13.32	14.50	13.04	16.83	15.24	
5		12.06	9.98	7.68	8.73	11.11	13.09	15.18	12.56	17.43	15.43	
6		11.98	9.75	8.44	9.21	11.84	12.31	13.65	13.68	18.18	15.09	
7		11.83	9.26	8.01	9.17	11.26	10.37	12.75	14.12	17.95	15.08	
8		11.65	9.30	8.44	8.63	11.26	9.59	11.93	14.10	17.15	14.98	
9		11.03	10.55	8.10	7.09	11.56	11.09	12.29	14.29	16.16	15.03	
10		10.84	10.96	6.29	7.07	11.28	11.55	12.57	13.63	15.30	14.94	
11		10.25	10.93	8.28	7.34	10.54	11.67	12.82	12.75	15.27	14.81	
12		9.07	10.33	8.87	7.53	10.36	11.43	13.17	14.44	15.36	14.63	
13		9.29	9.73	9.41	7.58	11.18	10.79	12.71	14.90	15.39	15.17	
14		9.94	10.30	9.42	9.13	12.19	11.64	11.45	15.68	14.30	15.34	
15	14.16	10.60	10.19	9.62	9.53	12.25	12.76	10.76	16.10	14.87	15.41	
16	13.83	10.41	8.41	10.03	9.27	12.12	13.77	10.75	14.84	15.35	15.11	
17	12.97	9.71	9.78	10.44	8.11	10.50	14.03	10.85	14.38	15.65	15.11	
18	12.90	9.20	11.09	10.05	9.13	9.29	13.48	11.33	14.91	15.45	15.20	
19	12.85	9.83	11.56	9.18	8.57	9.32	14.20	12.70	15.64	16.03	15.05	
20	12.61	9.74	10.55	8.60	8.90	10.20	13.70	12.66	16.52	16.48	14.85	
21	12.72	8.85	9.62	8.49	8.93	10.16	12.63	12.79	17.23	16.04	15.19	
22	12.79	8.61	10.14	9.00	8.77	10.46	11.90	12.01	17.02	15.81	15.01	
23	12.31	8.74	9.94	8.93	8.97	10.05	11.92	11.73	15.89	15.68	15.59	13.85
24	13.59	8.08	8.69	8.36	9.13	9.88	12.47	12.48	15.14	15.73	15.85	
25	13.44	5.63	9.30	8.72	9.14	10.56	11.98	12.14	14.86	15.63		
26	11.39	5.70	8.92	8.75	8.05	11.21	11.99	12.41	15.31	15.41		
27	10.49	7.23	7.92	8.64	8.82	11.29	12.47	12.69	15.39	15.47		
28	11.02	7.62	8.85	8.16	9.22	11.57	12.29	12.88	15.01	16.04		
29	11.14	6.92	9.83	8.68		12.12	11.66	12.26	14.54	16.17		
30	11.35	6.44	8.35	9.27		12.97	12.08	12.69	15.13	16.11		
31	10.86		8.58	8.96		14.13		11.36		15.95		
Mean Day	12.4	9.6	9.5	8.8	8.4	11.1	12.3	12.5	14.5	16.1	15.2	13.9
Max Day	14.2	12.5	11.6	10.4	9.5	14.1	14.5	15.2	17.2	18.2	15.9	13.9
Min Day	10.5	5.6	6.9	6.3	7.1	9.2	9.6	10.8	11.5	14.3	14.6	13.9

