9.0 SANTA CLARA RIVER WATERSHED MANAGEMENT AREA

9.1 Watershed Description

9.1.1 Watershed Land Use, Percent Impervious, and Population

The Santa Clara River Watershed Management Area is dominated by vacant land which comprises 88% of the total land use (SCAG 2000). Only small portions of agriculture (4%) and urban land (6%) exist (Figure 9-1). Much of the residential area (3%) is located near the City of Santa Clarita in the center of the watershed as shown on the land use map for Santa Clara River Watershed Management Area (Figure 9-2). Recently, the watershed has been under rapid development and the current land use percentages are likely to have changed since the 2000 survey represented on Figure 9-1. The Santa Clara River Watershed Management Area is the least developed and urbanized of the watershed management areas in Los Angeles County.

The percentage of impervious area of the Santa Clara River Watershed is estimated to be 7% based on assumptions on impervious areas in each land use type. This is the lowest ratio of impervious land area in the six Watershed Management Areas of Los Angeles County.

The population in the Santa Clara River Watershed is concentrated near the City of Santa Clarita above the mass emission station. Other population centers are along the Santa Clara River, which is located lower in the watershed (Figure 9-3). This watershed is the least populated of the six watersheds in Los Angeles County.

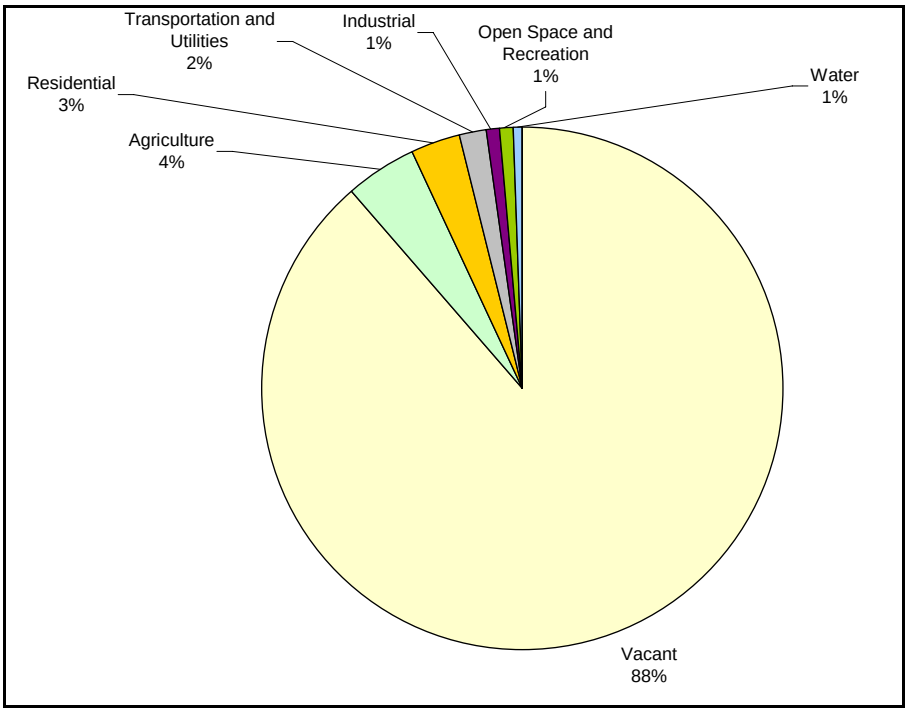
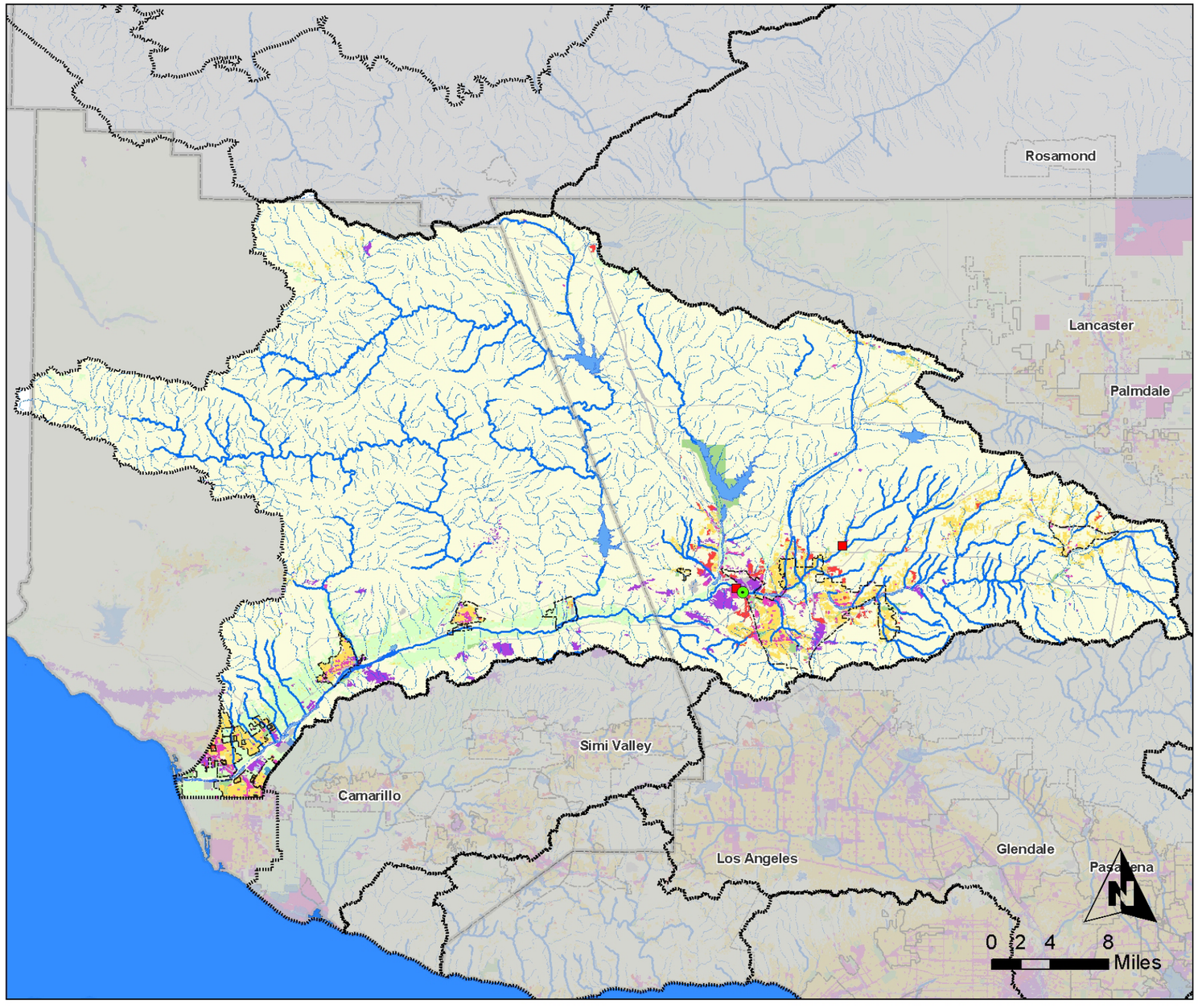
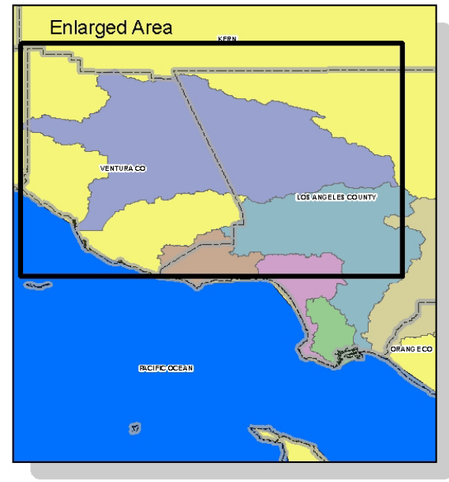


Figure 9-1. Land Use Percentages in the Santa Clara River Watershed Management Area.





