ES10.0 SAN DIEGO RIVER WMA EXECUTIVE SUMMARY

This section summarizes the results of the 2006-2007 monitoring of the San Diego River Watershed Management Area (WMA).

Watershed Monitoring

Wet weather and bioassessment monitoring sites within the San Diego WMA are depicted in Figure ES10-1. Dry weather monitoring stations are not included in Figure ES10-1. Activities included:

- Chemical and toxicity testing of storm water runoff.
- Dry weather data analysis.
- Rapid stream bioassessment.

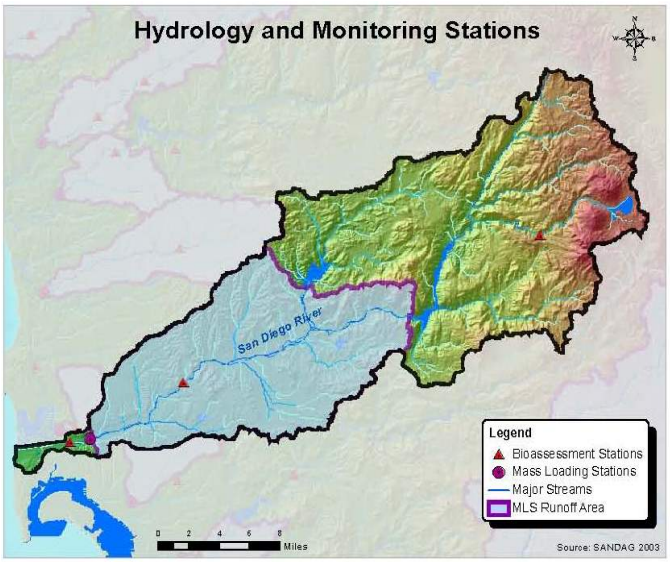


Figure ES10-1. San Diego WMA Wet Weather and Bioassessment Monitoring Locations.

Storm Water Runoff

The San Diego River (SDR) mass loading station (MLS) is located along a natural channel in San Diego, adjacent to the Fashion Valley Mall (Figure ES10-2). The contributing runoff area consists of over 107,200 acres, which is approximately 39% of the San Diego Watershed land area. The areas above San Vicente Reservoir and El Capitan Reservoir are not included in the MLS contributing area because there is not a direct hydrologic connection due to municipal water supply infrastructure. The major land uses within the contributing runoff area are residential (30%), parks (25%), and undeveloped (19%) (Figure ES10-3).

Figure ES10-2. San Diego River MLS Site.

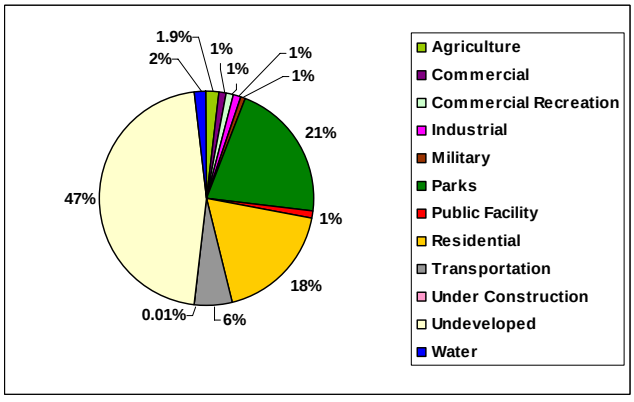


Figure ES10-3. San Diego River WMA Land Use Statistics

Figure ES10-4 depicts the three storm events that were monitored during the 2006-2007 wet-weather season. The figure depicts the river levels and flow rates observed during the monitoring season.

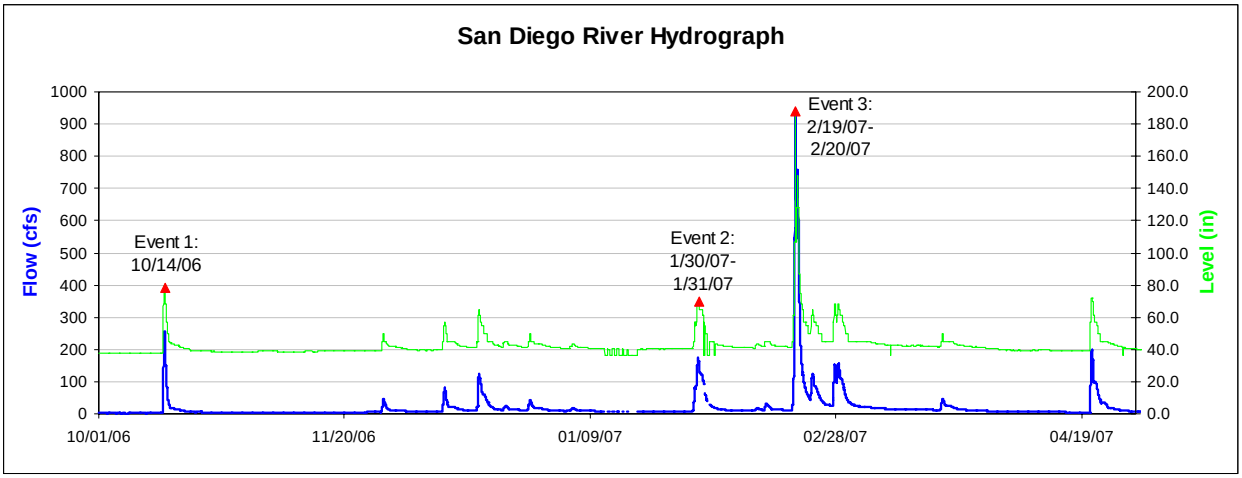


Figure ES10-4. San Diego River 2006-2007 Wet Weather Monitoring Period Flow Record and Monitored Storm Events.

Table ES10-1 summarizes constituents with concentrations detected at levels above the Copermittee water quality benchmarks with exceedances of benchmarks shown in bold. Pesticides and dissolved metals were not detected at levels above benchmark WQOs.

Table ES10-1. Constituents with Results Above the Benchmark WQO During the 2006-2007 Monitoring Season at the San Diego River MLS.

Analyte	Units	Benchmark WQO	Source	2006-2007 Storms		
				10/14/06	1/31/07	2/19/07
Fecal Coliform	MPN/100 mL	400	Basin Plan	**5,000**	**8,000**	**5,000**
Un-ionized ammonia	ug/L	25	Basin Plan	**37.2**	4.7	2.3
TDS	mg/L	1000	Basin Plan by watershed	**1200**	**1350**	642
TSS	mg/L	100	USEPA Multi-Sector General Permit	**111**	34	**124**
Turbidity	NTU	20	Basin Plan	**58.1**	**24.3**	**59.6**
Total Copper	mg/L	*	40 CFR 131	0.020	0.009	**0.029**
Total Lead	mg/L	*	40 CFR 131	0.016	0.004	**0.024**
Hyalella Toxicity	NOEC %	100		**25**	100	100

The ratio of selected constituent concentrations to the benchmark WQOs were plotted for each of the three storm events in the current monitoring year along with the ratio of historical mean concentrations from three monitored storm events per year (Figure ES10-5). The highest exceedances noted for the San Diego River WMA were for fecal coliform, turbidity and toxicity to *Hyalella azteca*. Total lead, total copper, TSS, TDS, and un-ionized ammonia results were just above the benchmark WQO.

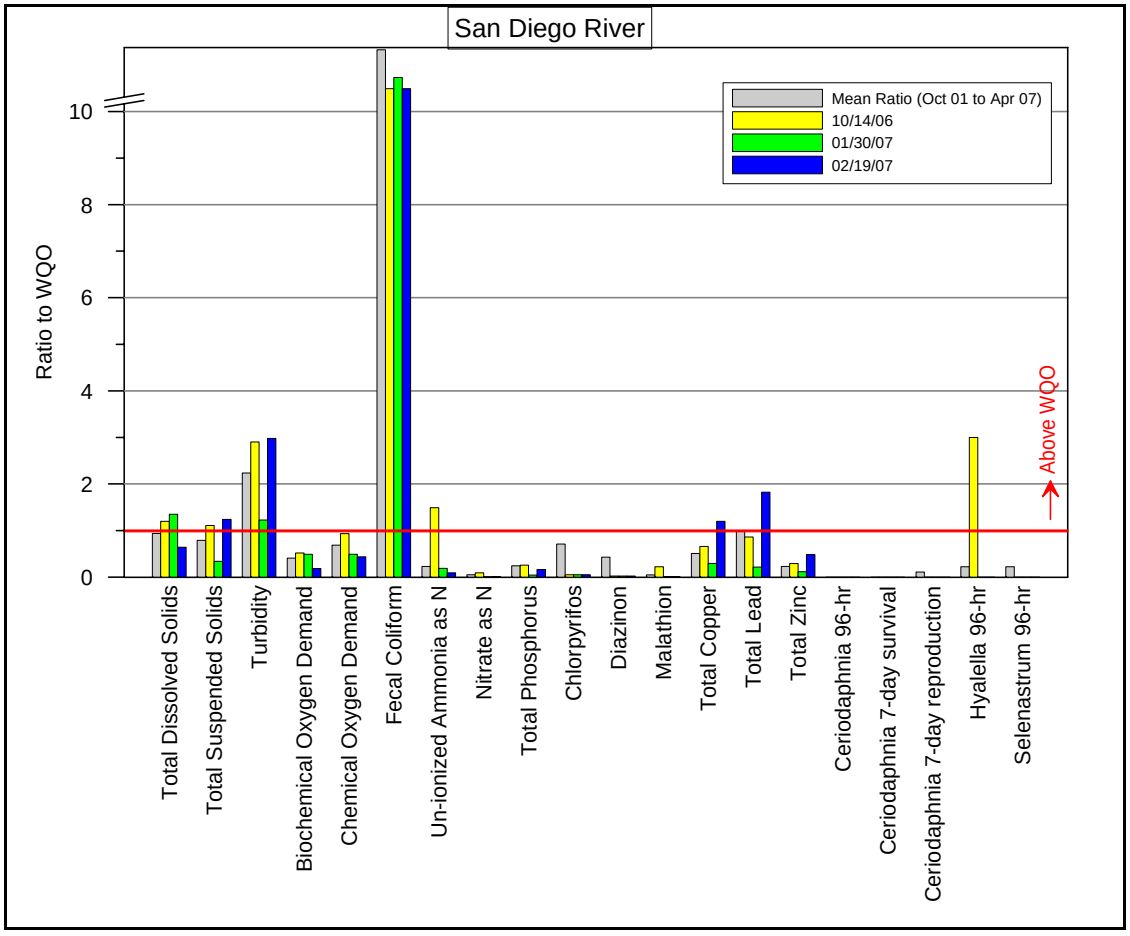


Figure ES10-5. Ratio of Results to Benchmark WQO for the San Diego River Watershed Management Area.

Mann-Kendall trend analyses were performed to identify any long-term trends observed in the data. Statistically significant increasing trends for turbidity and TSS were identified. The trend for turbidity is above the benchmark WQO while the trend for TSS is below, but approaching the benchmark WQO. Dissolved arsenic, dissolved copper, and nitrate had statistically significant decreasing trends.

Constituent Loads

Measured storm event loads were compared to loading values derived from the National Stormwater Quality Database (Pitt et al., 2004). Expected loads based on the national database were used to evaluate the magnitude of loads measured at each MLS site. Measured loads for total dissolved solids and bacterial indicators were greater than expected for a majority of the storm events sampled. Most of the constituents measured were within the expected range or lower than expected. In particular, metals consistently showed lower than expected loads for all the storms events sampled.

Dry Weather Data

A separate dry weather monitoring program is carried out by each jurisdiction. The purpose of this program is to identify and stop illicit discharges into the MS4, and for a variety of reasons, is not necessarily representative of Copermittee discharges from the MS4. Of these sites, 106 are located upstream of the MLS on the San Diego River. Constituents found to exceed dry weather action levels are depicted in Table ES10-2.

Table ES10-2. San Diego River WMA 2006 Dry Weather Exceedances.

Analyte	Number of Action Level Exceedances	Total Samples
Conductivity	14	159
Oil and Grease	1	62
pH	9	160
Enterococcus	15	67
Fecal Coliform	9	63
Total Coliform	23	63
Ammonia (NH3-N)	8	152
Orthophosphate (PO4-P)	2	140
Nitrate (NO3-N)	7	158
MBAS	4	63
Turbidity	34	139
Chlorpyrifos	1	64
Diazinon	2	63
Dissolved Cadmium	2	62
Dissolved Copper	3	63
Dissolved Zinc	1	63

Stream Bioassessment

Stream bioassessment monitoring was conducted twice at two urban monitoring sites and one reference site. One survey was conducted in October 2006 and one in May 2007. The upstream urban site was located in Mission Trails Regional Park (SDR-MT) (Figure ES10-6), and the downstream site was located upstream of the Morena Blvd. overcrossing in Mission Valley (SDR-1) (Figure ES10-7). A reference site was located on Boulder Creek upstream of Boulder Creek Road (REF-BCR) (Figure ES10-8).

Figure ES10-6. Mission Trails Site

Figure ES10-7. Mission Valley Site

Figure ES10-8. Boulder Creek Site

Two summary indices were used to assess the benthic communities at the monitoring sites: an Index of Biotic Integrity and an O/E ratio. For these indices, higher values indicate better biotic conditions (see Table ES10-3 footnotes for scoring criteria).