Table 11. Minimum Daily Water Temperature °C
San Clemente Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		9.40	5.29	8.23	6.68	6.61	10.93	8.09	9.48	12.75	13.16	
2		9.65	6.03	9.22	5.56	8.82	10.62	9.05	9.05	14.12	12.92	
3		10.36	7.23	7.94	5.54	8.85	9.20	9.31	9.16	14.50	12.52	
4		10.80	8.35	6.85	5.55	7.78	9.09	9.78	11.19	14.20	13.11	
5		11.18	9.11	6.26	6.82	8.50	9.79	11.23	11.14	14.35	12.91	
6		11.22	9.29	6.47	7.88	10.07	8.86	11.20	11.29	15.84	12.74	
7		11.11	7.60	6.81	7.72	9.77	8.87	10.46	11.57	15.65	12.80	
8		11.05	7.49	7.38	6.91	9.42	7.63	10.78	11.55	14.39	12.09	
9		9.46	9.32	6.25	5.31	8.57	7.19	10.04	11.20	13.02	11.73	
10		10.13	10.06	4.88	5.25	8.78	8.73	8.62	11.71	11.99	12.41	
11		8.57	10.05	6.26	5.11	8.84	8.41	10.09	11.59	12.86	12.34	
12		7.54	9.20	8.08	5.47	8.37	9.04	9.66	11.81	12.99	12.23	
13		7.84	8.45	7.51	5.39	8.59	8.78	9.72	11.76	13.78	12.80	
14		8.30	9.06	8.57	7.26	10.84	7.68	10.03	12.12	12.62	12.66	
15	12.81	9.44	8.47	8.18	8.77	9.62	8.39	9.37	13.21	12.65	12.78	
16	12.77	9.31	6.56	8.68	7.76	10.58	9.56	8.87	12.43	12.90	12.34	
17	12.38	8.02	8.22	9.49	6.97	8.09	10.60	9.97	11.44	13.45	12.38	
18	11.97	8.07	9.72	8.47	7.71	7.86	11.05	9.92	11.92	12.29	12.41	
19	11.53	9.17	10.57	8.11	7.50	8.20	11.90	8.95	12.69	13.36	12.92	
20	11.12	8.69	9.21	6.97	7.56	8.22	10.87	9.28	13.13	13.62	13.33	
21	12.11	8.08	8.42	6.86	7.41	8.79	10.63	10.05	13.88	13.40	13.35	
22	11.80	7.80	9.63	7.27	6.44	8.28	8.84	10.82	14.37	13.32	12.74	
23	10.87	7.92	8.60	7.46	7.85	9.25	9.54	10.47	13.15	13.12	12.75	13.85
24	12.34	5.66	7.19	6.74	8.00	9.14	10.63	9.88	11.83	13.41	13.73	
25	11.43	4.53	8.07	7.10	7.90	9.04	10.35	9.28	11.86	12.79		
26	9.94	4.40	7.47	7.19	6.85	9.70	10.30	9.74	11.95	12.84		
27	8.43	5.31	6.75	7.11	6.16	8.81	8.68	9.31	12.11	12.24		
28	9.30	6.96	6.94	6.55	6.60	9.84	9.34	10.33	13.03	13.32		
29	9.68	5.31	8.38	7.08		9.06	8.92	10.34	13.11	13.94		
30	10.61	4.85	6.66	8.51		9.90	7.84	10.55	11.60	14.13		
31	9.54		7.83	7.02		10.66		8.93		14.05		
Mean Day	11.1	8.3	8.2	7.4	6.8	9.0	9.4	9.8	11.9	13.5	12.7	13.9
Max Day	12.8	11.2	10.6	9.5	8.8	10.8	11.9	11.2	14.4	15.8	13.7	13.9
Min Day	8.4	4.4	5.3	4.9	5.1	6.6	7.2	8.1	9.1	12.0	11.7	13.9

Table 12. Mean Daily Specific Conductance (umhos/cm @ 25 °C)
San Clemente Creek, water year 2011

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		330.83	298.01	221.66	195.52	52.51	11.19	195.52	207.68	182.07	195.85	
2		330.92	299.11	138.02	196.83	56.85	11.25	196.58	208.58	183.08	196.79	
3		330.88	300.53	149.39	197.06	60.95	11.25	197.38	209.07	184.23	197.73	
4		330.84	300.29	161.04	197.02	63.86	11.63	198.56	195.04	185.09	198.05	
5		330.91	292.11	168.18	196.85	66.52	11.93	199.95	201.82	185.55	196.88	
6		330.74	283.80	172.80	197.15	69.10	11.99	201.25	202.99	186.47	198.03	
7		327.90	286.75	176.49	197.74	70.79	12.11	201.62	205.58	187.59	198.55	
8		328.24	290.22	178.94	198.15	71.73	12.15	201.70	205.36	188.17	199.43	
9		331.11	291.89	181.39	199.16	72.52	12.58	203.00	207.83	188.28	202.63	
10		331.01	292.93	183.60	199.17	73.07	13.29	204.16	207.32	188.59	203.78	
11		331.88	294.17	184.40	199.12	73.16	13.91	204.06	207.11	188.25	204.32	
12		332.19	295.19	185.34	199.08	72.41	14.33	204.71	207.84	186.98	205.39	
13		331.44	295.96	186.53	198.97	71.95	13.60	205.72	210.01	186.21	206.54	
14		331.46	296.29	187.23	197.95	72.62	13.21	205.40	210.79	184.82	207.84	
15	325.22	331.35	296.17	188.44	197.26	72.80	13.38	201.46	212.56	184.55	208.55	
16	325.66	331.40	297.85	189.52	158.57	73.22	13.57	205.01	212.01	185.17	208.82	
17	325.95	331.98	292.31	190.32	120.05	72.49	13.73	202.25	212.05	185.75	209.28	
18	328.27	332.28	272.40	191.37	36.95	71.09	13.87	193.79	212.16	186.29	210.00	
19	328.28	332.15	230.81	192.31	39.78	69.00	14.09	201.56	213.26	187.82	210.80	
20	327.88	315.64	227.63	193.29	42.78	11.51	14.20	203.24	199.23	189.29	210.91	
21	327.36	300.05	237.33	193.59	45.82	13.82	14.19	204.79	182.22	190.94	211.35	
22	327.55	321.27	225.40	193.92	48.39	16.09	115.16	203.87	182.19	191.39	211.56	
23	327.94	318.19	235.17	194.47	51.48	17.86	188.77	204.29	182.16	191.41	212.10	251.90
24	328.61	321.60	241.68	195.12	54.95	15.64	189.44	204.91	181.54	191.47	212.26	
25	329.30	318.27	227.96	195.30	50.45	7.96	190.39	206.00	180.53	191.49		
26	329.80	313.44	239.27	195.83	36.04	8.64	191.56	204.97	180.75	193.18		
27	330.11	301.41	242.67	196.53	43.79	8.99	193.29	204.37	181.99	194.70		
28	329.97	285.11	246.77	196.84	48.84	9.38	192.32	204.60	181.70	196.47		
29	331.40	294.00	181.91	196.68		9.70	192.90	205.05	180.20	197.28		
30	327.17	297.28	203.96	188.87		10.20	194.61	207.41	180.79	197.54		
31	330.51		216.47	192.73		10.74		207.79		196.44		
Mean Day	328.3	322.5	265.6	185.8	133.7	46.7	64.0	202.7	198.7	188.9	204.9	251.9
Max Day	331.4	332.3	300.5	221.7	199.2	73.2	194.6	207.8	213.3	197.5	212.3	251.9
Min Day	325.2	285.1	181.9	138.0	36.0	8.0	11.2	193.8	180.2	182.1	195.9	251.9