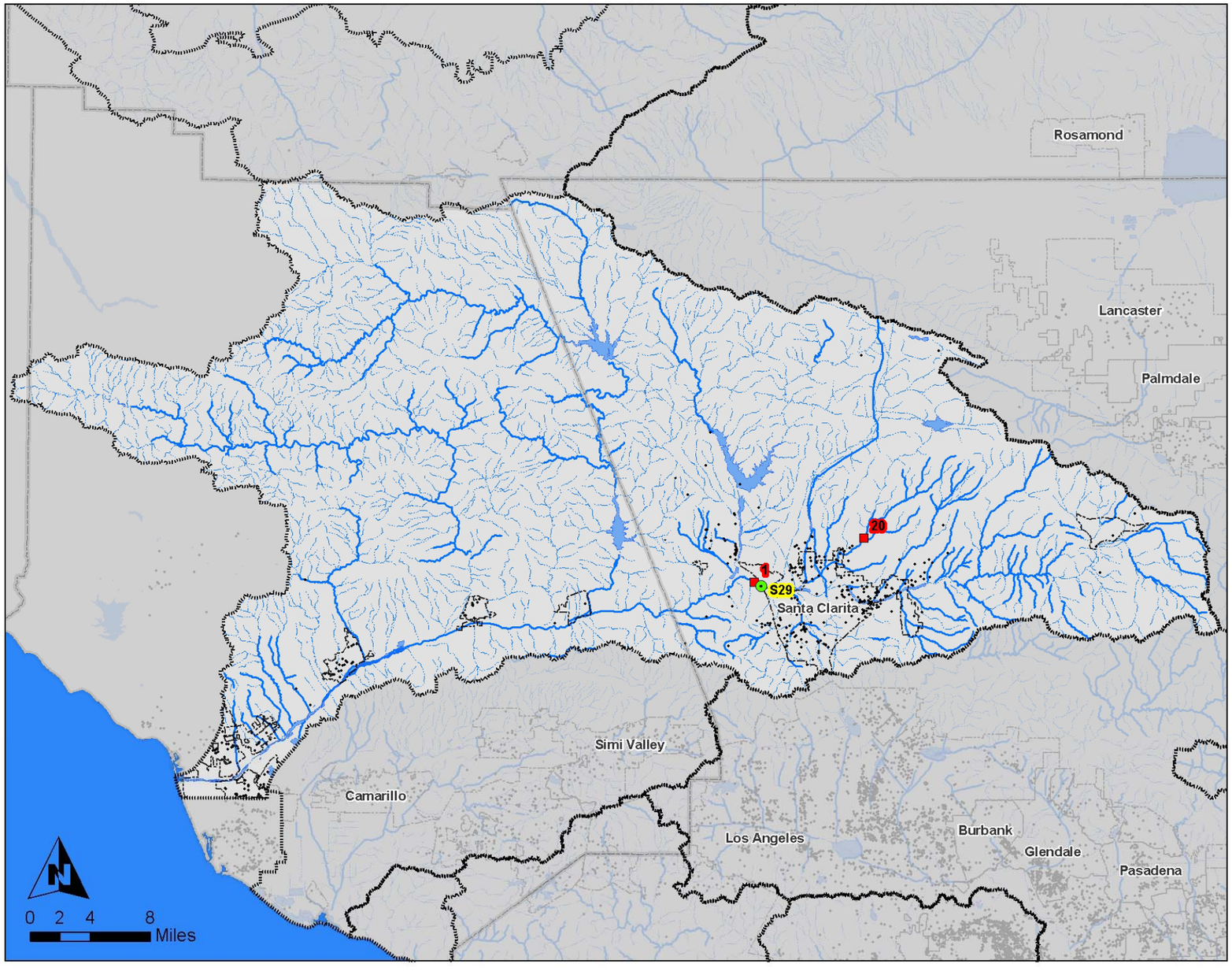
Land Use

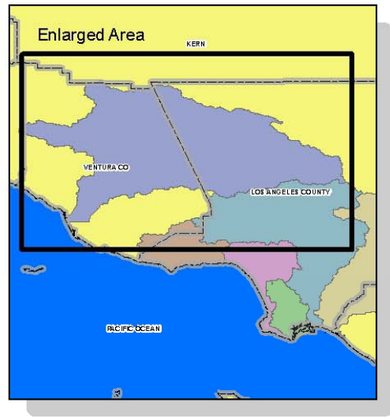
Santa Clara River Watershed Manangement Area

Legend
- Mass Emission Station
- Bioassessment Stations
- City Boundaries
- County Boundaries
- WMA Boundaries

Land Use (SCAG 2000)
- Residential
- Commercial and Public
- Industrial
- Mixed Use
- Transportation and Utilities
- Vacant
- Agriculture
- Open Space and Recreation
- Water

Figure 9-2. Land Use Distribution in the Santa Clara River WMA.





Population Density

Santa Clara River Watershed Manangement Area

Legend

- Population (Census 2000, 1 Dot = 500)
- Mass Emission Station
- Bioassessment Stations
- City Boundaries
- County Boundaries
- WMA Boundaries

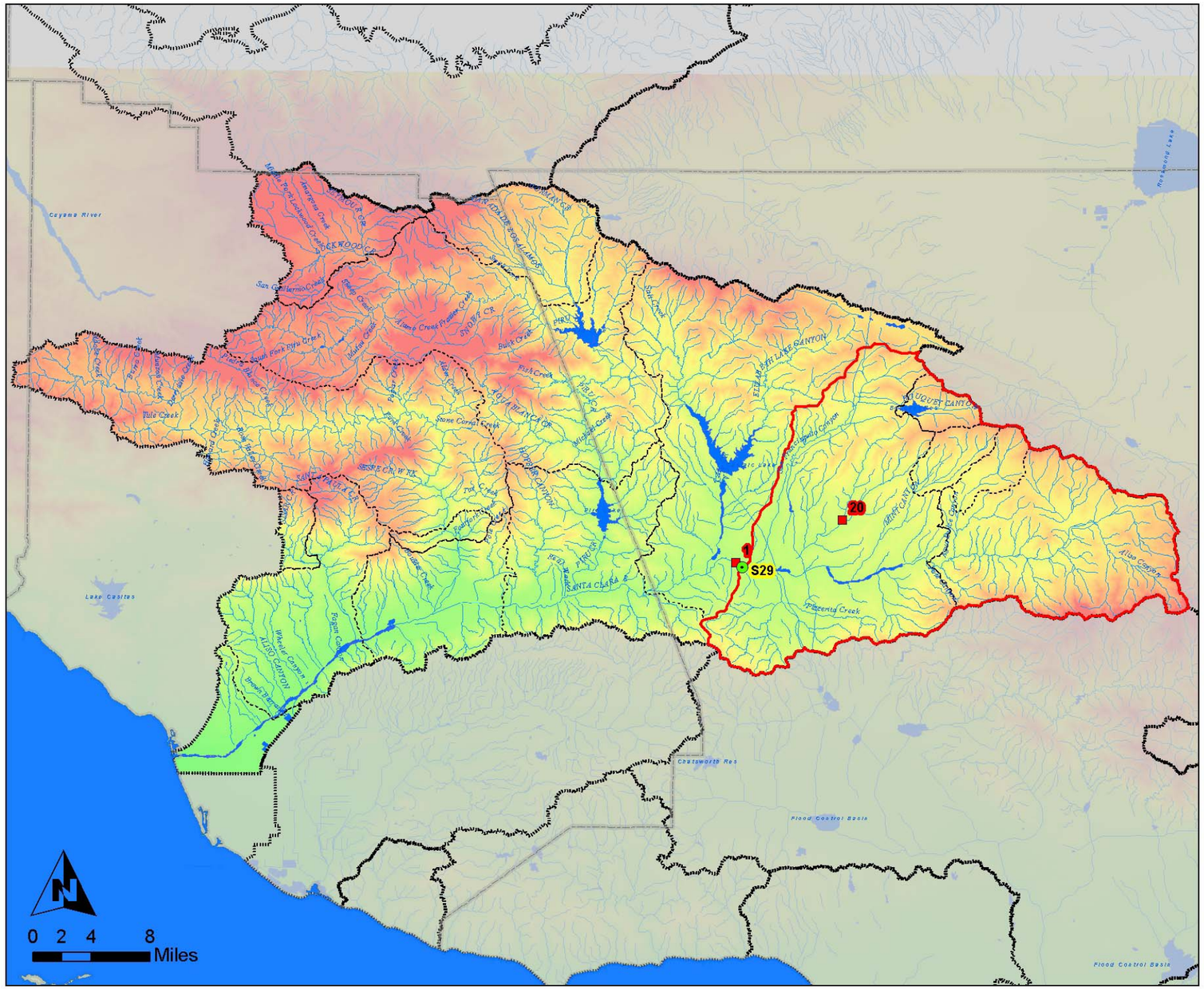
Figure 9-3. Population Density in the Santa Clara River WMA.