The San Diego River sites had Index of Biotic Integrity Ratings of Very Poor for both sites during both surveys (Table ES10-3). The O/E ratio for the Mission Trails site indicated an unimpaired benthic community for the October 2006 survey. The in-stream physical habitat of the Mission Trails site was optimal, while the Mission Valley physical habitat was described as sub-optimal with a highly degraded benthic community. The reference site in Boulder Creek was rated Fair in both fall and spring surveys

and had an average observed species to expected species ratio of nearly 1, indicative of an unimpaired benthic community.

Table ES10-3. Selected Biological Integrity Ratings and O/E Ratios for the San Diego River WMA.

San Diego River Watershed Management Area	San Diego River in Mission Trails Regional Park (SDR-MT)		San Diego River Upstream of Morena Blvd. (SDR-1)		Boulder Creek Reference Site (REF-BCR)	
Survey	Oct-06	May-07	Oct-06	May-07	Oct-06	May-07
Index of Biotic Integrity/ Qualitative Rating*	9 Very Poor	4 Very Poor	7 Very Poor	0 Very Poor	35 Fair	28 Fair
O/E Ratio**	0.82	0.58	0.27	0.27	1.02	0.86

*IBI Score 0-13=Very Poor, 14-26=Poor, 27-40=Fair, 41-55=Good, 56-70=Very Good,
**O/E ratio =observed/expected taxa ratio; value of >0.8 represents unimpacted conditions

Ambient Bay and Lagoon Monitoring

The Ambient Bay and Lagoon Monitoring Program was not conducted during the 2006-2007 monitoring period.

Watershed Management Area Assessment

The San Diego River WMA was assessed using the interim guidance document "Watershed Data Assessment Framework" (June 2004) to comply with NPDES Order 2001-01.
The following triad assessment results for the WMA are presented:

- Evidence of persistent water quality objective exceedances (turbidity)
- No evidence of persistent toxicity, and
- Indications of benthic alteration.

It should be noted that although bacteria and/or TDS frequently exceed benchmark WQOs, according to the Triad Approach, they are not considered toxic chemicals of concern.

Statistically significant long-term trends were observed for the following constituents:

- Turbidity (increasing and above benchmark WQO)
- TSS (increasing and approaching benchmark WQO)
- Dissolved arsenic (decreasing)
- Dissolved copper (decreasing)
- Nitrate (decreasing)

Constituents of concern identified for the San Diego WMA are summarized in Table ES10-4.

Table ES10-4. Constituent of Concern Rating Table Summary for the San Diego River WMA.

Constituents With Any Wet Weather (MLS) Benchmark WQO or Dry Weather Action Level Exceedance	Frequency of Occurrence Rating	Criterion Basis
Turbidity	High	Six of the last consecutive storm samples at the MLS exceed benchmark WQO.
Fecal Coliform	High	Mass loading station tests results exceed benchmark WQO in greater or equal to 80% of samples.
Total Coliform	Low	Dry weather site exceedances in 10 to 50% of the samples in the past year.
Enterococcus	Low	
TDS	Low	MLS exceedances found in 25% to less than or equal to 50% of the samples and at least one exceedance found in last 2 years at the MLS (with or without dry weather site exceedances in the last year).

Recommendations

The recommendations for the San Diego River Watershed are to continue monitoring to gather long-term trend information, identify where data gaps exist and do not allow for informed decision making, and consider where watershed resources may be more effectively targeted to reduce turbidity, bacterial indicators, and impacts to the physical stream habitats. The new permit monitoring order (R9-2007-0001) calls for three temporary watershed assessment stations (TWAS) for this watershed. The additional upstream station will provide the ability to evaluate the spatial distribution of constituents of concern. Additionally, the new permit calls for the evaluation of dry (ambient) conditions. This data will allow for the estimation of annual loading within the watershed and differences in seasonality.

10.0 SAN DIEGO RIVER WATERSHED MANAGEMENT AREA

This section presents the San Diego River Watershed Management Area (WMA) monitoring data for the 2006-2007 monitoring season. The information within the following subsections is presented as follows:

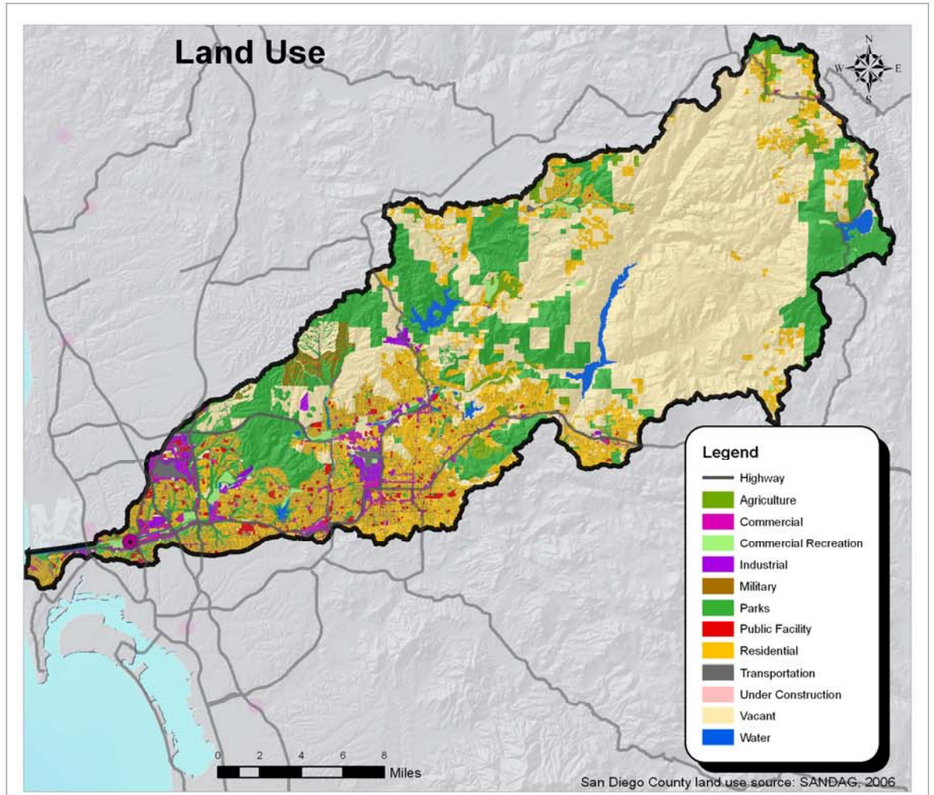
- Overview of the WMA, regulatory water quality challenges, and the monitoring site descriptions used to assess the WMA
- Watershed water quality monitoring results and data analysis, wet weather pollutant loadings, dry weather data summary, and third party data
- Stream bioassessment results and data analysis
- Watershed management area assessments, triad assessment, and LTEA priority ratings
- Summary and Recommendations

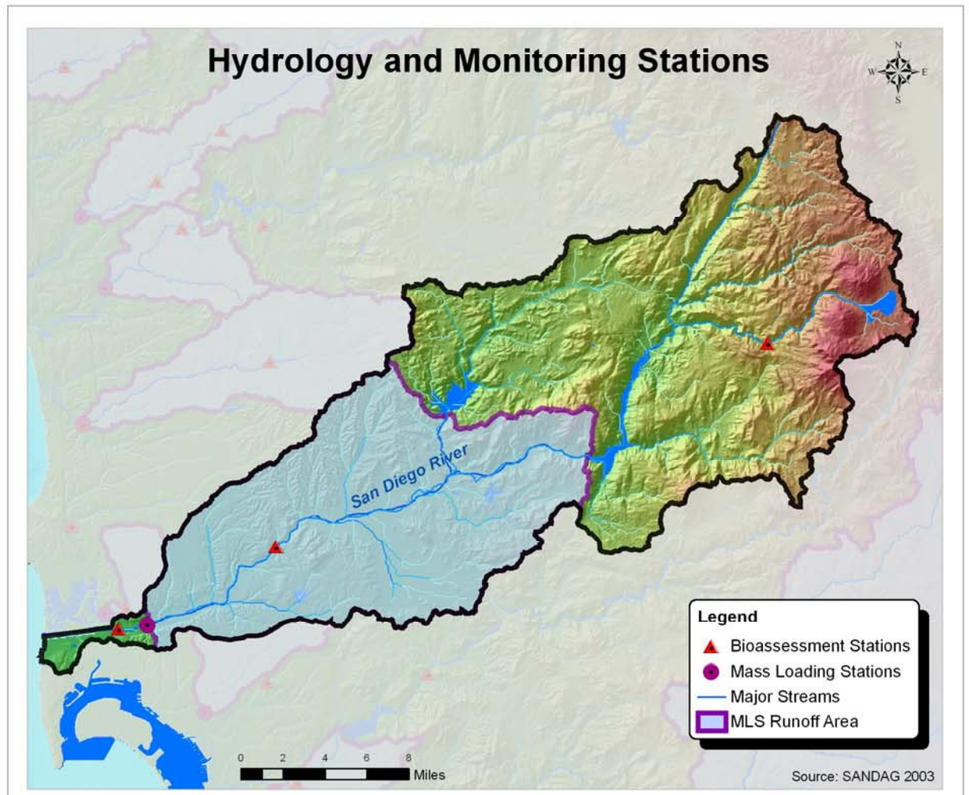
Changes from last years monitoring program include the following:

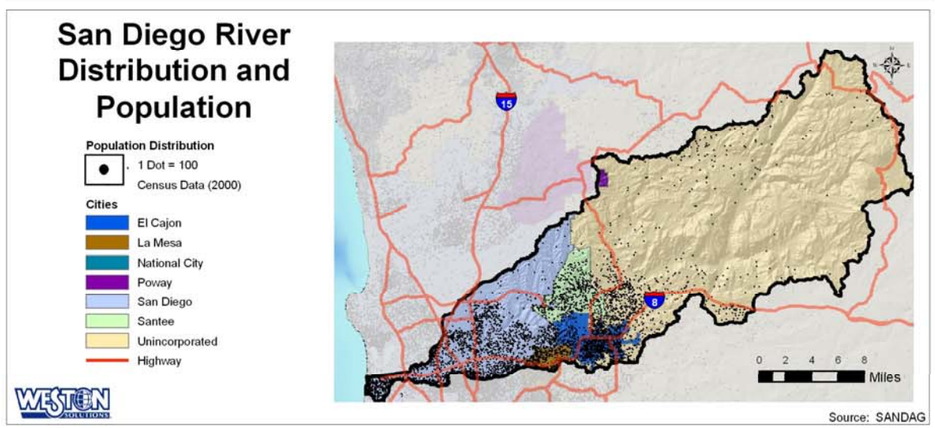
- The Ambient Bay and Lagoon Monitoring Program was completed in 2005-2006 and was not performed as part of the 2006-2007 monitoring program activities.
- LTEA water quality priority ratings remain unchanged from the previous Annual Monitoring Report as this was a five year assessment based on data collected from 2001-2006.
- Metals results over the previous two monitoring seasons were only compared to the criterion maximum concentration (CMC) or acute benchmark water quality objective (WQO) since it is believed to be representative of short term conditions. However, the metals results are now compared to both the CMC (acute) and criterion continuous concentration (CCC) or chronic benchmark WQO benchmark for comparison purposes. This change has resulted in some metals (particularly lead) being identified as a constituent of concern in some watersheds where in prior years it was not identified as a constituent of concern.

10.1 San Diego River Watershed Management Area Description

The San Diego River Watershed Management Area (WMA) (HU 907.00), is the second largest watershed lying entirely within San Diego County. The San Diego River WMA land area is 277,543 acres (Figure 10-1). Locations of mass loading stations and stream bioassessment stations within the San Diego River Watershed are indicated in Figure 10-1; however, dry weather monitoring stations are not included in this figure. The watershed includes four hydrologic areas: Lower San Diego, San Vicente, El Capitan, and Boulder Creek. The watershed is drained by the San Diego River which discharges into the Pacific Ocean between Mission Beach and Ocean Beach. Annual precipitation ranges from 10.5 inches near the coast to nearly 35 inches in the eastern portion of the watershed. Locations of wet weather and bioassessment monitoring stations within the San Diego River WMA are depicted in Figure 10-1 (dry weather stations are not shown).







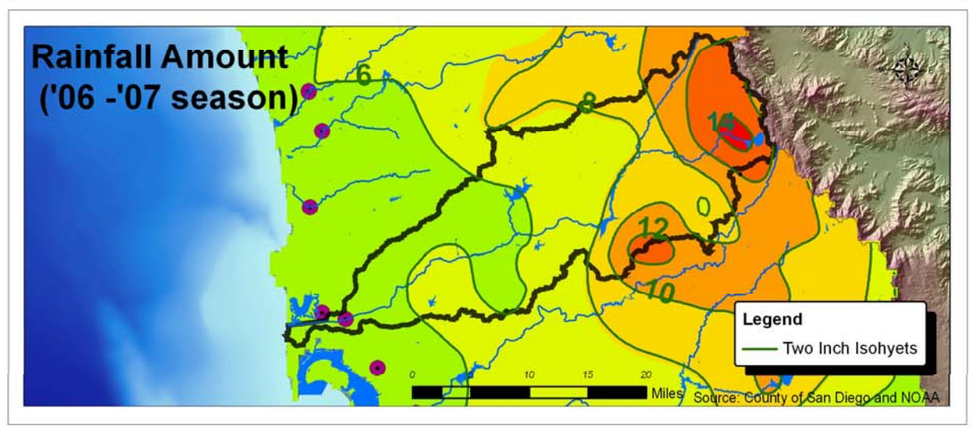


Figure 10-1. San Diego River Watershed Management Area.