7 Figures

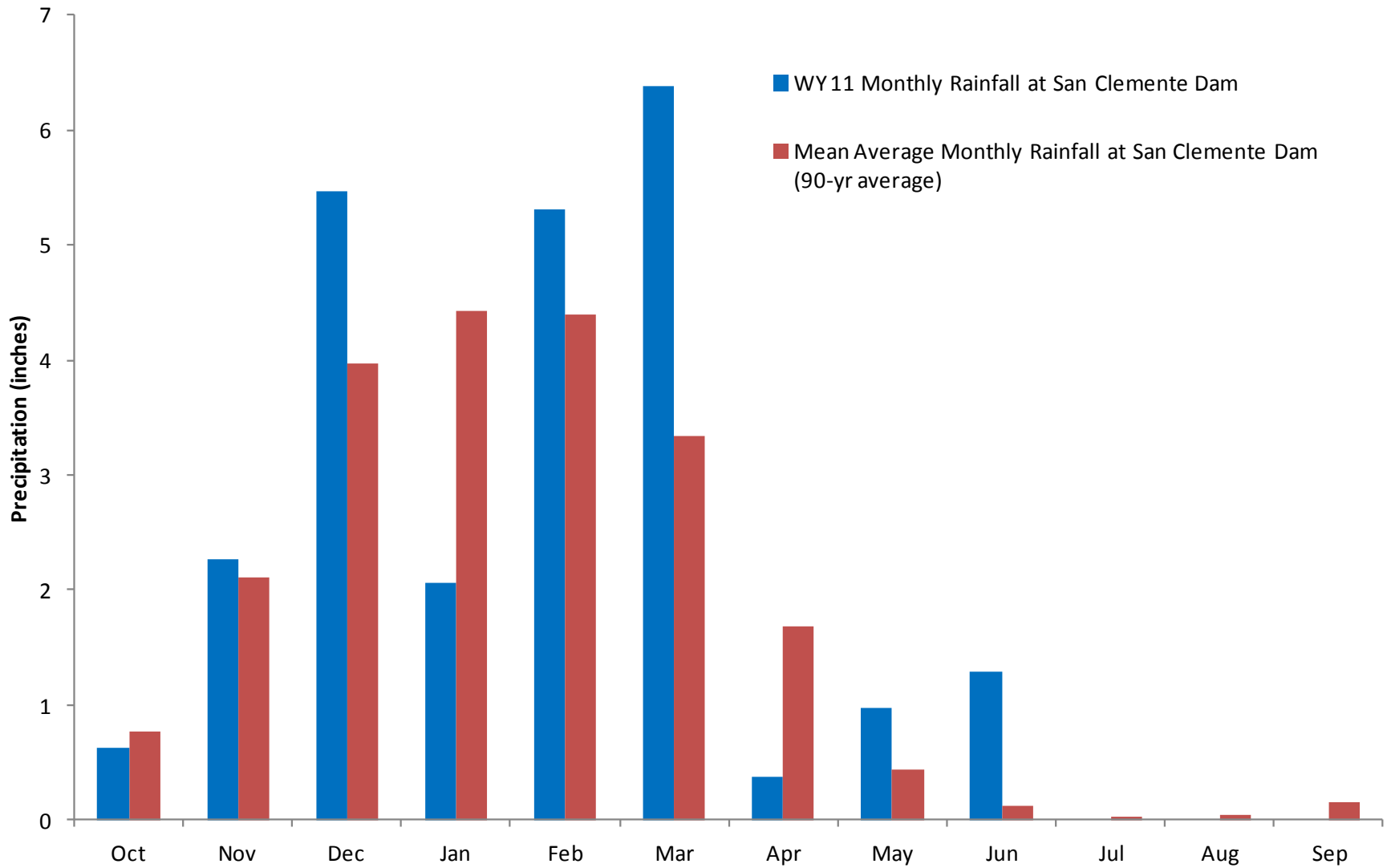


Figure 1. Monthly precipitation at San Clemente Dam for Water Year 2011. WY 2011 precipitation was above average. Total precipitation in WY 2011 at the dam was 24.73 inches compared to the average total precipitation at the dam, 21.47 inches. Mean monthly data is based on Water Years 1922 - 2011. Precipitation in December and March was well above average and contributed a large portion of the precipitation for WY 2011. Precipitation data are from the Monterey Peninsula Water Management District (2011).