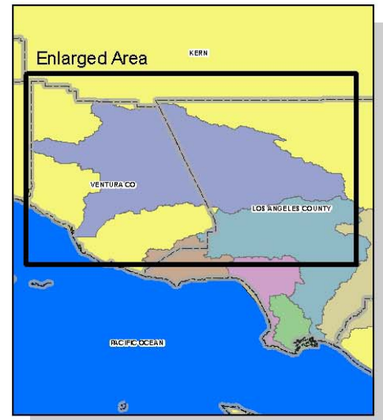
9.1.2 Hydrology and Monitoring Stations

The Santa Clara River originates in the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean halfway between the cities of Santa Buenaventura and Oxnard. The Upper Santa Clara River lies within Los Angeles County and consists of approximately 680 square miles. Extensive patches of high quality riparian habitat are present along the length of the river and its tributaries.

The upper part of the Santa Clara River flow by mass emission station S29 downstream from the City of Santa Clarita (Figure 9-4). One bioassessment site is at the same general location as the mass emission site while a second one is higher in the watershed on Vasquez Canyon Creek.

Figure 9-5 presents the rainfall amounts in the Santa Clara River Watershed Management Area and the monitored storms for the 2004-2005 sampling period. The first event of the season on October 17, 2004 was also the first mass emission monitored event. This storm continued for four days. Other monitored storms and rainfall amounts are shown on Figure 9-5. The December 5, 2004 storm event measured 0.3" of rainfall and was one of the smaller storms of the season. The wettest period of the season occurred over a 16 day stretch in late December and early January and included the January 7, 2005 monitored event which had over an inch and a half of rainfall.





Hydrology

Santa Clara River Watershed Manangement Area

Legend

- Mass Emission Station
- Bioassessment Sites
- Drainage Area of Core Monitoring Program
- County Boundaries
- WMA Boundaries
- Hydrologic SubUnit

Elevation (ft)

11,500'

0'

Figure 9-4. Watershed Hydrology and Monitoring Stations in the Santa Clara River WMA.

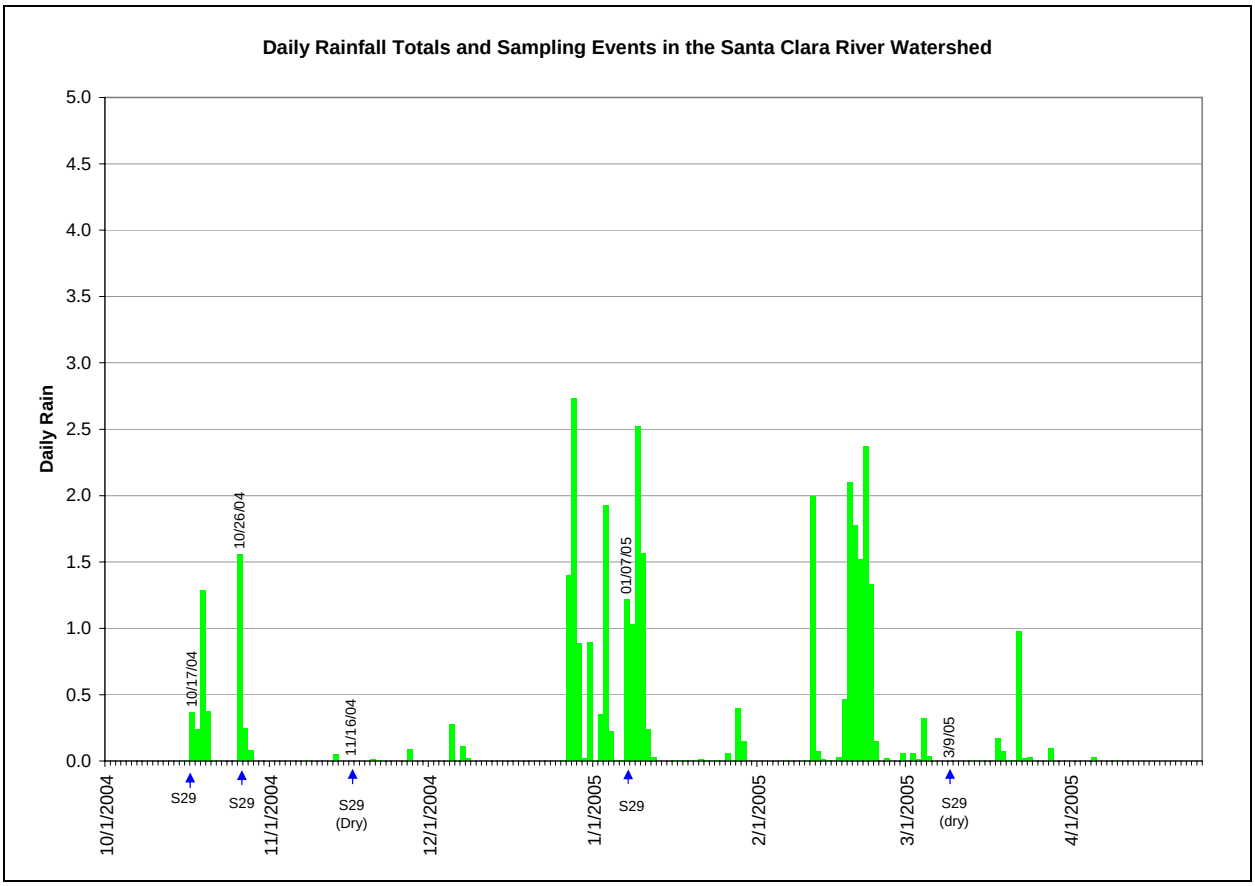
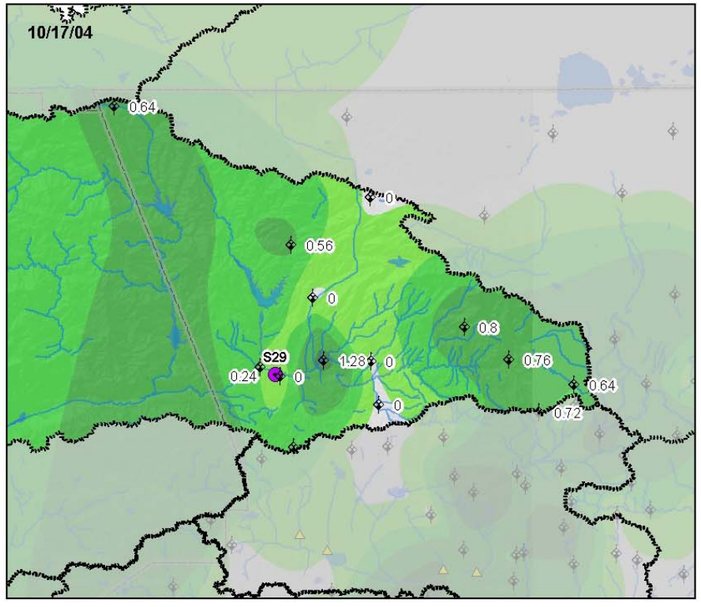
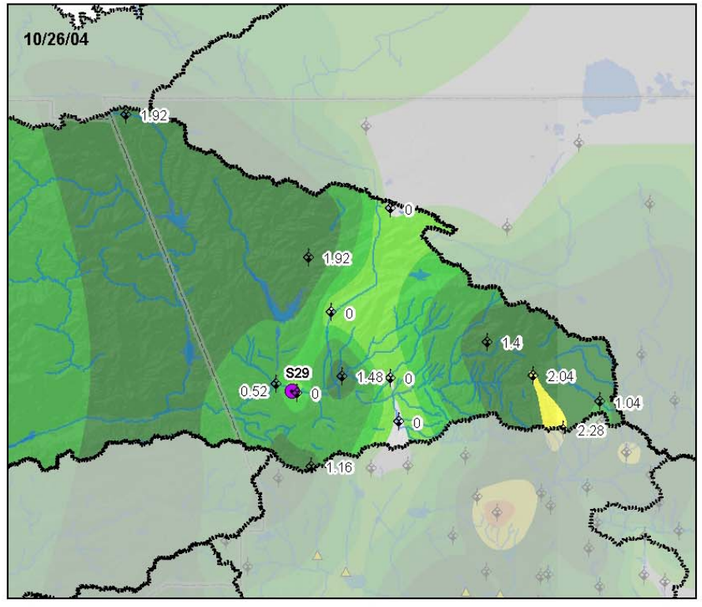


Figure 9-5. Daily Rainfall and Sampling Events in the Santa Clara River Watershed (2004-2005).