10.1.1 Land Use

The San Diego River Watershed contains the second largest percentage of unincorporated land in San Diego County: 74.7% of the watershed is unincorporated. The remaining areas of the watershed include the Cities of El Cajon, La Mesa, Poway, San Diego, and Santee. Land use within the watershed is primarily undeveloped (47%), parks and recreation (21.0%), and residential (17.8%). Other uses are comprised of transportation (5.7%), agriculture (1.9%), commercial (1.2%) and industrial (1.2%), as illustrated in Figure 10-2 (SANDAG, 2006). Approximately half of the watershed is privately-owned land. The remaining portions are mostly federally-owned with a small percentage of land being state or locally-owned. The San Diego River Watershed is the most populated in the county containing over 506,000 people, yet it has a rather low population density of 1.82 persons per acre.

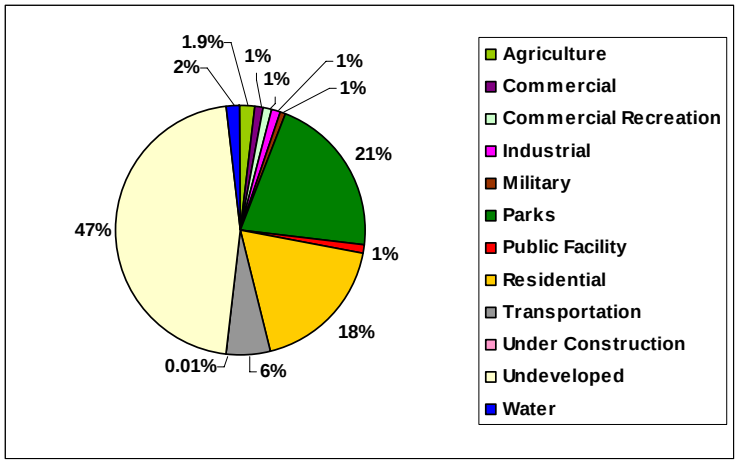


Figure 10-2. Percent Land Use for San Diego River WMA

10.1.2 Beneficial Uses

The San Diego River Watershed provides many beneficial uses with its many reservoirs, lakes, rivers, and creeks. A listing of the beneficial uses from the San Diego Basin Plan are presented in Table 10-1. The watershed contains the San Diego River, Boulder Creek, El Capitan Reservoir, San Vicente Reservoir, Lake Jennings, Lake Cuyamaca, and Lake Murray. Principal aquifers in the watershed include the Santee/El Monte Basin and the Mission Valley Basin. In addition to water resources the watershed contains many parks and open space areas. Famosa Slough is a 37-acre wetland that lies near the mouth of the San Diego River and provides wetlands habitat. Mission Trails Regional Park provides nearly 5,800 acres of natural habitat and recreation areas.

Table 10-1. Beneficial Uses Within the San Diego River Watershed.

Beneficial Uses	Inland Surface Waters	Coastal Waters (excluding Pacific Ocean)	Pacific Ocean	Reservoirs and Lakes	Ground Waters
Municipal and Domestic Supply	●			●	●
Agricultural Supply	●			●	●
Industrial Service Supply	●		●	●	●
Industrial Process Supply	●			●	●
Ground Water Recharge					
Freshwater Replenishment					
Hydropower Generation				●	
Navigation			●		
Contact Water Recreation	●	●	●	●[1]	
Non-Contact Water Recreation	●	●	●	●	
Commercial and Sport Fishing		●	●		
Warm Freshwater Habitat	●			●	
Cold Freshwater Habitat	●			●	
Estuarine Habitat		●	●		
Wildlife Habitat	●	●		●	
Biological Habitats of Special Significance	●		●		
Rare, Threatened, or Endangered Species	●	●	●	●	
Marine Habitat		●	●		
Migration of Aquatic Organisms		●	●		
Aquaculture			●		
Shellfish Harvesting		●	●		
Spawning, Reproduction and/or Early Development	●	●	●		

● = Existing

[1] Shore and boat fishing only. Other REC1 uses prohibited (exception is Lake Jennings).

Note: Beneficial uses vary by hydrologic unit basin number. Please refer to the basin plan for individual hydrologic units.

Source: Basin Plan September 8, 1994 (Tables 2-2, 2-3, 2-4, 2-5), amendments adopted through 2/8/2006.

10.1.3 Regulatory Water Quality Challenges

Table 10-2 presents the water bodies in the San Diego River Watershed that have been placed on the SWRCB 303(d) list. Major impacts to the watershed include surface water quality degradation, habitat degradation and loss, sediment, invasive species, eutrophication, and flooding (San Diego County, 2006). Constituents that have been placed on the SWRCB 2006 303(d) list for water bodies throughout the watershed include bacterial indicators, TDS, phosphorus, eutrophication, pH, dissolved oxygen, color, chloride, manganese, and sulfates. Factors that may be impairing water quality in the watershed include urban runoff, agricultural runoff, mining operations, sewage spills, sand mining, and other natural sources (San Diego County, 2006).

The San Diego Regional Water Quality Control Board is considering a Basin Plan amendment to incorporate proposed bacteria indicator TMDLs developed in "Project I - Beaches and Creeks in the San Diego Region". Project I involved calculating TMDLs for numerous surface waters throughout the San Diego Region. TMDLs are only proposed for coastal shorelines and creeks discharging to shorelines. Creeks discharging to lagoons, bays, or harbors were not included. TMDLs for lower Forrester Creek,

lower San Diego River and the beach at the mouth of the San Diego River have been proposed. Several municipalities have been identified as responsible parties. Interim and final goals for reducing fecal coliform and enterococcus loading over 10 years have been identified. These reductions are to be achieved by the municipalities through conditions written in the MS4 Storm Water Permit.

Table 10-2. Water Bodies on the SWRCB 303(d) List in the San Diego River Watershed.

Water Body Name	Hydrologic Sub Area (HSA)	HSA #	Pollutant/Stressor
Famosa Slough and Channel	Mission San Diego	907.11	Eutrophic
Pacific Ocean Shoreline	Mission San Diego	907.11	Bacterial Indicators
Lower San Diego River	Mission San Diego	907.11	Fecal Coliform, Low Dissolved Oxygen, Phosphorus, TDS
Forrester Creek	Santee	907.12	Fecal Coliform, pH, TDS, Dissolved Oxygen, Phosphorus
El Capitan Lake	El Cajon	907.31	Color, Manganese, pH
Murray Reservoir	Mission San Diego	907.11	pH
San Vicente Reservoir	Fernbrook	907.21	Chloride, Color, Manganese, pH, Sulfates

Source: SWRCB, 2006

The Famosa Slough has also been identified in the new San Diego Regional Water Quality Control Board (RWQCB) Investigation Order and Technical Report for Lagoons TMDL Project - Order No. R9-2006-0076, which establishes monitoring requirements for dischargers. Famosa Slough is impaired due to eutrophic conditions. Investigation Order No. R9-2006-0076 requires the dischargers to develop a monitoring program and submit monitoring program reports. Responsible dischargers to the Famosa Slough, as identified within the Lagoon Order, include the City of San Diego and Caltrans. This order requires monitoring to begin during the 2007-2008 wet weather monitoring season.

10.1.4 Mass Loading Station Site Description

The San Diego River (SDR) mass loading station (MLS) is located along a natural channel in San Diego, adjacent to the Fashion Valley Mall (Figure 10-1) (Latitude: 32'45.914, Longitude: 117'10.117). The contributing runoff area consists of over 107,200 acres, which is approximately 39% of the San Diego Watershed land area. The major land uses within the contributing runoff area are residential (30%), parks (25%), and undeveloped (19%). The San Diego River drains into the Pacific Ocean.

The San Diego River mass loading station is co-located with a USGS stream gauging station which is approximately 50 meters downstream. The channel substrate of the location is composed primarily of silt and sand with a random amount of cobbles and boulders.

The high volume of discharge that occurred during the 2004-2005 wet weather season produced a scour point at the location of the MLS in stream monitoring equipment. The high flows substantially deepened the channel bed and altered the dynamics of this point in the channel. Monitoring during the 2006-2007 continued at the downstream location selected in 2005-2006. Flow data presented in this report is comparable to data from the USGS stream gauging station. The flow runoff equation used to estimate

flow at this location during the 2004-2005 wet weather season was modified due to the changes in the channel dimensions. Flow measurements used for composite sample collection purposes during the 2006-2007 wet weather monitoring season were calculated using a ratings curve. The ratings curve produces an estimated flow rate using the stage of the stream, velocity of the stream, and the surveyed dimensions of the channel.

Evidence of trash and debris were commonly observed in the channel during equipment installations and monitoring events. In addition, human waste from transient individuals was frequently observed on the stream banks within the vicinity of this site.

10.1.5 Stream Bioassessment Site Description

Stream bioassessment in the San Diego River WMA included two urban affected monitoring sites. One bioassessment site upstream of the MLS was located in Mission Trails Regional Park, and one bioassessment site downstream of the MLS was located upstream of the Morena Blvd. overcrossing in Mission Valley (Figure 10-1).

10.2 Watershed Water Quality Monitoring

The following sub-sections include the results and analysis of chemistry, bacteria, and toxicity data collected during three storm water events and historical data at the MLS, dry weather data collected during the 2006 dry weather monitoring program, toxicity identification evaluations (TIE), and available and relevant third party data.

The triad approach is used to evaluate chemistry, toxicity, and the benthic community to perform watershed management area assessments. Analysis of watershed water quality monitoring data is one leg of the triad approach. The chemistry data provides an indication of the pollutant load and toxicity data provides an indication of the potential impacts to aquatic organisms during storm events. Dry weather chemistry data provides an indication of urban runoff pollutants. The benthic community data collected during stream bioassessment provides a more direct indication of the ecological health of the watershed in terms of the insect/benthic community abundance and diversity.

10.2.1 2006-2007 Storm Water Monitoring and Results

Annual storm water monitoring has occurred at the San Diego River MLS since the 2001-2002 wet weather monitoring season. Three storm events were monitored at the MLS during the 2006-2007 wet weather monitoring period occurring on October 14, 2006, January 30 and February 19, 2007. Rainfall statistics for each monitoring event are provided in Table 10-3. Figure 10-3 shows the stream flow and water levels measured during the 2006-2007 wet weather period and when monitoring events occurred. Hydrographs from each storm event are presented in Appendix A.

Table 10-3. 2006-2007 Rainfall Statistics for Monitored Storm Events for the San Diego River Mass Loading Station.

Date Start	Total Rain (in)	Duration (hr)	Intensity (in/hr)	Antecedent Dry Days
10/13/2006	0.33	14	0.02	75
1/29/2007	0.47	20	0.02	34
2/18/2007	1.37	18	0.07	6

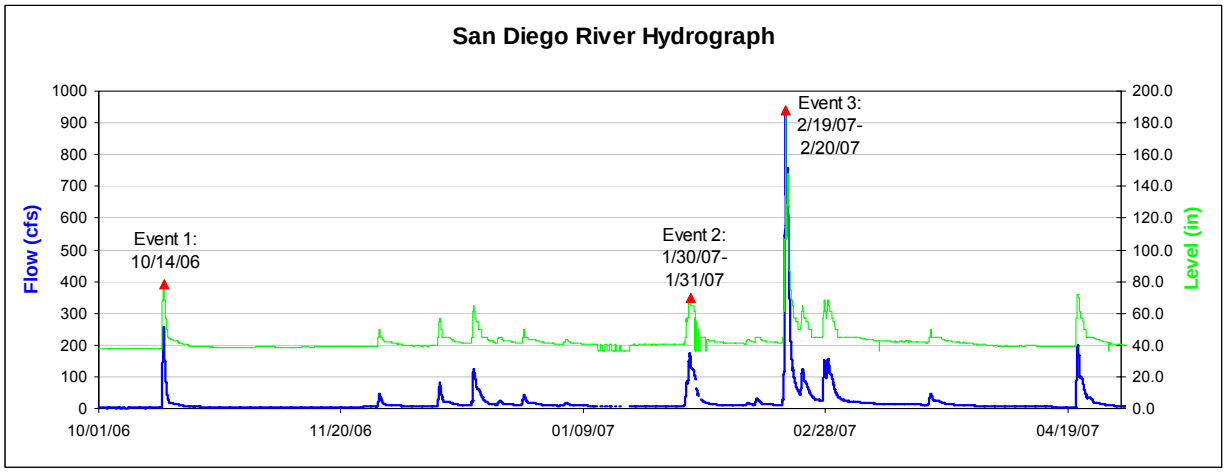


Figure 10-3. San Diego River 2006-2007 Wet Weather Monitoring Period Flow Record and Monitored Storm Events.

10.2.1.1 Storm Water Monitoring Event Summary

The first storm of the 2006-2007 wet weather monitoring season occurred on October 13-14, 2006. The rain pattern affected predominantly the North and South portion of the county leaving the majority of the central county without significant rainfall. A total of 61 one-liter composite sample aliquots were collected at a rate such that one sample was collected for every 60,000 cubic feet of water that passed by the monitoring station. Additionally, grab samples were collected for those constituents that are not conducive to composite sampling prior to the peak of the storm hydrograph. Sampling was conducted over a 19-hour period which captured the rise and initial peak of the runoff produced by the storm.