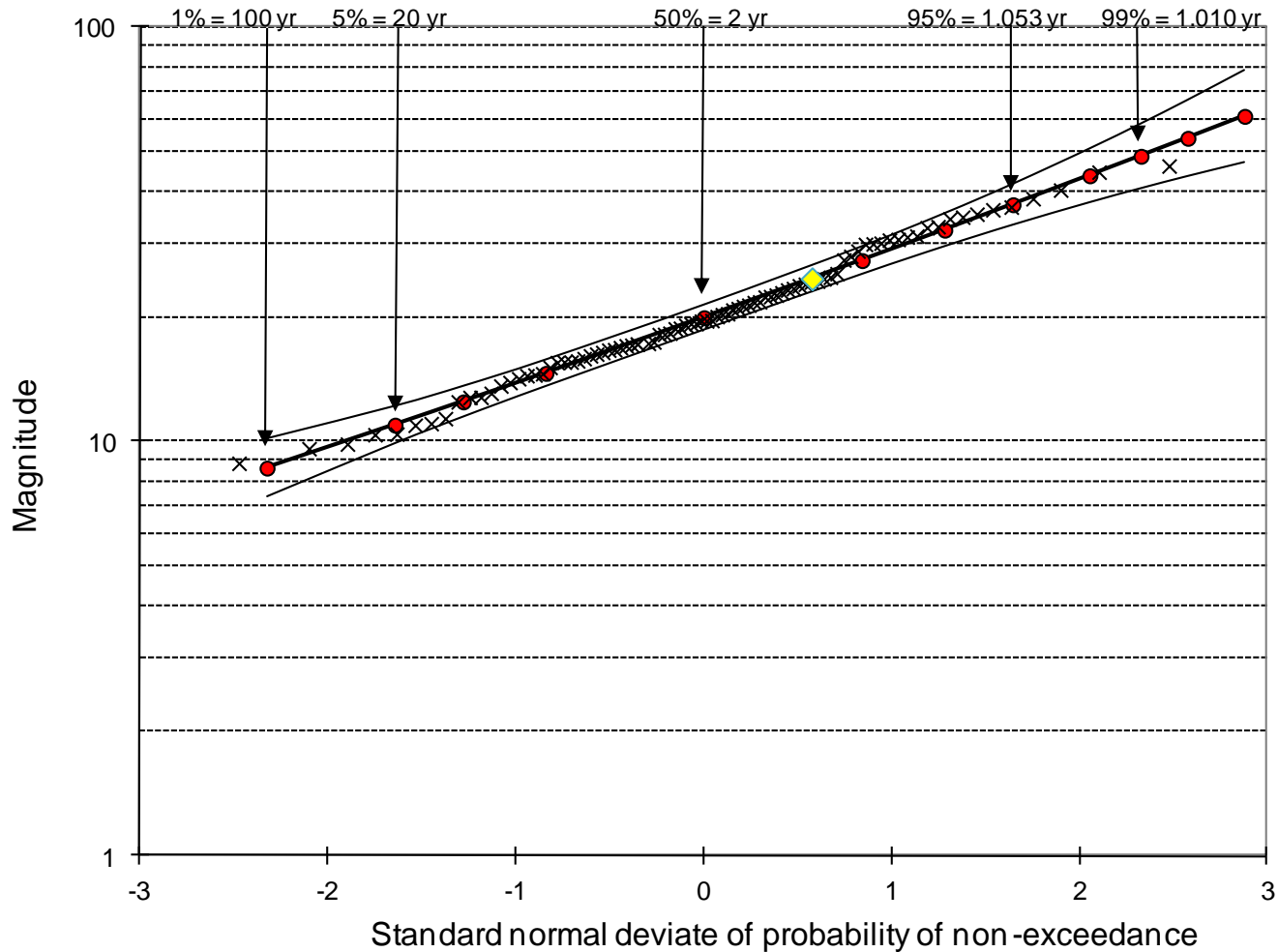


Figure 2. Log-Pearson Type-III statistical analysis of historic precipitation data from San Clemente Dam. Thin curved lines represent upper and lower 95% confidence bounds for precipitation and non-exceedance probability. The yellow diamond symbol marks the 24.73 inch precipitation of the 2011 water year. Rainfall at San Clemente Dam should be less than 24.73 inches once every 1.39 years on average.