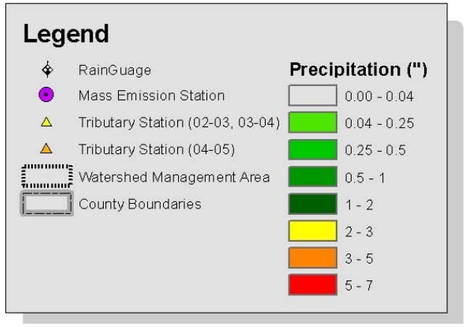
Figure 9-6 presents the distribution of rainfall across the eastern part of the watershed for the 2004-2005 monitoring period.

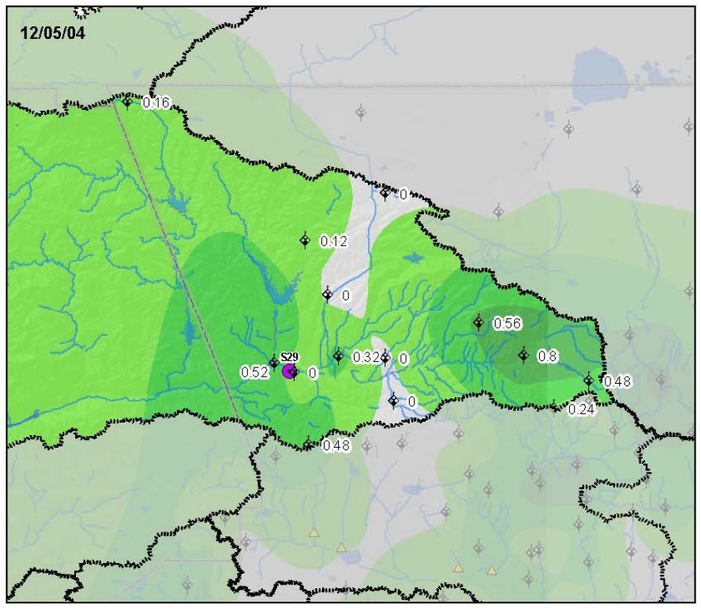




Rain

Santa Clara River Watershed Manangement Area





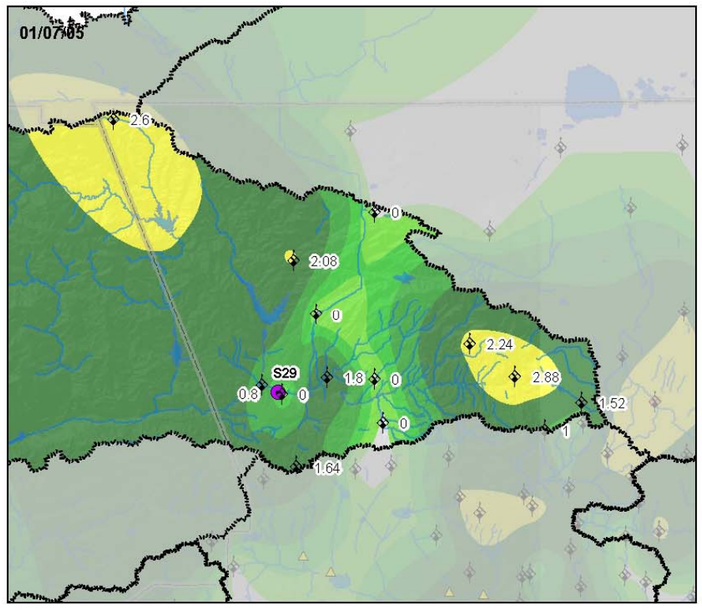


Figure 9-6. Distribution of Rainfall in Santa Clara River Watershed for Monitored Storms.

9.2 Flow Monitoring

Figure 9-7 shows a historical flow volume record of monitored storms at the Santa Clara River Watershed mass emission station. Monitored flow (green bars) represents the amount of storm flow that is represented in the mass emission station composite sampling. Total flow (blue bars) represents the total amount of storm flow over the entire storm event. A log scale was used for Figure 9-7 due to the highly variable flow volume.

Note: Verified flow data for the 2004/05 storm season has not yet been provided by LADPW.

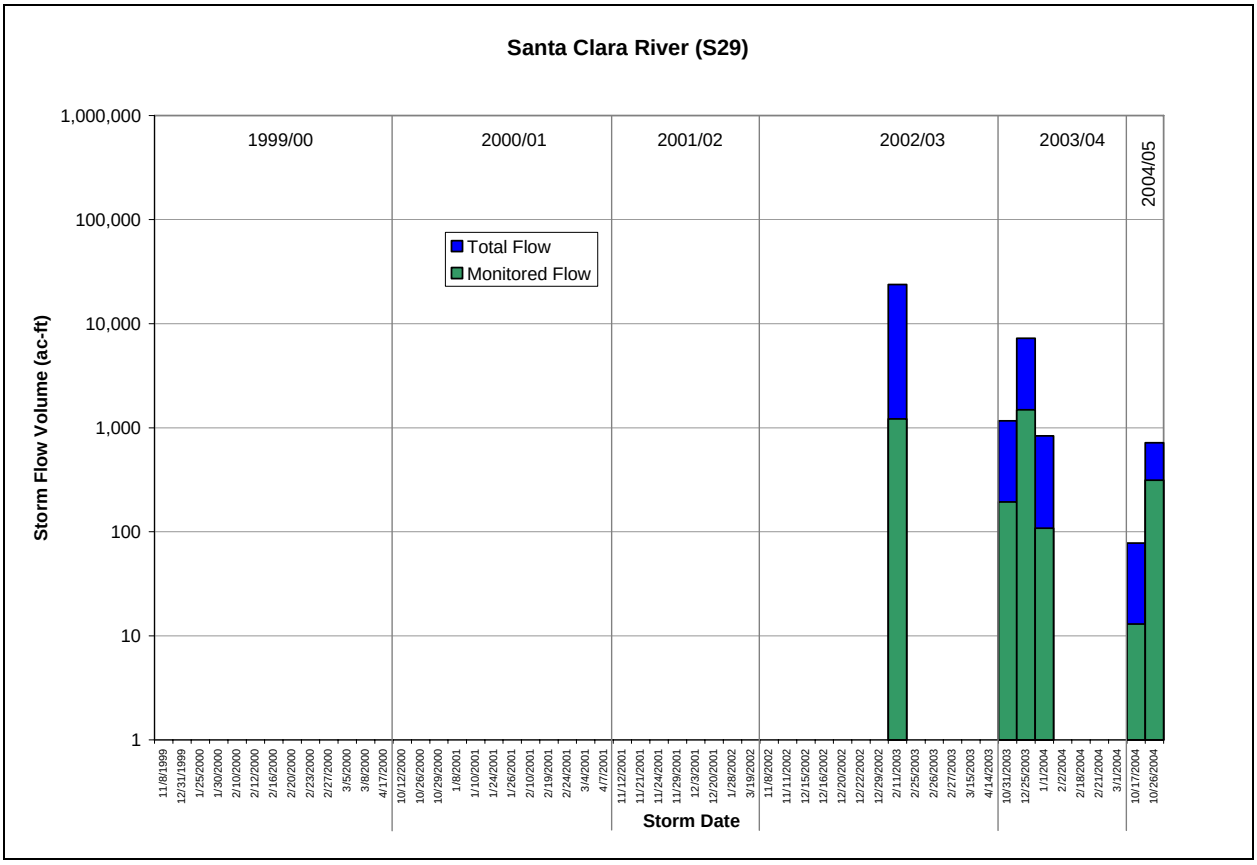


Figure 9-7. Monitored Storm Flow Volumes on Santa Clara River.