The second storm monitored at the San Diego MLS during the 2006-2007 wet weather monitoring season occurred on January 29- 30, 2007. The storm began to move into San Diego County on January 29, 2007 with most of the rain located near the coast in a south to north pattern. The total rainfall for the San Diego River watershed was 0.47" (Table 10-3). A total of 43 one-liter composite sample aliquots were initially collected at a rate such that one sample was collected for every 50,000 cubic feet of water that passed by the monitoring station. During the peak flow of the San Diego River, sample aliquots were collected at a rate such that one sample was collected for every 100,000 cubic feet of water that passed by the monitoring station. Additionally, grab samples were collected for those constituents that are not conducive to composite sampling prior to the peak of the storm hydrograph. Sampling was conducted over a 12-hour period which captured the rise and initial peak of the runoff produced by the storm.

The third storm monitored at the San Diego MLS during the 2006-2007 wet weather monitoring season occurred on February 18-19, 2007. The storm produced a total of 1.37" of rainfall (Table 10-3). A total of 46 one-liter composite sample aliquots were initially collected at a rate such that one sample was collected for every 200,000 cubic feet of water that passed by the monitoring station. During the peak flow of the San Diego River, sample aliquots were collected at a rate such that one sample was collected for every 400,000 cubic feet of water that passed by the monitoring station. Additionally, grab samples were collected for those constituents that are not conducive to composite sampling prior to the peak of the storm hydrograph. Sampling was conducted over a 12-hour period which captured the rise and initial peak of the runoff produced by the storm.

10.2.1.2 Storm Water Monitoring Results

Analytical results from the 2006-2007 wet weather monitoring period at the San Diego River MLS are presented with the historical results in Table 10-4. Sample results are compared to the benchmark water quality objectives (WQO) that are provided in the table. These benchmark WQO were selected by the Copermittee Monitoring Workgroup from the sources provided in the results table. A description of the benchmark WQO sources and the technical reasoning of how the results are compared to the benchmark WQO are provided in Section 3.4. Discussion of sample results occur in groups; conventional parameters, bacteriological, pesticides, metals, and toxicity. A comparison of these results to previous monitoring data is presented in Section 10.2.2.

Table 10-4. Analytes Measured at the San Diego River Mass Loading Station.

ANALYTE	UNITS	WQO[1]	SOURCE	2001-2002			2002-2003			2003-2004			2004-2005			2005-2006			2006-2007			Frequency Above WQO	Mean Ratio to WQO
				11/29/01	2/17/02	3/17/02	11/8/02	12/16/02	2/11/03	11/12/03	2/3/04	3/2/04	10/27/04	2/11/05	2/18/05	10/18/05	2/19/06	3/11/06	10/14/06	1/30/07	2/19/07		
General / Physical / Organic																							
Electrical Conductivity	umhos/cm			1680	2230	2270	1568	811	1550	2470	1546	995	560	1260	747	2870	2490	1262	1499	2830	994		
Oil and Grease	mg/L	15	USEPA Multi-Sector General Permit	<1	4	<1	10.70	<1.00	2.39	4.83	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<5	0%	0.13
pH	pH Units	6.5-8.5	Basin Plan	7.3	7.6	7.5	7.68	7.64	7.61	7.48	7.70	7.26	7.16	7.63	7.20	7.79	8.07	7.74	8.32	7.67	6.95	0%	0.00
Bacteriological																							
Enterococci	MPN/100 mL			80	2,200	170	17,000	13,000	7,000	11,000	23,000	358	22,000	2,300	22,000	50,000	3,000	5,000	17,000	2,300	9,000		
Fecal Coliform	MPN/100 mL	400	Basin Plan	130	**30,000**	170	**110,000**	**17,000**	**5,000**	**13,000**	**2,300**	**500**	**5,000**	**800**	**1,300**	**70,000**	**3,000**	**800**	**5,000**	**8,000**	**5,000**	89%	38.47
Total Coliform	MPN/100 mL			2,300	80,000	3,000	220,000	50,000	23,000	50,000	28,000	11,000	300,000	30,000	50,000	1,100,000	50,000	30,000	30,000	14,000	23,000		
Wet Chemistry																							
Ammonia As N	mg/L			0.9	0.7	0.2	0.34	0.13	0.19	<0.1	<0.1	1.8	0.38	0.28	0.95	0.19	0.31	<0.1	0.54	0.51	1.04		
Un-ionized Ammonia as N	µg/L	25 (a)	Basin Plan				5.11	1.5	2.04	0.48	0.62	7.90	0.2	0.5	8.2	4.1	9.2	1.3	**37.2**	4.7	2.3	7%	0.23
Biochemical Oxygen Demand	mg/L	30	USEPA Multi-Sector General Permit	12	**58.8**	3.4	4.73	<2.0	20.7	8.44	**45.2**	2.94	4.22	3.68	3.39	8.24	2.21	5.17	15.6	14.8	5.51	11%	0.41
Chemical Oxygen Demand	mg/L	120	USEPA Multi-Sector General Permit	28	**154**	54	71	48	63	83	67	52	98	**283**	56	62	65	74	112	59	52	11%	0.69
Dissolved Organic Carbon	mg/L						6.80	8.68	10.70	16.6	4.26	5.57	33.2	2.94	5.62	9.41	12.8	5.59	66	13	9.03		
Dissolved Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	0.3	0.03	0.12	0.19	0.24	0.19	0.41	0.13	0.15	0.44	<0.05	0.32	0.24	0.37	0.11	0.29	0.07	0.1	0%	0.10
Nitrate As N	mg/L	10	Basin Plan	0.9	0.8	0.3	0.67	0.56	0.57	0.5	0.2	0.63	0.37	0.66	1.01	0.63	0.25	0.29	0.9	<0.05	0.1	0%	0.05
Nitrite As N	mg/L	1	Basin Plan	0.12	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0%	0.03
Surfactants (MBAS)	mg/L	0.5	Basin Plan	<0.5	**0.6**	<0.5	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6%	0.49
Total Dissolved Solids	mg/L	1000	Basin Plan	869	691	796	**1260**	676	896	**1540**	**1120**	491	594	756	490	**1490**	**1370**	655	**1200**	**1350**	642	39%	0.94
Total Kjeldahl Nitrogen	mg/L			2.7	2.9	1.7	1.6	1.2	1.5	1.4	2.8	2	2.3	<0.5	23.3	1.6	4.3	1.5	2.2	1.7	3.1		
Total Organic Carbon	mg/L						18.3	39.8	12.4	16.7	11.7	11.5	62	9.61	9.6	22.4	14.1	8.57	69.4	16	9.85		
Total Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	1.21	0.4	0.28	0.57	1.01	0.33	0.34	0.23	0.35	0.85	0.28	0.44	0.5	0.45	0.52	0.51	0.09	0.33	0%	0.24
Total Suspended Solids	mg/L	100	USEPA Multi-Sector General Permit	<20	24	20	43	**212**	66	34	<20	21	**477**	50	61	31	42	48	**111**	34	**124**	22%	0.79
Turbidity	NTU	20	Basin Plan	8.6	15.3	13.1	**40.7**	**104**	**34.5**	19.9	**31.2**	**22.4**	**234**	14.5	**30.9**	**27.3**	**34.8**	**32.3**	**58.1**	**24.5**	**59.6**	72%	2.24
Pesticides																							
Chlorpyrifos	µg/L	0.02	CA Dept. of Fish & Game	<0.03*	<0.03*	**0.03**	**0.043**	**0.051**	**0.048**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.002	<0.002	<0.002	25%	0.71
Diazinon	µg/L	0.08	CA Dept. of Fish & Game	**0.21**	**0.10**	0.08	0.051	0.051	0.038	<0.01	<0.01	<0.01	<0.01	0.038	<0.01	<0.01	<0.02	<0.02	<0.004	<0.004	<0.004	11%	0.43
Malathion	µg/L	0.43	CA Dept. of Fish & Game				<0.10	<0.10	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	0.095	<0.006	<0.006	0%	0.05
Hardness																							
Total Hardness	mg CaCO3/L			429	399	490	545	331	483	759	476	206	201	364	251	706	751	366	657	713	305		
Total Metals																							
Antimony	mg/L	0.006	Basin Plan	<0.002	0.003	<0.002	<0.002	0.006	**0.007**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	0.003	0.004	6%	0.48
Arsenic	mg/L	0.34/0.05	40 CFR 131/ Basin Plan	0.003	0.002	0.005	0.005	0.008	0.004	0.005	0.006	0.003	0.006	0.006	<0.002	0.008	0.005	0.006	0.015	<0.001	0.004	0%	0.10
Cadmium	mg/L	(b)	40 CFR 131	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.012**	0.003	<0.001	<0.001	6%	0.19
Chromium	mg/L	(b)	CTR (Cr VI)	0.005	<0.005	0.007	<0.005	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0%	0.01
Copper	mg/L	(b)	40 CFR 131	0.007	0.028	0.011	0.009	0.021	0.017	0.008	0.013	0.006	**0.025**	0.006	0.006	0.01	0.008	0.008	0.02	0.009	**0.029**	11%	0.51
Lead	mg/L	(b)	40 CFR 131	0.003	0.004	0.009	0.007	**0.035**	0.011	0.004	0.006	0.005	**0.060**	0.005	0.004	0.004	0.006	0.007	0.016	0.004	**0.024**	17%	0.98
Nickel	mg/L	(b)/0.1	40 CFR 131/ Basin Plan	0.004	0.005	0.004	0.007	0.005	0.005	0.005	0.003	<0.002	0.006	0.003	0.002	0.007	0.005	0.003	0.006	0.003	0.007	0%	0.03
Selenium	mg/L	0.02	40 CFR 131	<0.002	0.002	<0.002	<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	0.004	<0.004	0%	0.11
Zinc	mg/L	(b)	40 CFR 131	0.029	0.112	0.067	0.031	0.118	0.077	0.046	0.053	0.026	0.213	0.033	0.032	0.075	0.045	0.068	0.113	0.045	0.149	0%	0.23
Dissolved Metals																							
Antimony	mg/L	(e)	40 CFR 131	<0.002	<0.002	<0.002	0.002	0.007	0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.002		
Arsenic	mg/L	0.34 (c)	40 CFR 131	0.002	<0.001	0.002	0.004	0.003	0.003	0.004	0.003	0.002	<0.002	<0.002	<0.002	0.003	<0.001	<0.001	0.003	<0.001	<0.001	0%	0.01
Cadmium	mg/L	(b)	40 CFR 131	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%	0.09
Chromium	mg/L	(b)	40 CFR 131	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%	0.01
Copper	mg/L	(b)	40 CFR 131	0.006	0.015	<0.005	0.005	0.006	0.015	<0.005	0.005	<0.005	<0.005	<0.005	0.005	0.005	<0.005	<0.005	0.003	0.005	0.003	0%	0.19
Lead	mg/L	(b)	40 CFR 131	0.002	<0.002	<0.002	0.006	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	0%	0.14
Nickel	mg/L	(b)	40 CFR 131	0.003	0.005	0.002	0.006	<0.002	0.003	0.003	0.003	<0.002	0.003	0.002	0.002	0.003	0.004	0.002	0.004	<0.002	0.002	0%	0.02
Selenium	mg/L	0.02 (d)	40 CFR 131	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.004	<0.004	<0.004	0%	0.01
Zinc	mg/L	(b)	40 CFR 131	0.022	0.084	<0.020	0.026	0.037	0.070	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.053	0.026	0.035	<0.02	<0.02	<0.02	0%	0.07
Toxicity																							
Ceriodaphnia 96-hr	LC50 (%)	100		>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	0%	0.00
Ceriodaphnia 7-day survival	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0%	0.00
Ceriodaphnia 7-day reproduction	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	**50**	100	100	100	100	100	6%	0.11
Hyalella 96-hr	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	**25**	100	100	6%	0.22
Selenastrum 96-hr	NOEC (%)	100		100	**25**	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	6%	0.22

See last page for footnotes and source references.

Table 10-4. Analytes Measured at the San Diego River Mass Loading Station.

Blank spaces have been verified and no data is available due to changes in the monitoring program.

[1] The Water Quality Objectives (WQO) are benchmarks for comparison of storm water results and were selected by the Copermittee Monitoring Workgroup for this program.

(a) Un-ionized Ammonia is a calculated value, non-detectable values calculated at the detection limit. Basin Plan WQO is 0.025 mg/L; values shown here have been converted to µg/L.
(b) Water Quality Objective for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.
(c) Water Quality Objectives for dissolved metal fractions are based on water effects ratios (WER) and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.
(d) Water Quality Objective is based on the total recoverable form as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.
(e) USEPA has not published an aquatic life criterion value.

Shaded text – bold values are above the **CCC** water quality objective and bold/underlined results are above the **CMC** water quality objective.

* Indicates detection limit above water quality objective, and not included in frequency above water quality objective calculation.

Sources
USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final
Siepmann and Finlayson 2000.
Basin Plan, September 8, 1994.
Assembly Bill 411 - Title 17 of the California Code of Regulations, Section 7958.
USEPA Federal Register Document 40 CFR Part 131, May 18, 2000.

Conventional constituent results were below their respective water quality objectives with the exception of unionized ammonia, total suspended solids (TSS), total dissolved solids (TDS) and turbidity. Unionized ammonia results were above the water quality objective of 5 mg/L on October 14, 2006 (37.2 mg/L). TSS results were above the benchmark WQO of 100 ml/L on October 14, 2006 (111 mg/L) and February 19 2007 (124 mg/L). TDS results were above the water quality objective of 1,000 mg/L on October 14, 2006 (1,200 mg/L) and on January 30, 2007 (1,350 mg/L). Turbidity was above the benchmark WQO of 20 NTUs during all three monitoring events. Turbidity results, were above the benchmark WQO on October 14, 2006 (58.1 NTU), January 30, 2007 (24.5 NTU) and February 19, 2007 (59.6 NTU).