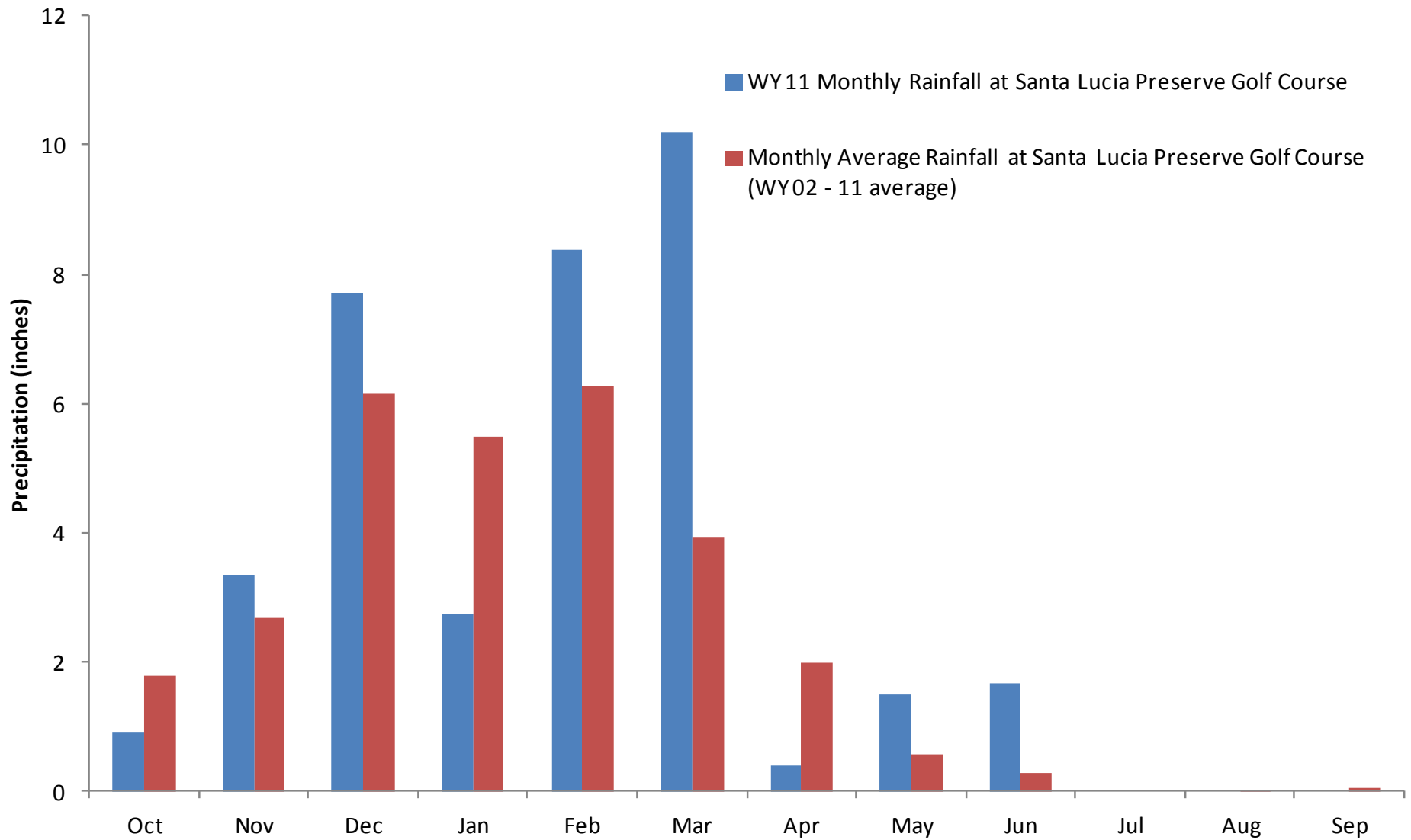


Figure 3. Monthly Precipitation at Santa Lucia Preserve Golf course for Water Year 2011. WY 2011 precipitation was above average at the golf course. Precipitation was 36.83 inches in Water Year 2011 compared to the 10 year annual average of 29.16 inches. Mean monthly average is based only on Water Years 2001 - 2011 and is probably not an accurate characterization of actual long-term patterns (precipitation data from Santa Lucia Preserve, 2011).