9.3 Stormwater Monitoring Summary

9.3.1 Mass Emissions

Three wet weather events were monitored at the Santa Clara River watershed mass emission station. Sampling occurred during storms on October 17 and 26 and January 7, 2005. The mass emission station was also monitored during two dry weather events on November 16, 2004 and March 9, 2005. The results from these sampling events are discussed in Section 9.3.1.1 and presented in Appendix C, Table 7. Highlighted cells in Table 7 represent concentrations

exceeding respective water quality objectives. This discussion presents the results based on groups of constituents (general chemistry, nutrients, bacterial indicators, metals, semi-volatiles and PCBs, and pesticides and herbicides). Wet weather data for each group of constituents are reviewed and presented first, followed by a brief comparison of the dry weather results. Section 9.3.1.2 presents a summary of the historical data collected at these stations and an assessment of the trend analyses performed on the water quality data. Section 9.3.1.3 lists the constituents of concern.

9.3.1.1 2004-2005 Results

General water chemistry results for the three stormwater samples were typically below water quality objectives and similar to water quality results in the other watersheds. For the constituents that had WQOs, only concentrations of chloride and cyanide exceeded water quality objectives (Appendix C, Table 7). Chloride exceeded objectives during the first storm event and one dry weather event. Cyanide exceeded the Ocean Plan WQO during the first storm event on October 17, 2004. Oil and grease and total phenols were not detected in any of the samples collected during the 2004-2005 season and TPH was only detected in one storm sample. Major ions that constitute TDS were detected in all samples, with the exception of carbonate which was never detected. Wet season hardness ranged from 90-428 mg/L. Total organic carbon and biological oxygen demand were highest during the first storm sampled, on October 17, 2004. Turbidity was highest during the last storm event with a value of 193 NTU.

All nutrients except ammonia and nitrite were detected during all storm and dry weather events. Nitrite was only detected during one storm event while ammonia was detected during two storm events and one dry weather event. Only nitrite-N has an established WQO, but this value was not exceeded. Nutrient levels during the October 26, 2004 storm were typically the highest that were measured during the 2004-2005 season.

Indicator bacteria densities consistently exceeded WQOs at the Santa Clara River mass emission site. Total coliform, fecal coliform and enterococcus densities exceeded objectives during all storm events monitored during the 2004-2005 season. Fecal streptococcus densities were identical to enterococcus densities, as expected due to the similar bacterial species that comprise both groups. Samples from the first storm (October 17, 2004) contained the highest densities of indicator bacteria. Peak bacteria densities on October 17 coincided with peak total organic carbon and biological oxygen demand values, which provided optimal growth conditions for the bacteria. Fecal enterococcus was the only indicator that exceeded objectives during both dry weather events and fecal coliform densities exceeded criteria during one dry weather event.

Aluminum, copper, and lead were the only metals to exceed CTR criteria. Total aluminum and total lead exceeded WQO in two out of three storms and total copper concentrations were above WQO during all storm events. Dissolved copper exceeded the criterion in two samples while dissolved lead exceeded during one storm event. Total copper was the only metal that exceeded objectives during both dry weather events. Total aluminum and total lead exceeded criteria during one dry weather event. Total and dissolved beryllium, hexavalent chromium, mercury, and thallium were not detected any of the wet or dry weather samples collected.

None of the semi-volatile organics, PCBs or herbicides were detected in any of the samples collected during the 2004-2005 monitoring season. Diazinon was the only pesticide to be

measured above detection limits. Concentrations of diazinon exceeded Basin Plan WQO during the first storm of the season with a value of 0.41. Diazinon was detected during the second storm event but concentrations were below water quality objectives.

9.3.1.2 Historical Review

Table 9-1 presents annual means for the constituents that were monitored from 1995 to 2005 with the appropriate water quality objectives. Each observation was compared to the lowest applicable WQO from the Basin Plan, Ocean Plan, or the California Toxic Rule and those above the WQO were highlighted. Water quality objectives for metals are hardness dependent. Metal concentrations were determined using a mean hardness value; however, individual events show specific hardness for that particular event. Therefore, results for individual events may show different results that may be less than water quality objectives. Individual events for each year are presented in the annual reports.

The yellow-highlighted cells in Table 9-1 indicate that a constituent's detection limit is greater than the WQO. For statistical analyses, one-half the detection limit is used in place of a non-detect result. Therefore, annual means generated from values highlighted in yellow may be misrepresentative of actual concentrations. For example, Table 9-1 suggests that total mercury and total thallium have consistently exceeded WQOs. However, out of all the individual samples collected during the past 3 years of monitoring, total mercury and thallium have never been detected. The detection limits were also greater than the Ocean Plan criteria, and therefore actual concentrations could not be determined. Furthermore, the Ocean Plan was developed for the protection of marine resources. It applies specifically to discharges to the ocean and not to discharges to enclosed bays, estuaries or inland waters. The Ocean Plan criteria were intended for ocean water samples representative of the discharge area after initial dilution has been completed (SWRCB 2001). Therefore, applying the Ocean Plan criteria to stormwater samples collected upstream of the Santa Clara River mouth and interpreting these results should be done with caution. Concentrations for these constituents were not considered as exceedances.

Table 9-1 also presents frequency and mean magnitude of exceedance ratios for each constituent. The frequency ratio was determined by dividing the total number of years a constituent was analyzed into the number of times the mean value of a constituent exceeded the WQO. The mean magnitude of exceedance was determined by dividing the WQO for a constituent into the constituents mean value for each year, then calculating the average magnitude of exceedance. A frequency ratio greater than 0.5 (50%) and a mean exceedance ratio greater than 1.0 were used as the criteria for determining whether a given parameter should be considered as a COC.

Blue highlighted cells in Table 9-1 represent exceedances of water quality objectives; yellow cells represent constituents in which the detection limits were above water quality objectives and were not considered exceedances; orange cells represent a frequency ratio greater than 0.5 (50% exceedance) and a mean exceedance ratio greater than 1.0.

Table 9-1. Annual Mean Concentration for Constituents Measured at the Santa Clara River Mass Emission Site, 2002 to 2005.

Constituent	Units	Lowest WQO[1]	2002-03	2003-04	2004-05	Frequency Ratio	Mean Exceedance Ratio[2]
General							
Alkalinity	mg/l		101.42	185	149	0.0	
Bicarbonate	mg/l				221	0.0	
BOD	mg/l		19.66	12.168	10.35	0.0	
Calcium	mg/l				75.03	0.0	
Carbonate	mg/l				1.00	0.0	
Chloride	mg/l	100	53.4	86.3	70.0	0.0	0.7
COD	mg/l		48.0	52.6	26.5	0.0	
Cyanide	mg/l	0.004	0.01	0.01	0.01	1.0	1.5
Dissolved Oxygen	mg/l	<5	7.20	8.24	9.02	0.0	0.6
Fluoride	mg/l	2.4	0.27	0.36	0.3	0.0	0.1
Hardness	mg/l		184.57	272	284.5	0.0	
Magnesium	mg/l				23.58	0.0	
MBAS	mg/l		0.05	0.06	0.04	0.0	
Oil and Grease	mg/l		2.47	2.22	2.50	0.0	
pH		6.5/8.5	7.68	7.68	7.43	0.0	
Potassium	mg/l				5.96	0.0	
Sodium	mg/l				59.3	0.0	
Specific Conductance	umhos/cm		658	880	797	0.0	
Sulfate	mg/l	300	82	142	172	0.0	0.4
Total Dissolved Solids	mg/l	1500	428	545	497	0.0	0.3
Total Organic Carbon	mg/l		9.44	11.24	9.82	0.0	
Total Phenols	mg/l		0.05	0.05	0.05	0.0	
Total Suspended Solids	mg/l		239	1139	2532	0.0	
TPH	mg/l		0.63	0.63	0.33	0.0	
Turbidity	ntu	225	108	242	93	0.3	0.7
Volatile Suspended Solids	mg/l		15.7	110.6	210.5	0.0	
Nutrients							
Ammonia	mg/l				0.17	0.0	
Dissolved Phosphorus	mg/l		0.23	0.31	0.18	0.0	
Kjeldahl-N	mg/l		1.28	3.07	2.08	0.0	
NH3-N	mg/l		0.27	0.07	0.14	0.0	
Nitrate	mg/l		4.32	4.76	4.62	0.0	
Nitrate-N	mg/l	10	0.97	1.12	1.04	0.0	0.1
Nitrite-N	mg/l	1	0.22	0.47	0.14	0.0	0.3
Total Phosphorus	mg/l		0.29	0.46	0.42	0.0	
Indicator Bacteria							
Fecal Coliform	mpn/100ml	400	62,695	36,104	139,005	1.0	198.2
Enterococcus	mpn/100ml	104	64,540	52,068	152,575	1.0	862.8
Fecal Streptococcus	mpn/100ml		105,088	117,068	152,575	0.0	
Total Coliform	mpn/100ml	10,000	183,083	138,026	276,250	1.0	19.9
Metals							
Dissolved Aluminum	ug/l		77	318	958	0.0	
Dissolved Antimony	ug/l		1.53	1.79	1.65	0.0	
Dissolved Arsenic	ug/l		2.10	2.06	1.51	0.0	
Dissolved Barium	ug/l				74.3	0.0	
Dissolved Berylium	ug/l		0.5	0.5	0.5	0.0	
Dissolved Boron	ug/l				467	0.0	
Dissolved Cadmium	ug/l	3.5-4.8	0.5	0.5	0.56	0.0	0.1
Dissolved Chromium	ug/l	108-154	2.17	3.73	1.25	0.0	0.0
Dissolved Chromium +6	ug/l		5	5	5	0.0	
Dissolved Copper	ug/l	15.1-21.9	5.42	5.99	11.90	0.0	0.4
Dissolved Iron	ug/l		206	564	946	0.0	
Dissolved Lead	ug/l	4.9-7.7	2.22	2.41	5.00	0.0	0.5
Dissolved Manganese	ug/l				165.5	0.0	
Dissolved Mercury	ug/l		0.5	0.5	0.5	0.0	
Dissolved Nickel	ug/l	87.4-126.1	7.33	10.49	10.86	0.0	0.1
Dissolved Selenium	ug/l		2.26	2.40	2.87	0.0	
Dissolved Silver	ug/l		0.5	0.5	0.5	0.0	