Fecal coliform is the only bacterial indicator with a water quality objective for wet weather monitoring. Fecal coliform results were above the REC-1 benchmark WQO of 400 MPN/100 mL during all three monitoring events. Results for fecal coliform ranged from 5,000 MPN/100mL on October 14, 2006 to 8,000 MPN/100 mL on January 30, 2007. Enterococci results ranged from 2,300 MPN/100ml to 17,000 MPN/100ml while total coliforms ranged from 14,000 MPN/100 mL to 30,000 MPN/100 mL.

The pesticides Chlorpyrifos and Diazinon were not detected in any sample during the 2006-2007 wet weather monitoring season. Malathion was detected only during the first monitoring event at a concentration of 0.095 μg/L on October 14, 2006. Although Malathion was detected, it was below the benchmark WQO.

Several total metals were detected in storm water samples collected during the 2006-2007 wet weather monitoring season. The total metals antimony, nickel, and zinc were detected in all three storm water monitoring events but were below their respective hardness-based benchmark WQOs. Total copper (0.029 mg/L) and total lead (0.024 mg/L) concentrations were above their chronic (CCC) hardness-based benchmark WQO during the February 19, 2007 storm event but were below their respective acute (CMC) benchmark WQO. No other metals were detected above the benchmark WQO criteria.

All dissolved metals were below detection limits with the exception of arsenic, copper, nickel, and zinc which were detected but were all below their respective benchmark WQO.

Toxicity was not observed for the acute or chronic survival endpoints for *Ceriodaphnia dubia* or for *Selenastrum capricornutum* during the 2006-2007 wet weather monitoring season. Toxicity was observed to *Hyalella azteca* during the October 14, 2006 monitoring event. This species had a No Observed Effect Concentration of 25 percent sample water.

10.2.2 Monitoring Results: Comparison to Benchmarks/Statistical analyses/Trends

An evaluation of storm water monitoring data collected at the San Diego River MLS over the past six monitoring years was performed. This evaluation compares the frequency of constituents measured above benchmark WQOs, statistical trend analyses, and comparison of the magnitude of values above benchmark WQOs.

10.2.2.1 Comparison to Benchmarks

Several constituents have had analytical results measured above their respective benchmark WQO. Fecal coliform and turbidity are two constituents that have frequently had results above their respective benchmark WQO. Fecal coliform results were above the benchmark WQO for a total of 16 of 18 storm events (89%). Turbidity results were measured above the benchmark WQO during 13 of 18 storm

events (72%). Results for nutrients have never been above their respective benchmark WQOs during any of the 15 storm events monitored.

Conventional constituents that have had concentrations measured above their respective benchmark WQO, but less frequently include the following:

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Un-ionized ammonia
- MBAS
- Total Dissolved Solids (TDS)
- Total Suspended Solids (TSS)

Historically, TDS results have typically been above the benchmark WQO during the first or second storm of the season but have been below the benchmark WQO during the last storm of the season. This is consistent with data provided by Padre Dam which is discussed later in this section and may be attributable to importation of water from the Colorado River.

Visual observation of the bacteriological results indicate that higher results consistently occur during the first storm event of each wet weather season in comparison to the second and third storm events monitored later in the season.

The synthetic pyrethroids Chlorpyrifos and Diazinon were not detected in samples collected from monitored storm events during the 2006-2007 monitoring season. Malathion was detected for the first time in five years of monitoring during the October 14, 2006 storm event. Chlorpyrifos had concentrations that were above the benchmark WQO during the 2001-2002 and 2002-2003 monitoring seasons. However, Chlorpyrifos has not been detected over the past four monitoring seasons. Diazinon results were above the benchmark WQO during the 2001-2002 wet weather monitoring season. However, diazinon results have steadily decreased over the past six years of monitoring and have not been detected since the 2002-2003 monitoring season.

During the last six years of monitoring, four total metals concentrations (antimony, cadmium, copper, and lead) have infrequently been above their respective benchmark WQO. One result for total antimony was above the basin plan WQO during the 2002-2003 monitoring season. The only detected total cadmium concentration over the past five years of monitoring occurred on March 11, 2006 and was above the hardness-based chronic benchmark WQO but below the acute benchmark WQO. Total copper and total lead have been detected in every sample since the 2001-2002 monitoring season. Only two results for total copper (October 27, 2004 and February 19, 2007) and three results for total lead (December 16, 2002, October 27, 2004 and February 19, 2007) were above the hardness-based chronic benchmark WQO. However, the results for both total copper and total lead were below their respective hardness-based acute benchmark WQO.

Results for dissolved metals have never been above their respective hardness-based acute or chronic benchmark WQO over the past five years of monitoring at the San Diego River MLS.

Toxicity has only been observed in three monitoring events over the past six years of monitoring at the San Diego River MLS. The first occasion of observed toxicity was in the algal growth endpoint for *Selenastrum capricornutum* on February 17, 2002. The second occasion of observed toxicity was in the

chronic reproductive endpoint for *Ceriodaphnia dubia* during the October 18, 2005 monitoring event. The third occasion of observed toxicity was in the growth endpoint of *Hyalella azteca* on October 14, 2006.

10.2.2.2 Trends

A non-parametric trend analysis was conducted using the Mann-Kendall trend test to evaluate the presence or absence of significant trends using all available monitoring data. This test is often employed for analysis of environmental time series data. The test does not assume any single distribution for the data being tested, which is an advantage when analyzing environmental data. This test does not incorporate magnitude, but instead calculates the number of positive and negative differences between samples. The number of positive and negative differences is summed to calculate the S statistic, which is compared to a table value to determine significance.

Sen's estimate of slope is shown on the graphs to illustrate the median trend of the data per constituent unit per year. This is a non-parametric estimate of slope that shows the change of constituent concentrations over time.

Any change in observed trends from prior year's data to 2006-2007 is likely affected by the new use of methodology in trend analysis. The 2006-2007 data set analysis utilized the Mann-Kendall method for trend analysis which is insensitive to outliers (see Methods Section 3.5). Only the scatterplots showing significant trends are shown in this WMA section. All other scatterplots can be found in Appendix C. A table of trend results including the S values and critical S values is also included in Appendix C.

Mann-Kendall trend analysis indicates that there is a statistically significant decreasing trend for dissolved arsenic (S=-51), dissolved copper (S=-67), and nitrate (S=-45; Sen's slope= -0.0909 mg/L/yr. Statistically significant increasing trends exist in the San Diego River for TSS (S=45; Sen's slope=7.8872) and turbidity (S=45; Sen's slope= 4.4227). The Mann-Kendall test does not allow the calculation of Sen's slope for datasets with greater than 15% non-detect values. As a result, Sen's slope is not reported for dissolved arsenic and dissolved copper. The increasing trend for turbidity has crossed the WQO benchmark. The increasing trend for TSS is below the WQO benchmark but is reason for concern.

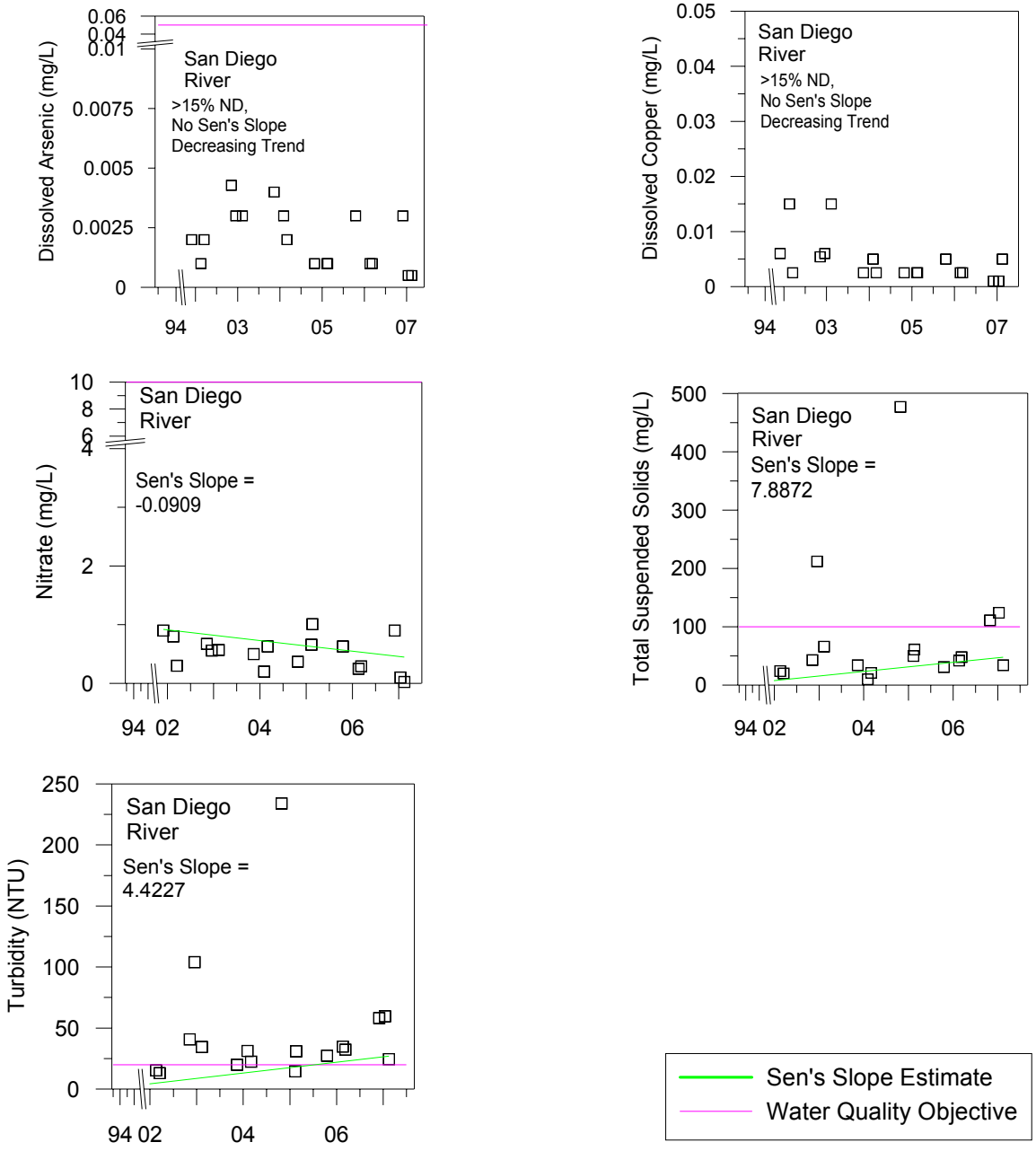


Figure 10-4. Scatterplots of Constituents With Significant Mann-Kendall Trends and Sen's Estimate of Slope.

10.2.2.3 Magnitude of Exceedance

In order to illustrate the magnitude of the water quality exceedances for 2006-2007, the ratio of water quality results to the benchmark WQOs were plotted for constituents that have had benchmark WQO exceedances. The results are shown in Figure 10-5. Fecal coliform, which was approximately 20 times greater than the benchmark WQO during the January 30, 2007 storm event, had the highest ratio of exceedance to benchmark WQOs of all measured constituents. An average magnitude exceedance ratio

was also determined for each constituent by calculating the mean ratio of water quality results to the benchmark WQOs from all storm events from October 2001 through April 2007. Mean ratios are illustrated in Figure 10-5. The largest mean ratio of exceedance for the period of record was for fecal coliform, which was approximately 38 times the benchmark WQO. Turbidity, which had the next largest average exceedance, was approximately twice the concentration of the benchmark WQO.