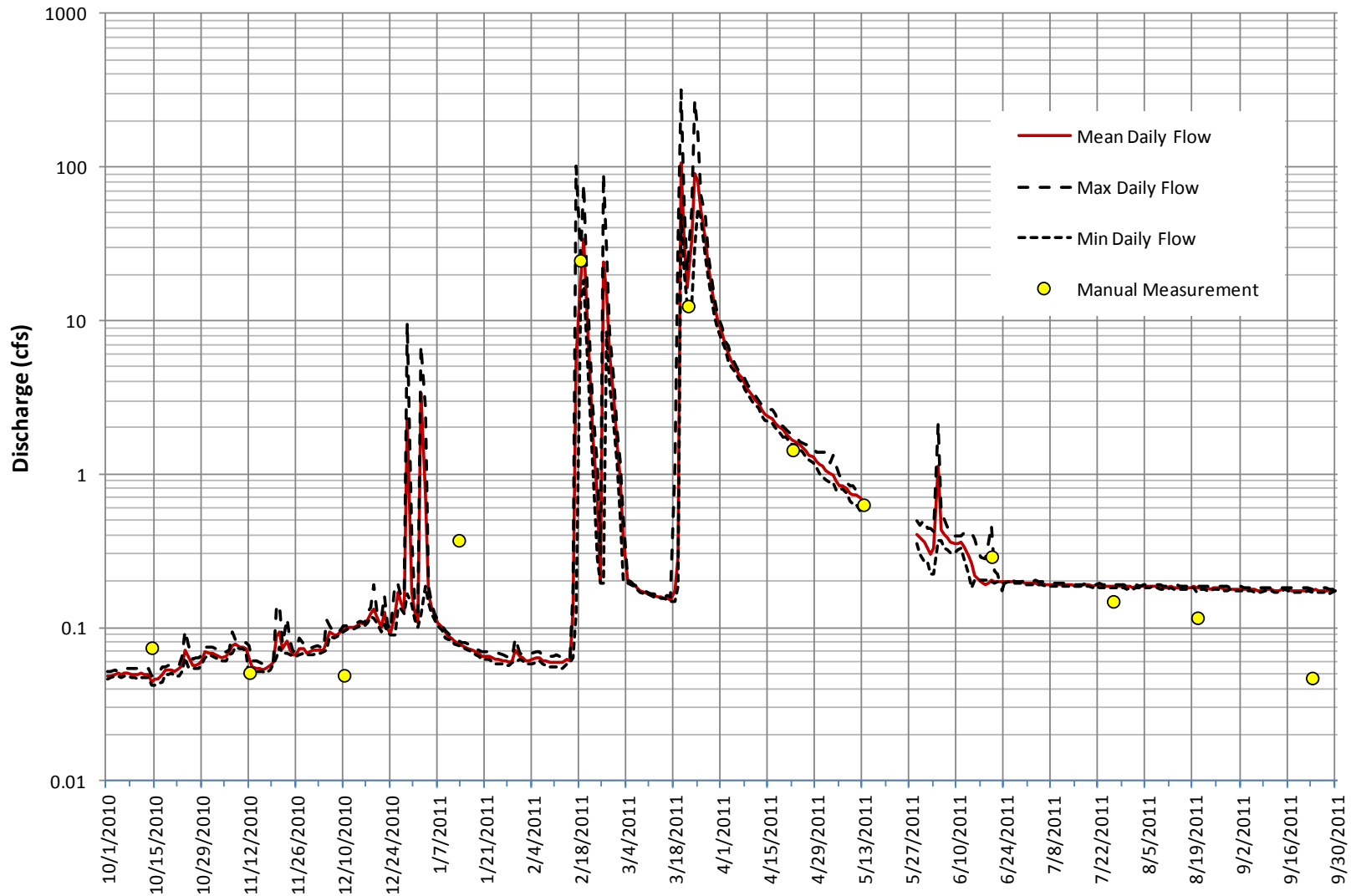


Figure 4. Mean Daily Streamflow at Potrero Creek gage for Water Year 2011. Red line is mean daily streamflow. Minimum and maximum daily flows are also shown. Yellow points represent manual discharge measurements.