Table 9-1. Annual Mean Concentration for Constituents Measured at the Santa Clara River Mass Emission Site, 2002 to 2005.

Constituent	Units	Lowest WQO[1]	2002-03	2003-04	2004-05	Frequency Ratio	Mean Exceedance Ratio[2]
Dissolved Thallium	ug/l		2.5	2.5	2.5	0.0	
Dissolved Zinc	ug/l	197-284.2	29.54	18.05	19.23	0.0	0.1
Total Aluminum	ug/l	1000	711.5	2035	7623	0.7	3.5
Total Antimony	ug/l	6	1.65	2.14	1.31	0.0	0.3
Total Arsenic	ug/l	32	2.23	2.60	3.01	0.0	0.1
Total Barium	ug/l				141.6	0.0	
Total Beryllium	ug/l	4	0.5	0.5	0.5	0.0	0.1
Total Boron	ug/l				817	0.0	
Total Cadmium	ug/l	4-5.6	0.48	0.53	0.81	0.0	0.1
Total Chromium	ug/l	50	8.08	9.45	9.88	0.0	0.2
Total Chromium +6	ug/l		5	5	5	0.0	
Total Copper	ug/l	15.7-22.8	13.1	22.7	19.4	0.3	0.9
Total Iron	ug/l		1071	3771	15868	0.0	
Total Lead	ug/l	6.9-12	3.97	10.10	13.64	0.3	0.9
Total Manganese	ug/l				296.13	0.0	
Total Mercury	ug/l	0.16	0.50	0.44	0.50	1.0	3.0
Total Nickel	ug/l	88-126	13.66	14.56	16.33	0.0	0.1
Total Selenium	ug/l	60	2.29	2.23	3.07	0.0	0.0
Total Silver	ug/l	2.8	0.5	0.5	0.4375	0.0	0.2
Total Thallium	ug/l	2	2.5	2.5	2.5	1.0	1.3
Total Zinc	ug/l	201-291	55.1	104.5	42.0	0.0	0.3
Pesticides							
Diazinon	ug/l	0.08	0.130	0.028	0.113	0.7	1.1
Prometryn	ug/l		1	1	1	0.0	

[1] WQO for metals are hardness dependent and were based on minimum hardness by year.
[2] Mean Exceedance Ratio calculated using annual mean concentrations reported up to four significant figures. Ratio shown may not exactly equal ratio of mean values shown in table due to rounding of presented means.
Blue = WQO Exceedances; Yellow = DL above WQO; Orange = Frequency ratio > 0.5, Mean exceedance > 1.0.

The results of the 2004-2005 monitoring season were similar to findings from previous years. Since the 2002-2003 monitoring season, cyanide and indicator bacteria have consistently exceeded WQOs. Annual means of cyanide and indicator bacteria exceeded water quality objectives all three years and total aluminum exceeded objectives in 2003-2004 and 2004-2005. The annual mean concentration of total copper and total lead each exceeded WQOs during one year. Diazinon exceeded water quality objectives in 2002-2003 and 2004-2005.

Regression analyses were performed on the water quality data collected since 1995-1996 to determine if any of the constituents had a significantly increasing or decreasing trend. In the Santa Clara River, the level of only one constituent has changed significantly over the monitoring period of three years for the mass emission station. Wet season TPH values have significantly decreased. The annual average for TPH for 2004-2005 is less than 0.4 mg/L (Figure 9-8). It should be noted that this trend is based on only three years of data and does not have the degree of confidence a trend with a greater number of data points would have. The annual mean of dry season alkalinity, hardness, sulfate, and phosphorus appear to be increasing, however only sulfate is increasing significantly.

Annual mean concentrations of the constituents that typically exceeded WQO in 2004-2005 have shown no significant trend throughout the monitoring period. Indicator bacteria have been consistently high, neither increasing nor decreasing. Copper and lead values do not show a discernable pattern, but one annual mean for each constituent was above WQOs. Figure 9-9a-d contains representative scatterplots of these constituents.

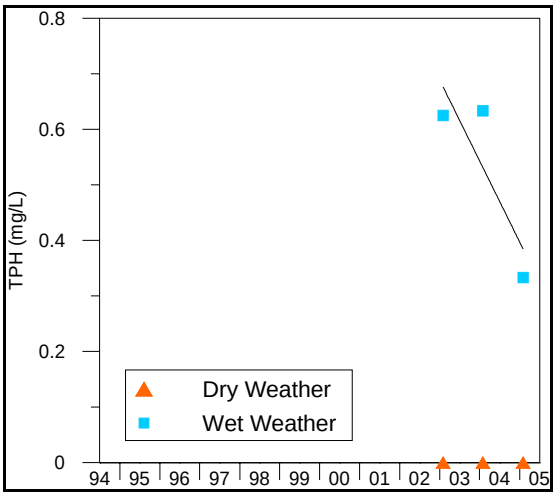


Figure 9-8. Scatterplot and Trend for Total Petroleum Hydrocarbons at the Santa Clara River Mass Emission Site, 2002 to 2005.