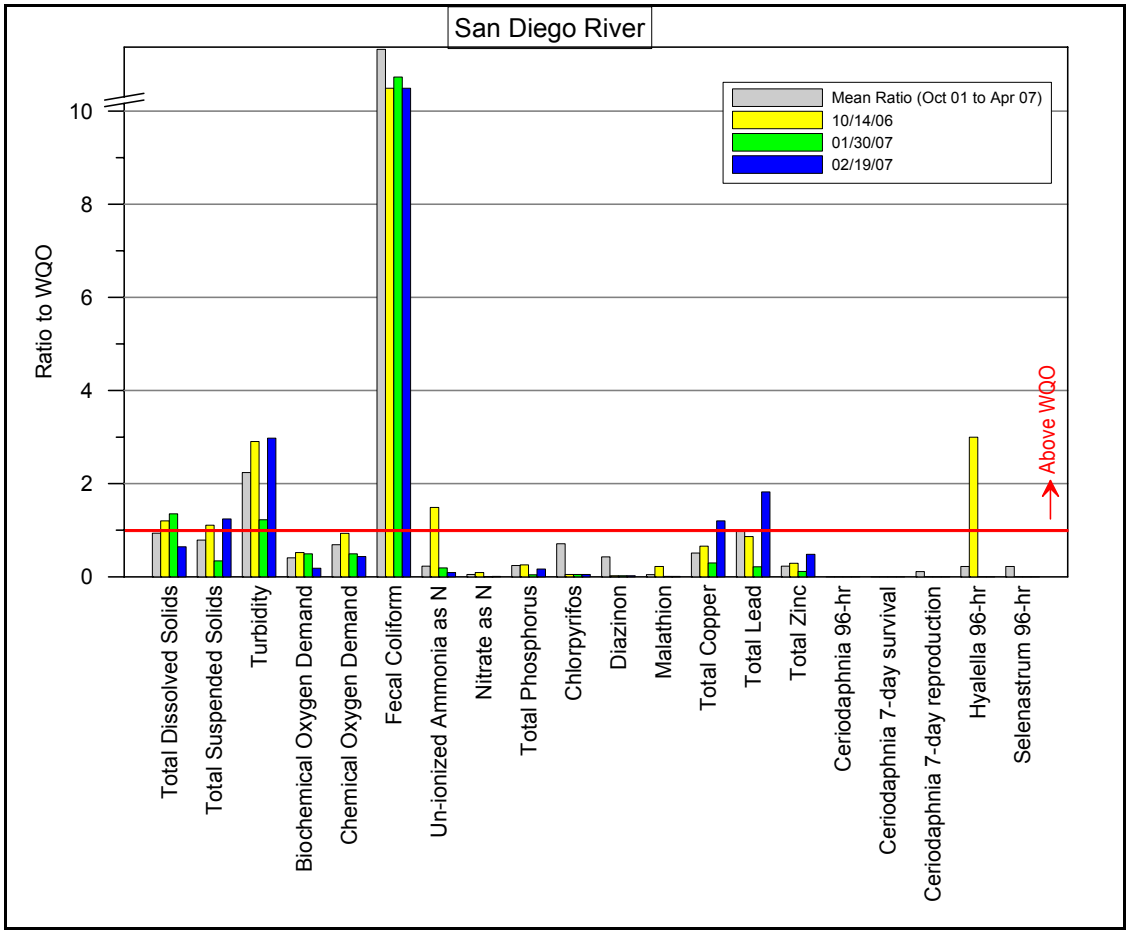


Figure 10-5. San Diego River Water Quality Ratios.

10.2.3 Wet Weather Constituent Loading Analysis

As discussed in the methods section, measured storm event loads may not represent the entire duration of the storm event due to monitoring constraints related to safety, autosampler pacings, and the unpredictable nature of rainfall events in general. For example, rain events can be scattered throughout the watershed and flow can stop and start again for any given storm event. Weston makes every attempt and uses best professional judgment to make decisions on cessation of sample collection. The modeled storm event loads represent the entire volume of runoff from the entire rainfall volume of the event. In order to compare the measured loads with the modeled loads, the proportion of the storm volume sampled must be determined. This proportion can be expressed as the ratio of the modeled volume of runoff for the storm event to the volume of water that passes by the MLS during sample compositing. This ratio is then used to estimate what the measured load would be if the entire event

runoff were sampled. The estimation of the full storm load allows the comparison to expected loading based on land use and rainfall event modeling.

Measured loading values for each constituent sampled were derived using the event mean concentration (EMC) values obtained from composite samples collected at the SDR MLS site and the recorded volume of water discharged during the sampling period. The entire runoff for each storm event runoff was derived using the "Simple Method" (Schueler, 1987) based on event rainfall amounts and impervious areas in the MLS catchment. Entire storm event loads were estimated from measured loads using the proportion of runoff estimated through modeling to that runoff measured during sample compositing. The Simple Method is limited in that it makes assumptions regarding rainfall across an entire watershed. The Simple Method does not account for storage, evaporative loses, or retardation which more complex models can handle. Additionally, rainfall may vary throughout a watershed in intensity, duration, and volume.

Measured storm event loads were compared to loading values derived from the National Stormwater Quality Database (NSQD) (Pitt et al., 2004). For each land use, the 25th percentile and the 75th percentile EMC from the NSQD were used to derive area weighted EMC values for each MLS catchment. The interquartile range (between the 25th and 75th percentiles) of these area-weighted loads can be used as expected loads based on the national database. One can evaluate the degree of measured loading in terms of the range of expected loads.

Measured loads (estimated for the entire storm event) were compared to the 25th and 75th percentile loads estimated through land use and rainfall modeling (Table 10-5). Measured loading values that were above the range of expected loads are identified in Table 10-5 with a "+" symbol. Measured loading values that were below the range of expected loads are identified with a "-" symbol. Measured loading values within the range of expected loads are shown with a "0" symbol.

The comparison of the sampled runoff to the total runoff shows a difference between events. The amount of runoff ranged between 10 and 27 times more than that sampled. This variation represents differences in the duration of composite sampling times between storm events which ranged from 7.8 hours to 13.7 hours and due to the limitations of the Simple Method.

Measured loads for total dissolved solids and bacterial indicators were greater than expected for a majority of the storm events sampled. Most of the constituents measured were within the expected range or lower than expected. In particular, metals consistently showed lower than expected loads for all the storms events sampled.

Table 10-5. Modeled Loading Values Compared to Measured Loading Values for San Diego River (SDR) Mass Loading Station.

MLS Station - Event	SDR-Event 1	SDR-Event 2	SDR-Event 3
Event Date	14-Oct-2006	30-Jan-2007	19-Feb-2007
Composite Duration (hours)	7.8	13.7	11.8
Modeled to Composite Runoff Ratio	10	13	27
Conventional Constituents			
Oil & Grease	0	0	0
Total Dissolved Solids	+	+	+
Total Suspended Solids	0	0	0
Biochemical Oxygen Demand, 5-day	+	0	0
Chemical Oxygen Demand	+	0	0
Nutrients			
Ammonia	0	0	+
Nitrate+Nitrite	0	–	–
Total Kjeldahl Nitrogen	0	0	+
Dissolved Phosphorus	0	–	0
Total Phosphorus	0	–	0
Metals			
Cadmium, Total	+	0	0
Cadmium, Dissolved	0	0	0
Chromium, Total	–	–	0
Chromium, Dissolved	0	0	0
Copper, Total	0	0	+
Copper, Dissolved	–	0	–
Lead, Total	0	–	0
Lead, Dissolved	–	–	–
Nickel, Total	0	–	0
Nickel, Dissolved	0	–	0
Zinc, Total	0	0	0
Zinc, Dissolved	–	–	–
Bacterial Indicators			
Fecal Coliform	+	+	+
Total Coliform	+	+	+

+ Loading is greater than expected
- Loading is less than expected
0 Loading is within the expected range

10.2.4 2006 Dry Weather Monitoring Data Evaluation

In addition to the wet weather monitoring discussed above, a separate dry weather monitoring program is carried out by each jurisdiction. Dry weather monitoring reports are provided separately by each jurisdiction in its Jurisdictional Urban Runoff Management Program (JURMP) Annual Report. Dry weather data is also provided in a regional data sharing format which is used for the watershed management area assessments and regional comparisons in this report as described in Section 3. A summary of the 2006

dry weather monitoring results for the San Diego River WMA are presented below in Table 10-6. Dry weather monitoring sites with field parameter and chemistry results are presented in this section and are shown on Figure 10-6.

Water quality monitoring was performed at 123 locations in the San Diego River WMA during the 2006 dry weather monitoring program. The total number of samples collected for each analyte may differ from the number of sample locations due to multiple sample analysis at each location. Of these, 106 sites are located upstream of the mass loading station in the San Diego River.

Table 10-6. Summary of the 2006 Dry Weather Monitoring Results in the San Diego River WMA.

Analyte	Units	DW Action Level	Number of Samples	RESULTS		
				Minimum	Mean	Maximum
Conductivity*	µS/cm	5,000	159	731	2,789	20,000
Oil & Grease	mg/L	15	62	1.60	2.87	24
pH	pH units	6.5-9	160	6.80	8.03	9.60
Enterococcus	MPN/100mL	10,000	67	10	10,321	130,000
Fecal Coliform	MPN/100mL	20,000	63	1	25,206	800,000
Total Coliform	MPN/100mL	50,000	63	10	406,713	16,000,000
Ammonia (NH3-N)	mg/L	1	152	0	0.41	3.50
Orthophosphate (PO4-P)	mg/L	2	140	0.01	0.29	5.50
Nitrate (NO3-N)	mg/L	10	158	0.06	3.32	15.46
MBAS	mg/L	1	63	0.03	0.31	6.30
Turbidity**	NTU	20	139	0.35	26.06	681
Chlorpyrifos	µg/L	0.5	64	0	0.06	2.50
Diazinon	µg/L	0.5	63	0.03	0.27	11.40
Hardness	mg CaCO3/L		63	4	682	5150
Cadmium Dissolved	µg/L	(a)	62	0.50	1.88	2.50
Copper Dissolved	µg/L	(a)	63	0.50	5.47	47
Lead Dissolved	µg/L	(a)	63	0.50	2.07	8.50
Zinc Dissolved	µg/L	(a)	63	1.91	34.70	311

* Action Levels were adopted by the Dry Weather Working Group (Table 3-8) and are based on best professional judgment (BPJ).

** For Action Level the Basin Plan benchmark WQO was used instead of BPJ when comparing with MLS data.

Mean values are calculated including non-detect results at half the reporting limit. If the mean value was less than the reporting limit, then the mean was not included in the table.

(a) Dry weather action level for dissolved metal fraction based on total hardness and calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000. If Total Hardness was greater than 400 mg/L, then 400 mg/L was used to calculate dissolved metals water quality objectives.

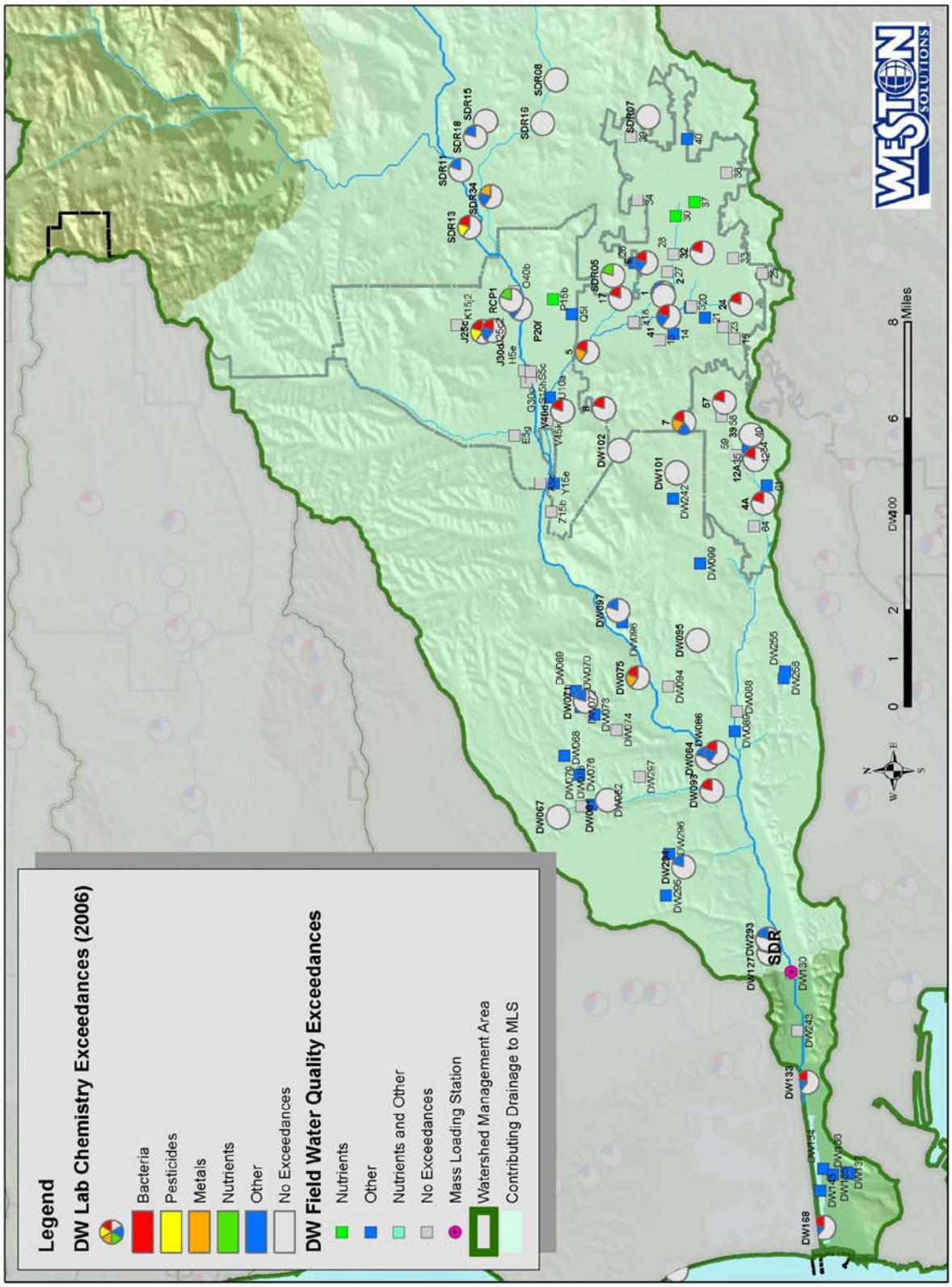


Figure 10-6. San Diego River WMA Dry Weather Exceedance Map.

Table 10-7 summarizes all of the 2006 Dry Weather Program constituents that were detected above action levels. Constituent results that were above the dry weather action level at the dry weather monitoring sites include oil and grease, pH, enterococcus, fecal coliform, total coliform, ammonia, nitrate, turbidity, chlorpyrifos, diazinon, dissolved cadmium, dissolved copper, and dissolved zinc.