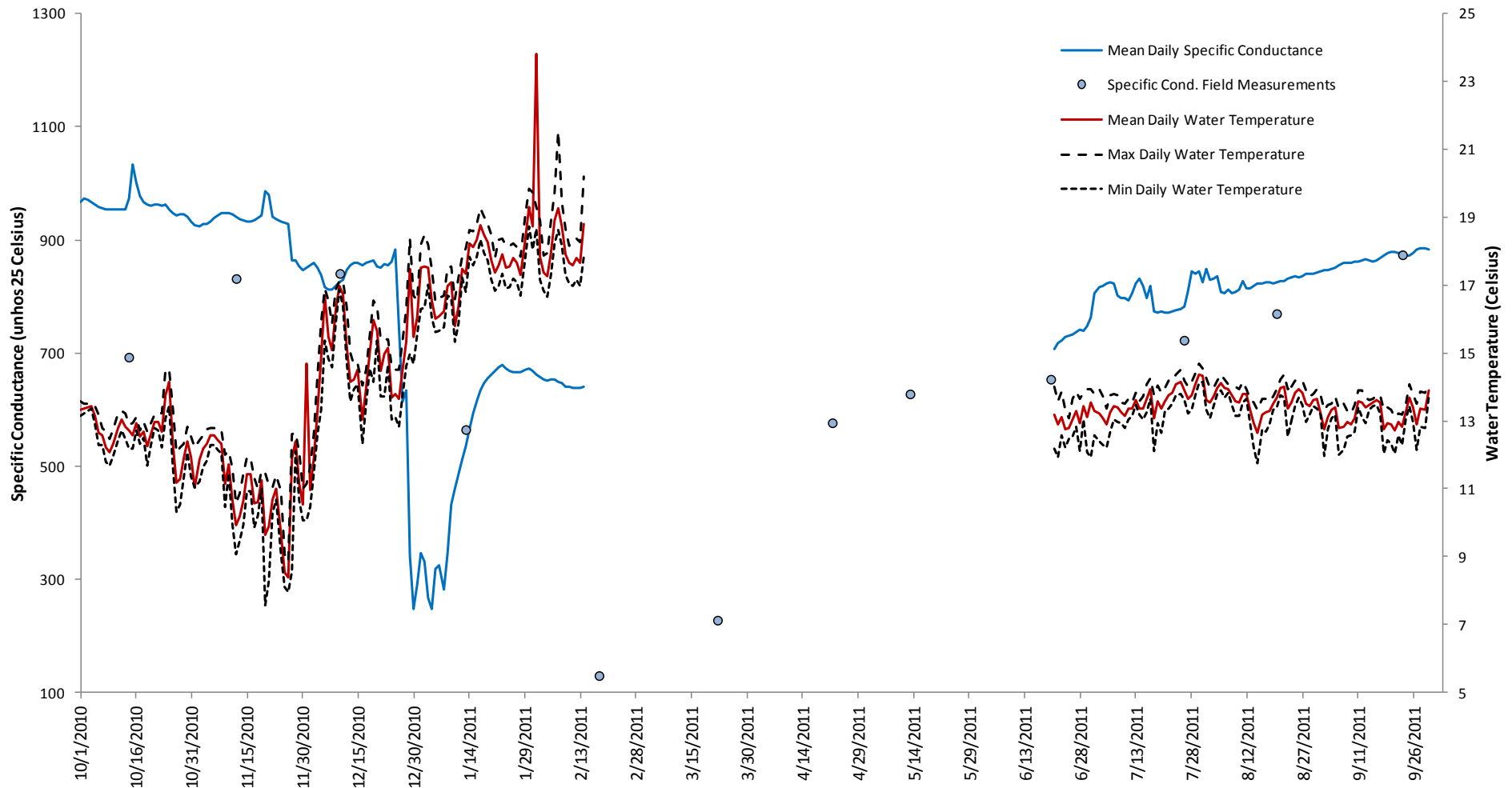


Figure 5. Daily Specific Conductance Water Temperature data at Potrero Creek gage for Water Year 2011.

Blue line is mean daily specific conductance; red line is mean daily water temperature; dotted lines represent minimum and maximum daily water temperature values.