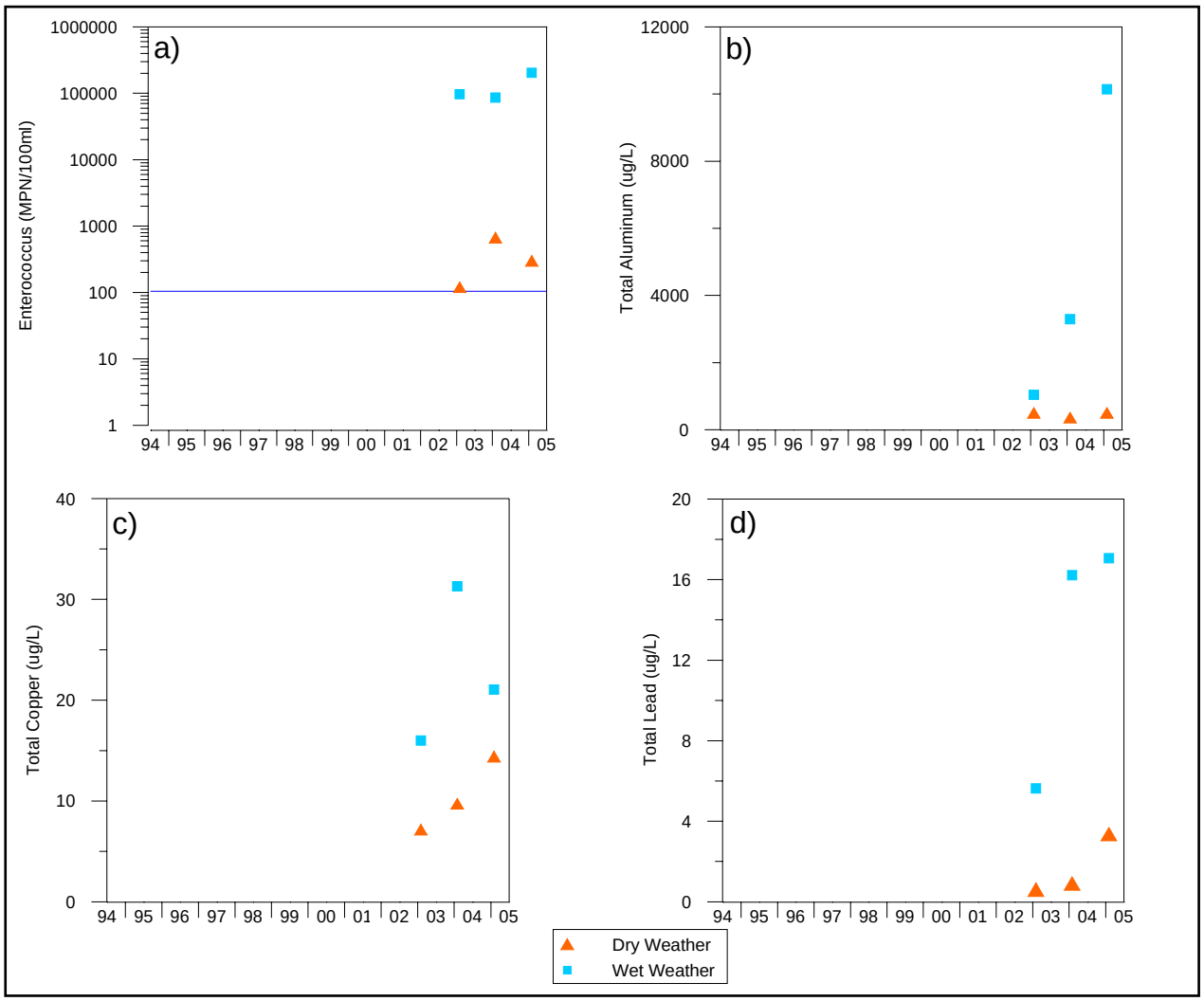


Figure 9-9. Scatterplot for Enterococcus (a), Total Aluminum (b), Total Copper (c) and Total Lead (d) at the Santa Clara River Mass Emission Site, 2002 – 2005.

9.3.1.3 Constituents of Concern

The constituents of concern for the Santa Clara River are shown in Figure 9-10 and Table 9-2. A constituent is considered a COC if its frequency ratio exceeds 0.5 and/or mean exceedance ratio exceeds 1.0 (see Section 9.3.1.2 for an explanation of how frequency ratios and mean exceedance ratios are derived). Therefore, COC's as they are designated in this report serve as flags for water quality managers and should not be used for other purposes such as regulatory compliance.

COCs in the Santa Clara River based on the mass emission data include cyanide, indicator bacteria, total aluminum and diazinon. Total and fecal coliform and enterococcus densities consistently exceeded WQOs at the Santa Clara River mass emission site. Average annual fecal coliform and enterococcus densities exceeded their respective WQOs by nearly 200 and 900 times, respectively (Figure 9-10). Total coliform densities exceeded its WQO by over 19 times. Total aluminum was the only metal that was identified as a COC. Total aluminum had a frequency of exceedance of 70% and a mean exceedance ratio of 3.5. Total copper and lead had mean exceedance ratios of 0.9, therefore they were not identified as constituents of concern. Diazinon exceeded objectives 70% of the time and had a mean exceedance ratio of 1.1 which included it as a COC. Based on the 2004-2005 monitoring data, only the indicator bacteria concentrations indicated a "first flush" phenomena in that the highest concentrations were observed in the first storm event samples.

Cyanide had a mean exceedance ratio of 1.5 and was identified as a COC; however, it is not included in Figure 9-10 as the graph focuses on indicator bacteria, metals and diazinon. The origin of cyanide detected in the stormwater samples can be from a number of potential anthropogenic and natural non-point sources. It is assumed that potential industrial point sources are regulated under their own individual NPDES permit. Stormwater runoff from metal plating and finishing operations can be source of cyanide. Non-point sources of cyanide may include pesticide use. The largest likely source of cyanide in the WMA is air-borne deposition from motor vehicle emissions. The amount of cyanide that could be released to the environment from natural sources is comparatively low. Potential natural sources of cyanide include incomplete combustion from forest fires, decomposition of plant material and fungi. Water concentrations of cyanide tend to breakdown within days, but may bind to organic matter in sediments carried by stormwater and remain more persistent (www.eco-usa.net, www.dsf.health.state.pa, www.cynaidecode.org, www.npi.gov).

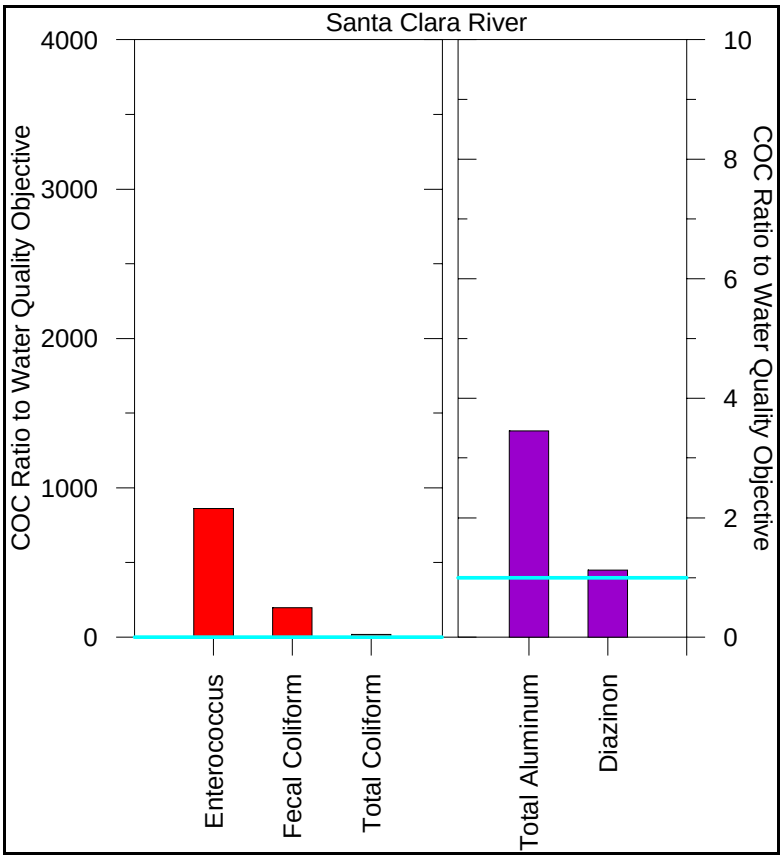


Figure 9-10. Mean Exceedance Ratio for Constituents Frequently Exceeding WQOs at the Santa Clara River Mass Emission Site.

Total mercury and total thallium have exceeded objectives since 2002-2003 (Table 9-1). However, it should be noted that the detection limits for these constituents are greater than the water quality objectives. Total mercury and thallium were not included as a COC because the exceedance is due to a higher PQL than the WQO. Total mercury and thallium were never detected in any samples collected from Santa Clara River in the past 3 years.

Table 9-2 summarizes constituents of concern identified by the mass emission data and compares them to the pollutants on the 303(d) list for the Santa Clara River. The first column of Table 9-2 lists constituents of concern as determined from the integrated data set of annual mean values and the second column is presented for comparison purposes and provides constituents that are 303(d) listed. No constituents indicated significant increasing trends in the Santa Clara River based on the results from the MES.

Table 9-2. Constituents of Concern and Comparison to 303(d) List in Santa Clara River.

Constituent	Constituents of Concern Based on Mass Emission Data Frequency/Magnitude	Comparison to 303(d) List
Cyanide	X	
Enterococcus	X	X
Fecal Coliform	X	X
Total Coliform	X	X
Chloride		X
TDS		X
Ammonia		X
Nitrate		X
Nitrite		X
Total Aluminum	X	
Diazinon	X	

The 303(d) list identifies coliforms, chloride, nutrients (ammonia, nitrate and nitrite) and TDS as constituents of concern in the Santa Clara River. Chloride, nitrate, nitrite and TDS are included on the 303(d) list; however, annual mean concentrations have been below WQOs for the past three years. Ammonia does not have a WQO to compare sample results to, though its annual mean concentration during the 2004-2005 monitoring year was relatively low at 0.17 mg/L. Total aluminum, cyanide and diazinon have been identified as COC's within the Santa Clara River based on water quality monitoring; however, they are not included on the 303(d) list.