Table 10-7. San Diego River WMA 2006 Dry Weather Exceedance Matrix.

Analyte	Category	Total	Number of Exceedances	Average Ratio of Exceedance*	St. Dev. Ratio of Exceedance
Conductivity	Other	159	14	0.56	0.58
Oil & Grease	Other	62	1	0.19	0.18
pH	Other	160	9	0.11	0.23
Enterococcus	Bacteria	67	15	1.03	2.42
Fecal Coliform	Bacteria	63	9	1.26	5.37
Total Coliform	Bacteria	63	23	8.13	40.47
Ammonia (NH3-N)	Other	152	8	0.41	0.51
Orthophosphate (PO4-P)	Nutrients	140	2	0.14	0.29
Nitrate (NO3-N)	Nutrients	158	7	0.33	0.33
MBAS	Other	63	4	0.31	0.81
Turbidity	Other	139	34	1.30	3.52
Chlorpyrifos	Pesticide	64	1	0.12	0.62
Diazinon	Pesticide	63	2	0.55	3.01
Cadmium Dissolved	Metals	62	2	0.17	0.52
Copper Dissolved	Metals	63	3	0.16	0.38
Zinc Dissolved	Metals	63	1	0.10	0.22
San Diego River Total		**1604**	**135**	**0.74**	**8.29**

* Average ratio of exceedance is equal to the average concentration for all samples collected divided by the dry weather action level.

Constituents with average ratios of exceedance and standard deviations greater than one indicate exceedances that occur more frequently. Constituents with average ratios of exceedance less than one indicate exceedances that occur on a more random and infrequent basis. In the San Diego River WMA, diazinon, enterococcus, total coliform and turbidity had average ratios of exceedance greater than one.

Figure 10-6 depicts the 2006 dry weather program monitoring sample locations. Locations shown with circles have both field parameters and laboratory sample results. Locations shown as squares have field parameter results only. Pie symbols appear at dry weather stations that have had dry weather action level exceedances. The colored slices of the pie show the different constituent groups that contributed to the exceedances.

10.2.5 Third Party Data

Third party data was collected from the San Diego River Watershed under the Surface Water Ambient Monitoring Program (SWAMP), by Padre Dam Municipal Water District, and by D-Max for the City of La Mesa. The SWAMP data meets the acceptability for assessment under this program since it is performed under the SWAMP QA program. Padre Dam and City of La Mesa data meets the criteria since it is analyzed by a laboratory certified by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP). Additional third party data may be considered for future assessments upon determination that it has met QA acceptance criteria as detailed in Section 3.1.1 of the Watershed Data Assessment Framework (MEC-Weston, 2004).

10.2.5.1 Padre Dam Data

Third party data was provided by Padre Dam Municipal Water District (Padre Dam) and is presented in Table 13-23 of the Regional Assessments (Section 13 and in Appendix H). Monthly monitoring results collected from January 2006 through December 2006 at six locations upstream from the MLS were

assessed. The results were evaluated and compared to wet weather benchmark WQOs and dry weather action levels. Parameter groups that were included in the Padre Dam data include nutrients, conventional constituents, and microbiology. The sample results from Padre Dam represent a snapshot of the water quality conditions upstream of the MLS throughout the year. For parameters on the 303(d) list for the lower San Diego River, results from Padre Dam were above the Basin Plan WQO for TDS in 59 of 71 samples; dissolved oxygen results were did not meet the benchmark WQO standard (of > 5.0 mg/l) in 31 of 72 samples, and fecal coliform results were above the benchmark WQO in 21 of 72 samples. Although phosphorus is on the 303(d) list for the lower San Diego River, no phosphorus results were above the benchmark WQO during 2005 or 2006 in samples from Padre Dam.

Turbidity results were above the benchmark WQO in 5 of 72 samples; pH results were above the benchmark WQO in 2 of 72 samples; and *E. coli* results were above the benchmark WQO in 20 out of 72 samples. Results for pH were above the benchmark WQO at two locations during the month of August, but were between the bracketed benchmark WQOs of 6.5 to 8.5 at all other times of the year for each of the six locations. Parameters that were above benchmark WQOs in Padre Dam data, dry weather data, and wet weather MLS data in the 2006-2007 monitoring season include turbidity, fecal coliform, and total coliform.

10.2.5.2 Third Party SWAMP Data

Third party data was collected from the San Diego River Watershed under the Surface Water Ambient Monitoring Program (SWAMP) in May 2004 (Appendix H). This data meets the acceptability for assessment under this program since it is performed under the SWAMP QA program. Additional third party data may be considered for future assessments upon determination of meeting the QA acceptance criteria as provided in the Methods Section 3.0. A full suite of constituents were analyzed including organochlorine pesticides, triazine herbicides, PAHs, and PCBs in addition to metals, inorganics, and physical measurements.

A total of four sample locations were monitored in the San Diego River WMA. One sample each was collected from Boulder Creek, Los Coches Creek, Forrester Creek, and the San Diego River. Constituents with sample results above the benchmark WQO include turbidity, sulfate, and manganese. Turbidity was above the benchmark WQO only in the Boulder Creek sample (31.1 NTU). Sulfate (277 mg/L) and manganese (estimated value of 121 mg/L) were above the benchmark WQO only in the San Diego River Sample.

Only one organochlorine pesticide (oxadiazon) was detected, only in the Forrester Creek and San Diego River samples (0.01e μg/L and 0.024 μg/L, respectively). The triazine herbicides propazine, simazine, and terbuthylazine were detected in the Forrester Creek sample (0.133e μg/L, 0.1e μg/L, and 0.113e μg/L respectively), while secbumeton and terbuthylazine were detected in the San Diego River (0.243e and 0.314e μg/L, respectively). No other pesticides, PAHs, or PCBs were detected in the four samples collected during the 2004 SWAMP program in the San Diego River WMA.

10.2.5.3 Third Party Data (La Mesa)

Additional third party data was received from the City of La Mesa. Both dry and wet weather data were collected for the purposes of evaluating land use contributions within the City of La Mesa. This data was also used for the purposes of evaluating analytes of concern related to the San Diego River. One storm water sample event was conducted on 4/2/07 at two locations in the Alvarado Channel drainage area of the San Diego River Watershed. Dry weather sample events were conducted at the same locations on 6/26-27/07. Samples were collected by D-Max Engineering under contract with the City of La Mesa.

Wet weather samples were time-weighted composites while the dry weather samples were collected as grab samples. Wet weather samples were analyzed for conventional constituents, fecal bacterial indicators, dissolved metals, and organophosphate pesticides. The wet weather monitoring event provides additional useful data for the comparison of sample results to benchmark WQOs. The dry weather samples were collected outside of the 2006-2007 monitoring period and were, therefore, not used for the comparison of dry weather exceedances in the watershed management area assessment. Summary data tables can be found in Appendix H.

Constituents with sample results above the benchmark WQO include turbidity, TDS, and fecal coliforms. Turbidity was the only constituent measured above the benchmark WQO during the storm event in the Alvarado Channel location (Alv-1), while fecal coliforms and turbidity were above the benchmark WQO during the storm event in the Alvarado Channel location (Alv-2). During dry weather sampling, fecal coliforms and TDS were above the benchmark WQO at the Alv-1 location while fecal coliforms only were above the benchmark WQO at the Alv-2 location.

10.2.6 TIEs

Toxicity identification evaluation (TIE) testing was not performed on San Diego River samples. This mass loading station has not been identified as a TIE candidate site based upon past Triad Decision Matrix evaluations. Toxicity was observed for the reproductive endpoint (NOEC=25%) for *H. azteca* during the October 14, 2006 storm event but could not be attributed to any of the chemical constituents measured in the storm water sample. No other toxicity was observed in the remaining monitored storm events during the 2006-2007 monitoring period.

10.2.7 Watershed Water Quality Monitoring Summary

Turbidity, TDS, and elevated levels of bacterial indicators, specifically fecal coliform, appear to be the primary water quality concerns within the watershed. The Padre Dam data also indicates that dissolved oxygen levels are a concern during the summer months as they fell below the benchmark WQO of 5 mg/L in 20 of 24 samples collected between June and September 2006. Based on the period of record, there is a statistically significant downward trend in dissolved arsenic, dissolved copper, and nitrate concentrations while there is a significant increasing trend in TSS and turbidity.

10.3 Stream Bioassessment

Stream bioassessment in the San Diego River WMA included two urban affected monitoring sites and one reference site. The upstream urban site was located in Mission Trails Regional Park (SDR-MT), and the downstream site was located upstream of the Morena Blvd. overcrossing in Mission Valley (SDR-1). A reference site was located on Boulder Creek upstream of Boulder Creek Road (REF-BCR).

To assess the quality of the benthic macroinvertebrate communities at each site, biological metrics were calculated as well as two summary indices. The summary indices included a multi-metric Index of Biotic Integrity (IBI) and an Observed to Expected ratio (O/E), both of which are specific to Southern California ecological conditions.

The IBI is the cumulative score (0-70) of seven biological metrics, with the final score divided into five quality rating categories ranging from Very Poor to Very Good. An IBI score above 26 is presumed to represent unimpacted conditions. O/E is the ratio of organisms observed at a site (O) to the organisms expected to occur at a site (E). An O/E ratio of greater than 0.8 indicates unimpacted conditions, and represents a 20 percent loss of expected taxa (i.e. 0.8 is 20 percent below 1.0). These indices are described in greater detail in Methods Section 3.2.7. While the IBI and O/E ratio are very useful at broadly identifying impairment, analysis of individual taxa present (often in low numbers) may provide signals of benthic community quality that are too weak to be represented by summary indices.

An additional analysis was performed to assess macroinvertebrate community quality trends since the beginning of this monitoring program in 2001. The analysis was performed separately for the two summary indices described above, the IBI and O/E ratios.

10.3.1 Results and Discussion

San Diego River in Mission Trails Regional Park: SDR-MT

The Mission Trails monitoring site had a benthic community with an Index of Biotic Integrity rating of Very Poor for both the October 2006 and May 2007 survey, with IBI scores of 9 and 4, respectively (Table 10-8). The results of the O/E analysis show that the Mission Trails monitoring site had O/E ratios of 0.82 and 0.58. This implies that the benthic community has lost an estimated 28 to 42 percent of the biodiversity expected to occur at the site.

There were 23 and 17 different taxa collected in October and May, respectively. Five and four different ephemeroptera, plecoptera, and trichoptera taxa were collected in the surveys. There were no organisms collected that are highly intolerant (sensitive) to impairment, and percent tolerant taxa were about 14 and 17 percent of the community in October and May, respectively.

Table 10-8. Selected Biological Metrics and Physical Measures of the San Diego River Watershed Management Area.

San Diego River Watershed Management Area	San Diego River in Mission Trails Regional Park (SDR-MT)		San Diego River Upstream of Morena Blvd. (SDR-1)		Boulder Creek Reference Site (REF-BCR)	
Survey	**Oct-06**	**May-07**	**Oct-06**	**May-07**	**Oct-06**	**May-07**
Index of Biotic Integrity/ Qualitative Rating*	**9 Very Poor**	**4 Very Poor**	**7 Very Poor**	**0 Very Poor**	**35 Fair**	**28 Fair**
O/E Ratio**	**0.82**	**0.58**	**0.27**	**0.27**	**1.02**	**0.86**
Metrics						
Taxa Richness	23	17	8	10	28	24
EPT Taxa (mayflies, stoneflies, and caddisflies)	5	4	0	0	9	11
% Intolerant Taxa	0.0%	0.0%	0.0%	0.0%	0.4%	1.2%
% Tolerant Taxa	14.1%	16.8%	23..5%	14.6%	33.3%	10.8%
Average Tolerance Value	5.9	5.6	6.2	5.1	6.3	5.6
% Collector Filterers +Collector Gatherers	94%	94%	85%	97%	59%	77%
Physical Measures						
Elevation	180		10		2,655	
Physical Habitat Score	168	156	127	139	163	159
Riffle Velocity (ft/sec)	1.0	1.4	1.5	1.3	2.4	1.1
Substrate Composition						
Silt	4%		3%	3%		
Sand	16%	14%	13%	20%	28%	25%
Gravel	7%	23%	18%	19%	22%	19%
Cobble	56%	32%	46%	25%	20%	28%
Boulder	12%	20%	15%	20%	30%	20%
Roots	5%	11%	5%	13%		8%
Water Quality						
Temperature °C	14.8	18.7	20.2	22	10.6	24.7
pH	8.2	8.0	7.5	7.8	8.1	8.0
Specific Conductance (ms/cm)	2.687	2.306	3.742	1.961	0.432	0.330
Dissolved Oxygen (mg/l)	10.04	8.99	6.92	5.61	nr	11.00

*IBI Score 0-13=Very Poor, 14-26=Poor, 27-40=Fair, 41-55=Good, 56-70=Very Good

**O/E ratio of >0.8 represents unimpacted conditions

Overall, the benthic community was similar in each survey. Both surveys had high numbers of Baetid mayflies (*Baetis* and *Fallceon quilleri*) and chironomid midges (Table 10-9). There were also relatively high numbers of non-insect taxa collected. The most notable difference between surveys was the abundance of hydropsychid caddisflies, with 67 individuals collected in October and 7 in May. Percent Collector Filterers plus Collector Gatherers as well as percent Predators were nearly identical between the two surveys.