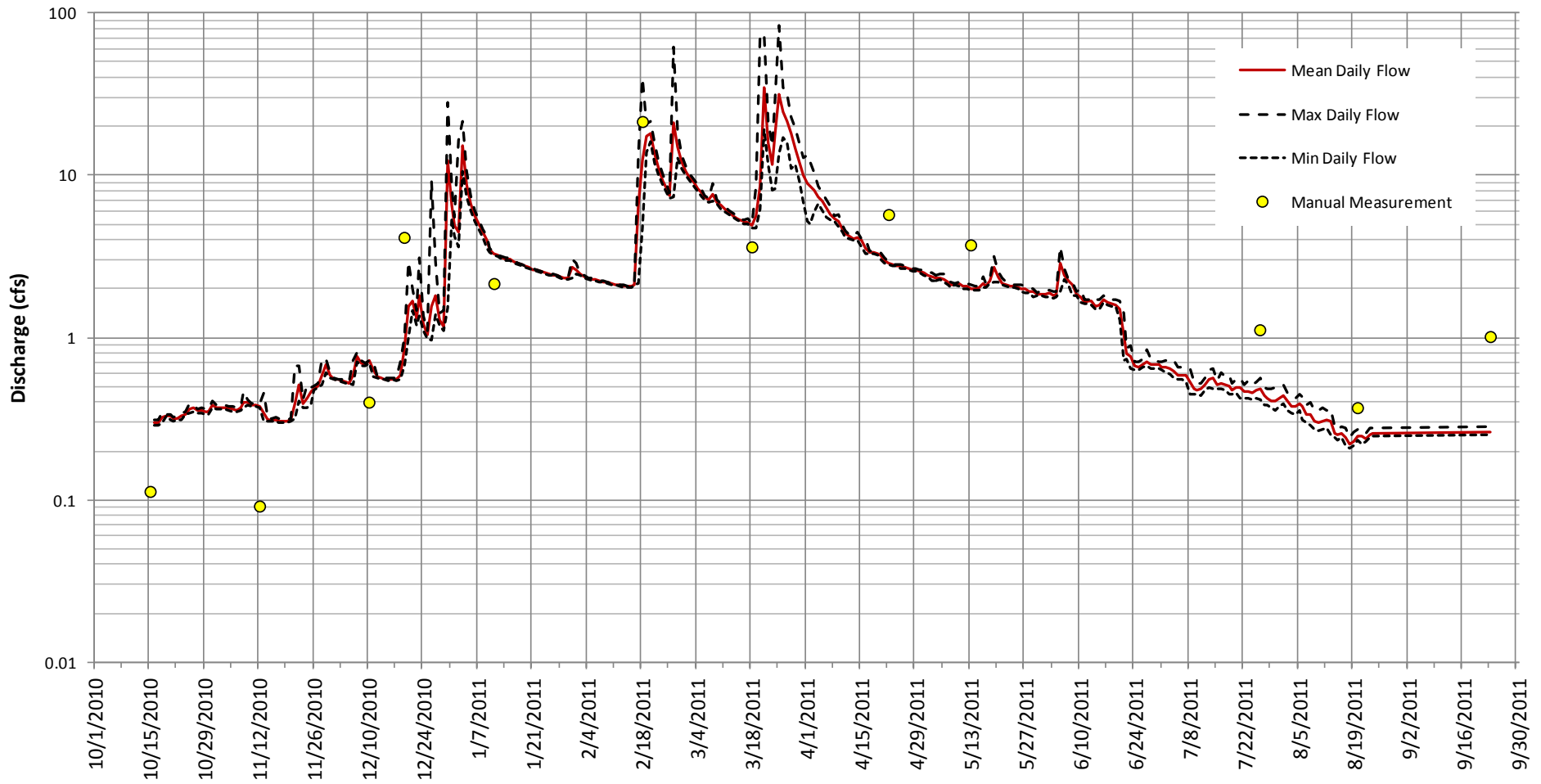


Figure 6. Mean Daily Streamflow at San Clemente Creek gage for Water Year 2011. Red line is mean daily streamflow. Minimum and maximum daily flows are also shown. Yellow points represent manual discharge measurements.

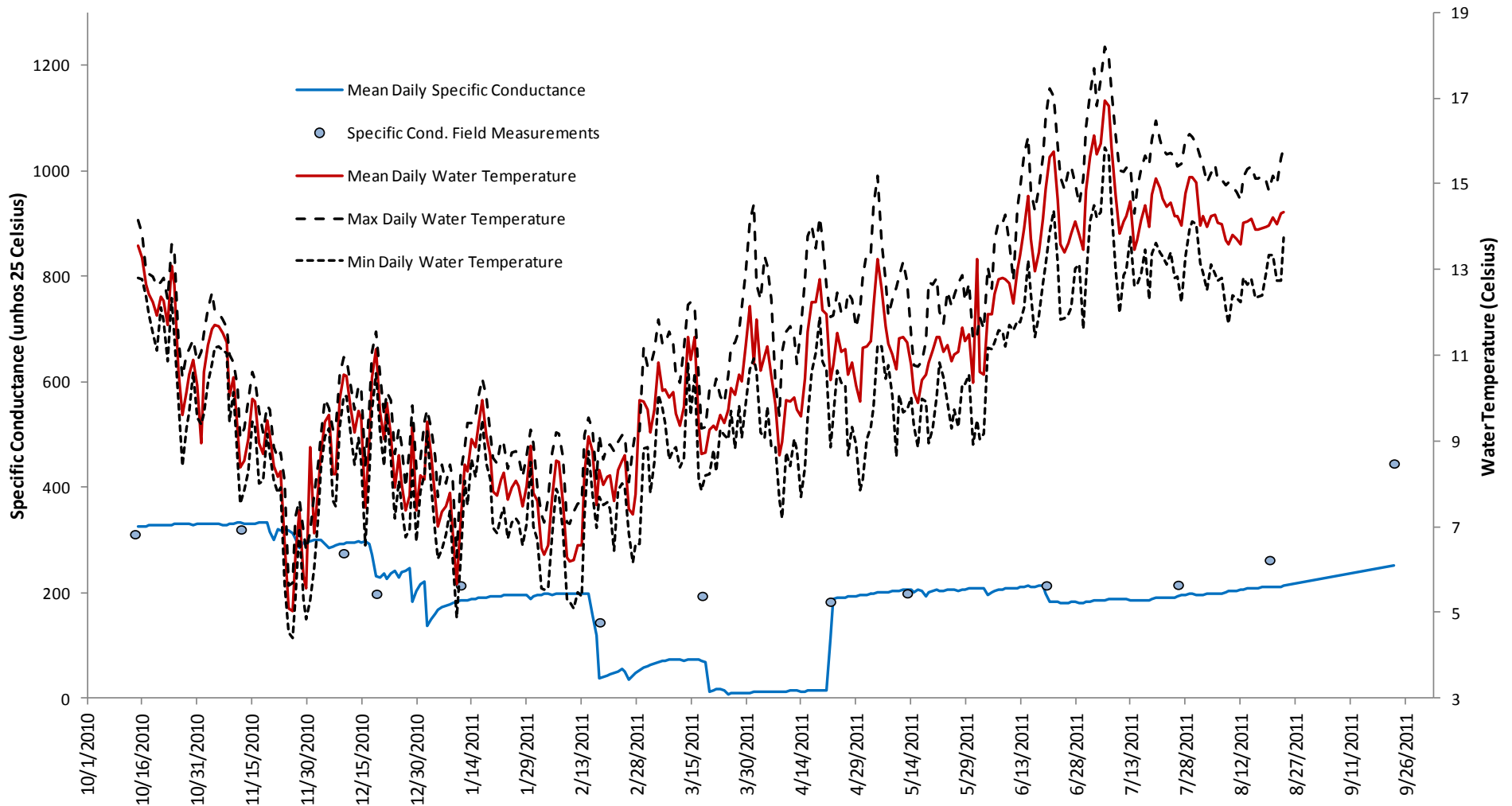


Figure 7. Daily Specific Conductance and Water Temperature data at San Clemente Creek gage for Water Year 2011. Blue line is mean daily specific conductance; red line is mean daily water temperature; dotted lines represent minimum and maximum daily water temperature values.