9.3.2 Water Column Toxicity Monitoring

Samples collected from the Santa Clara River mass emission site were analyzed for toxicity to *Ceriodaphnia dubia* survival and reproduction and sea urchin fertilization from 2002-2005.

Water column toxicity monitoring determined that stormwater collected from the Santa Clara River mass emission station on October 17 and 26, 2004 did not affect *C. dubia* survival or reproduction. However, sea urchin fertilization was inhibited by stormwater from both events. Dry weather samples collected during 2004-2005 were toxic to *C. dubia* and sea urchin reproduction.

Bioassays conducted before the 2004-2005 season determined that stormwater from the Santa Clara River affected the survival of *C. dubia* during 2003-2004. All other wet and dry weather samples were not toxic to the organisms.

TIEs determined that the toxicity in 2003-2004 stormwater was caused by a volatile compound.

Further discussion of toxicity results and inter-relationships on a cross-watershed basis is presented in Section 10. Due to the limited data-set on a watershed basis, the inter-relationship discussion is presented on regional basis in Section 10. Correlations between toxicity results with COC are discussed in this section using the results from all the watersheds.

9.3.3 Trash Monitoring

Photos were taken at the Santa Clara River mass emission station after four storms, including the first storm event of the season for each year. Photos from the 2004-2005 storm season are provided in Appendix D, Figures 25-28.

9.4 Regional Monitoring Summary

9.4.1 Bioassessment Results / Discussion

Information on the stream bioassessment surveys of October 2003 and October 2004 originally appeared in annual monitoring reports submitted to LACDPW (BonTerra 2004, Weston 2005). In the discussion below, ratings of the benthic macroinvertebrate communities is based on a CFG Southern California Index of Biotic Integrity (IBI) (Ode et al. In Press), a quantitative scoring system based on the cumulative value of seven biological metrics. The scoring range is 0-70, and the scores are categorized into qualitative ratings of Very Poor (0-13), Poor (14-26), Fair (27-40), Good (41-55), and Very Good (56-70). Additional individual metrics and aspects of species composition are discussed when notable. Section 10 of this report provides more overview and detail of the results from the regional monitoring.

9.4.1.1 Introduction

Two bioassessment monitoring sites were established in the Santa Clara River Watershed, but one of the sites, Station 20-Bouquet Canyon, has not been sampled due to dry conditions in both survey years. The Station 1-Santa Clara River monitoring reach contained mostly undisturbed habitat, with a sandy substrate and abundant emergent vegetation. The locations of the sites are presented in Figure 9-4, and a description of the sites and the justification for the monitoring locations are presented in Table 9-3.

Table 9-3. Santa Clara River Watershed stream bioassessment monitoring sites. October 2003 and 2004.

Station	Receiving Water Body	Location	Coordinates	Justification
1	Santa Clara River Unlined channel	Santa Clara River at The Old Road	N 34º 25.843' W 118º 35.652'	Location of DPW mass emission monitoring site
20	Bouquet Canyon Unlined channel	Bouquet Canyon Wash below Vasquez Canyon Road	N 34º 28.422' W 118º 28.023'	Assess conditions upstream of Diazinon findings; *not sampled due to dry conditions*

9.4.1.2 Benthic Macroinvertebrate Community

The benthic macroinvertebrate community at Station 1-Santa Clara River was rated Poor, with total CFG's Southern California Index of Biotic Integrity scores of 21 (2003) and 19 (2004) (Table 9-4). The benthic community was dominated by Ostracods in both survey years, and Chironomid midges, flatworms, soldier flies (*Caloparyphus/Euparyphus*) and the Baetid mayfly *Fallceon quilleri* were also abundant. The site had a notable richness and abundance of predator

taxa, with relatively high numbers of large dragonfly larvae including the highly intolerant *Progomphus*. Taxa richness was higher at Station 1 than all other urban monitoring sites that were sampled in both surveys. Most water quality measures were moderate, but specific conductance was somewhat high with values of 1.470 ms/cm (2003) and 1.544 ms/cm (2004).

Table 9-4. Index of Biotic Integrity and Water Quality Measures of the Santa Clara River Watershed.

Santa Clara River Watershed	Station 1 Santa Clara River (unlined channel)	
Survey	**Oct-03**	**Oct-04**
Index of Biotic Integrity/ Qualitative Rating	21 Poor	19 Poor
Water Quality		
Temperature (C)	17.8	16.5
pH	7.1	7.9
Specific Conductance (ms/cm)	1.470	1.544
Hardness (mg/L $CaCO_3$)	NS	560
Dissolved Oxygen (mg/l)	8.20	7.37

9.4.1.3 Relationship of Bioassessment to Constituents of Concern

Data from the mass emissions stations, summarized in Section 9.3, were used to identify possible relationships between constituents of concern and impacts to the benthic macroinvertebrate communities. Additional impairments identified in the 303(d) listing were not considered here due to a lack of available recent data.

Bioassessment Station 1-Santa Clara River was located in close proximity to the Santa Clara River mass emission station S29 (Figure 9-4). The benthic community was rated Poor at this site, although the presence of organisms highly intolerant to impairment (tolerance value 0, 1, or 2) indicates that overall water quality was better than at most of the mass emission stations. Constituents of concern that exceeded water quality objectives included indicator bacteria and total aluminum. Total copper and lead have also exceeded objectives during some events. High concentrations of heavy metals have long been known to negatively impact macroinvertebrate communities (e.g., Winner et al. 1980). Bacteria levels were consistently very high, and while bacteria likely did not directly impact the benthic community, they generally indicate other water quality issues such as elevated fine organic matter or nutrients that could degrade the system. Diazinon was the only pesticide detected at the station, but the level of exceedance was low.

9.5 Special Studies

9.5.1 Peak Discharge Impact Study Summary

The Peak Discharge Impact Study was conducted to assess the potential connection between stream erosion and urbanization. The main objectives of the study were to: establish a stream channel classification system for southern California streams; assess stream channel response to

watershed change, and attempt to develop predictive relationships between changes in impervious cover and stream channel enlargement; and to provide a conceptual model of stream channel behavior that will assist the development of a future numeric model. Eleven sites with varying degrees of urbanization in southern California were selected within five watersheds, including Santa Clara River, Santa Monica Bay, San Diego Creek, Santa Ana River and Calleguas Creek, for evaluation of their morphometric attributes. The focus of the study was to evaluate the changes in stream channel configuration over time and compare them to the changes in total basin impervious cover over the same time period. Background and historic information was gathered on each site and its contributing drainage area. Field data was then collected on the geomorphic condition of each study area. This information was then used to develop relationships between changes in impervious cover and channel form. Section 10 of this report provides more overview and detail of the results of this investigation.

9.5.2 New Development Impacts in the Santa Clara River Watershed

A water quality model has been selected to evaluate the possible changes that Standard Urban Stormwater Management Plan (SUSMP) implementation might have on stormwater quality. The drainage area of a specific development will be selected for modeling and monitoring. Regional data will used to calibrate the water quality calculations. The model will be validated with site specific water quality monitoring data. The monitoring approach will involve monitoring the selected development site during three storms by collecting and analyzing flow-weighted composite samples. Work on the modeling plan is on going. Water quality monitoring is scheduled to occur during the 2005-2006 wet weather season.

9.6 Conclusions

The results of the 2004-2005 monitoring season were similar to findings from previous years. Since the initiation of monitoring at the Santa Clara River mass emission site in 2002-2003, cyanide, indicator bacteria, total aluminum and diazinon have consistently exceeded WQOs and were identified as COCs. Concentrations of total copper and total lead also exceeded their respective WQOs, but less frequently. No significant trends in COC or other key constituents were observed during the monitoring period of three years at the mass emission station. The exception was TPH, which shows a decreasing trend in concentrations for the monitoring period.

Stream bioassessment monitoring was conducted in October 2003 and October 2004. Bioassessment monitoring sites were established at one location in the Santa Clara River Watershed to assess biological integrity and to detect biological trends and responses to pollution in receiving waters throughout the region. The Santa Clara River site received some urban runoff. The benthic macroinvertebrate community had Index of Biotic Integrity scores of 21 and 19, and quality ratings of Poor for both years. This site was the only urban site to support organisms highly intolerant to impairment, represented by larvae of the dragonfly *Progomphus*.