Table 10-9. Macroinvertebrate Community Summary: Five Most Abundant Taxa for San Diego River Watershed Management Area

Site	Date	Taxon	Common Name	Percent Composition	Tolerance Value	Functional Feeding Group
San Diego River in Mission Trails Regional Park (SDR-MT)	Oct-06	**Chironomidae**	**non-biting midges**	**39%**	**6**	**Collector Gatherer/Filterer**
		Fallceon quilleri	minnow mayfly	20%	4	Collector Gatherer
		Cheumatopsyche	net-spinning caddisfly	12%	5	Collector Filterer
		Corbicula	clam	7%	10	Collector Filterer
		Simulium	black fly	7%	6	Collector Filterer
	May-07	***Fallceon quilleri***	**minnow mayfly**	**32%**	**4**	**Collector Gatherer**
		Simulium	black fly	23%	6	Collector Filterer
		Chironomidae	non-biting midges	15%	6	Collector Gatherer/Filterer
		Ostracoda	seed shrimp	9%	8	Collector Gatherer
		Baetis	minnow mayfly	8%	5	Collector Gatherer
San Diego River Upstream of Morena Blvd. (SDR-1)	Oct-06	**Chironomidae**	**non-biting midges**	**58%**	**6**	**Collector Gatherer/Filterer**
		Hyalella	amphipod	22%	8	Collector Gatherer
		Turbellaria	flatworm	15%	4	Predator
		Oligochaeta	earthworm	2%	5	Collector Gatherer
		Americorophium	amphipod	1%	4	Collector Gatherer
	May-07	***Americorophium***	**amphipod**	**63%**	**4**	**Collector Gatherer**
		Chironomidae	non-biting midges	19%	6	Collector Gatherer/Filterer
		Hyalella	amphipod	9%	8	Collector Gatherer
		Simulium	black fly	3%	6	Collector Filterer
		Physa	aquatic snail	3%	8	Scraper
Boulder Creek Reference Site (REF-BCR)	Oct-06	**Chironomidae**	**non-biting midges**	**22%**	**6**	**Collector Gatherer/Filterer**
		Physa	aquatic snail	12%	8	Scraper
		Gyraulus	aquatic snail	11%	8	Scraper
		Cheumatopsyche	net-spinning caddisfly	8%	5	Collector Filterer
		Hydropsyche	net-spinning caddisfly	8%	4	Collector Filterer
	May-07	**Chironomidae**	**non-biting midges**	**39%**	**6**	**Collector Gatherer/Filterer**
		Fallceon quilleri	minnow mayfly	12%	4	Collector Gatherer
		Baetis	minnow mayfly	10%	5	Collector Gatherer
		Ochrotrichia	micro caddisfly	6%	4	Piercer Herbivore
		Argia	dancer damselfly	6%	7	Predator

The physical habitat of the monitoring reach was optimal. The substrate had very complex cobble, boulder, and tree root niche space suitable for colonization. The willow riparian zone was mostly undisturbed and the relatively steep gradient of the river made for good current velocity. Specific conductance values of 2.687 and 2.306 mS/cm were recorded in October and May, respectively. Values for pH were 8.2 and 8.0.

Measurement of benthic community quality at the Mission Trails site for the October survey was considerably different based on the IBI score versus the O/E ratio. An O/E ratio of 0.82 is considered to be above the threshold for impairment while the IBI score indicated the site was impaired. The site had relatively high overall organism diversity, but with 10 non-insect taxa, which was the highest of any of the sites in the program. There were also no highly intolerant (sensitive) taxa collected, no Coleoptera (beetle) taxa, and the EPT taxa collected are all known to tolerate urban runoff constituents such as nutrients and fine particulates (but not high levels of chemical pollutants). Considering these individual metrics, the true level of biotic integrity was likely somewhere between the IBI and O/E results, and the community should be considered slightly impaired.

The San Diego River mass loading station was too spatially disconnected from the Mission Trails site to correlate any of the storm water information with the benthic community.

Summary Indices Results Over Time

The Mission Trails site has been sampled 11 times and in every survey since October 2002. The mean IBI scores have shown some seasonal variation, with mean values of 14.2 for October surveys and 10.2 for May surveys (Figure 10-7). There were higher scores in October for every year of sampling except 2002. IBI scores have ranged from 4 in May 2007 to 20 in October 2004, and all were below the IBI impairment threshold.

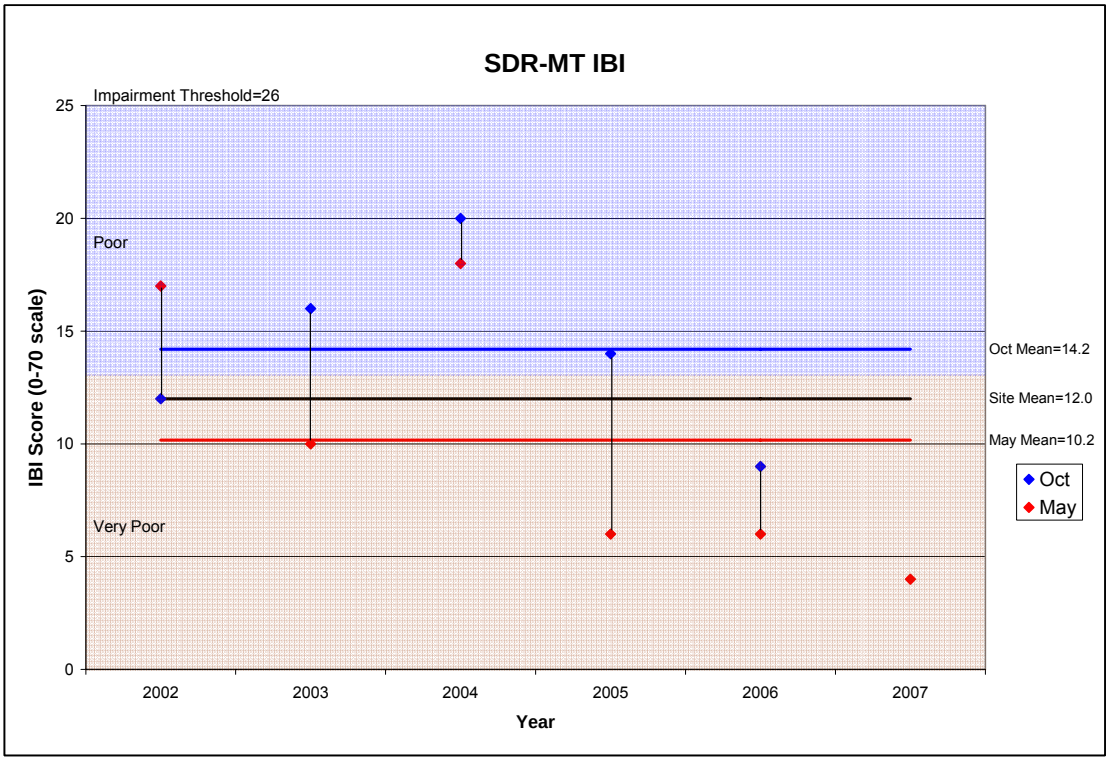


Figure 10-7. Index of Biotic Integrity for San Diego River in Mission Trails Regional Park (SDR-MT).

The mean O/E ratios for Mission Trails were 0.75 for October surveys and 0.58 for May surveys (Figure 10-8). Three surveys had O/E results that rated the benthic communities unimpaired: October 2002, May 2004, and October 2006. There were some discrepancies between the IBI scores and the O/E ratios. The October 2002 O/E ratio was well above the impairment threshold (i.e. unimpaired) and rated much higher than the May survey while the IBI rated the site Very Poor and with the May survey rated higher than the October survey. Considering the benthic community composition, e.g. low EPT richness and no intolerant or Coleoptera taxa, it is unlikely that the site should have O/E values within the range of reference conditions.

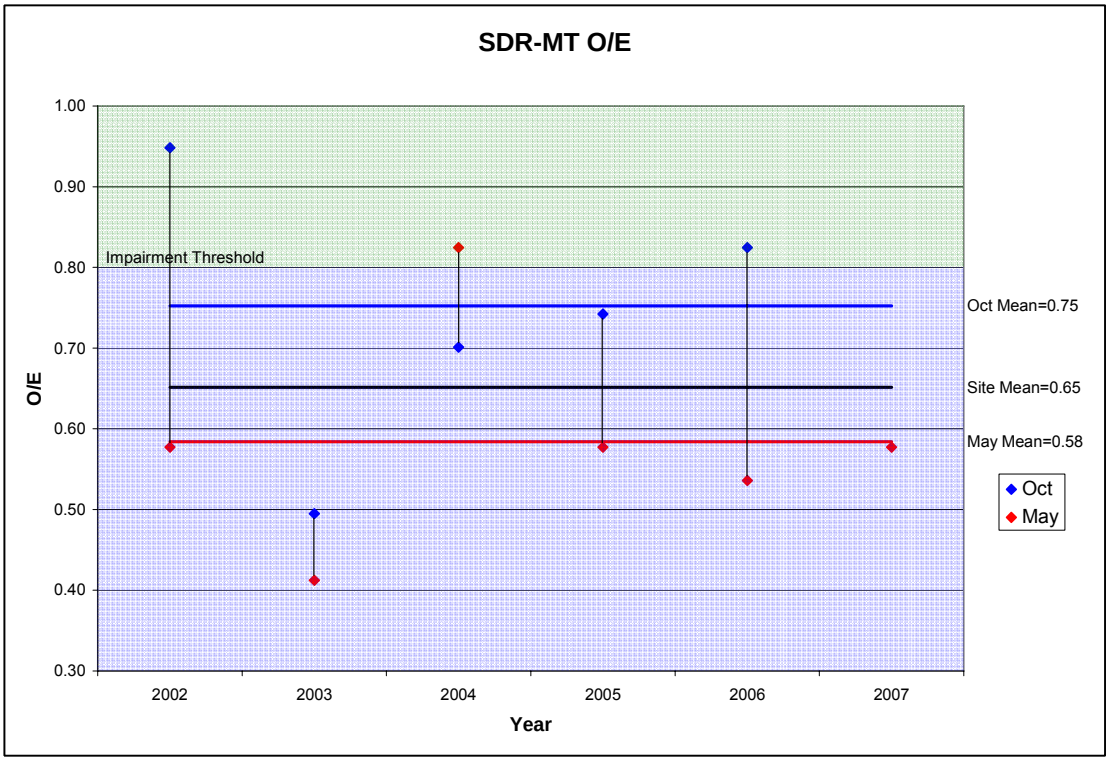


Figure 10-8. O/E Ratio for San Diego River in Mission Trails Regional Park (SDR-MT).

San Diego River at Morena Blvd.: SDR-1

The Mission Valley monitoring site had a benthic community with an Index of Biotic Integrity rating of Very Poor for both the October 2006 and May 2007 surveys, with IBI scores of 7 and 0, respectively (Table 10-8). The results of the O/E analysis show that the Mission Valley monitoring site had an O/E ratio of 0.27 for each survey. This implies that the benthic community has lost an estimated 73 percent of the biodiversity expected to occur at the site.

There were 8 and 10 different taxa collected in October and May, respectively, and there were no EPT taxa collected in either survey. There were no organisms collected that are highly intolerant (sensitive) to impairment, and the percent tolerant taxa comprised 59 and 77 percent of the community in October and May, respectively.

The benthic community was dominated by Amphipods (*Americorophium* and *Hyalella*) and chironomid midges in both surveys (Table 10-9). Most other constituents of the community were similar for both surveys, with the exception of flatworms, which were much more abundant in the October survey. The amphipod, *Americorophium*, an estuarine species tolerant of freshwater is typically collected in high numbers at this site, likely recruiting from the San Diego River estuarine habitat.

The physical habitat of the monitoring reach was sub-optimal. The San Diego River has a very low gradient through most of Mission Valley, although the riffles sampled are some of the few places where

current velocity is greater than 1 ft/sec. and cobble is present. Specific conductance was relatively high in October and much lower in May, with values of 3.742 and 1.961 ms/cm. Values for pH were 7.5 and 7.8.

The San Diego River mass loading station was located approximately one mile upstream of the bioassessment station and water quality measures may be correlated with the site. Turbidity was the only constituent of concern identified during storm water sampling that would have a negative impact on the biological community (Table 10-4). Toxicity was observed in the 96-hour acute *H. azteca* test during one wet weather monitoring event. No toxicity to either Ceriodaphnia or Selenastrum was observed. TDS was above the benchmark WQO during the first two monitoring events, and was present in high enough concentrations to have a possible cumulative impact on sensitive organisms. Considering the very low IBI scores of the bioassessment site, it is possible that there may be unmeasured constituents contributing to the degradation of the biological community.

Summary Indices Results Over Time

The San Diego River Mission Valley site has been sampled 11 times and in every survey since October 2002. The mean IBI scores have been consistent, with mean values of 4.0 for October surveys and 2.7 for May surveys (Figure 10-9). Unlike most of the sites in San Diego County, there was not the seasonal pattern of higher quality biological assemblages in October. IBI scores have ranged from 0 to 8 indicating a consistently highly degraded benthic community.

The mean O/E ratios for Mission Trails were 0.37 for October surveys and 0.35 for May surveys (Figure 10-10). The O/E means were very similar to one another and all rated the benthic community as impaired. The IBI scores and O/E values were in agreement, with the highest rating given to the October 2004 survey and neither expressing any notable seasonality.

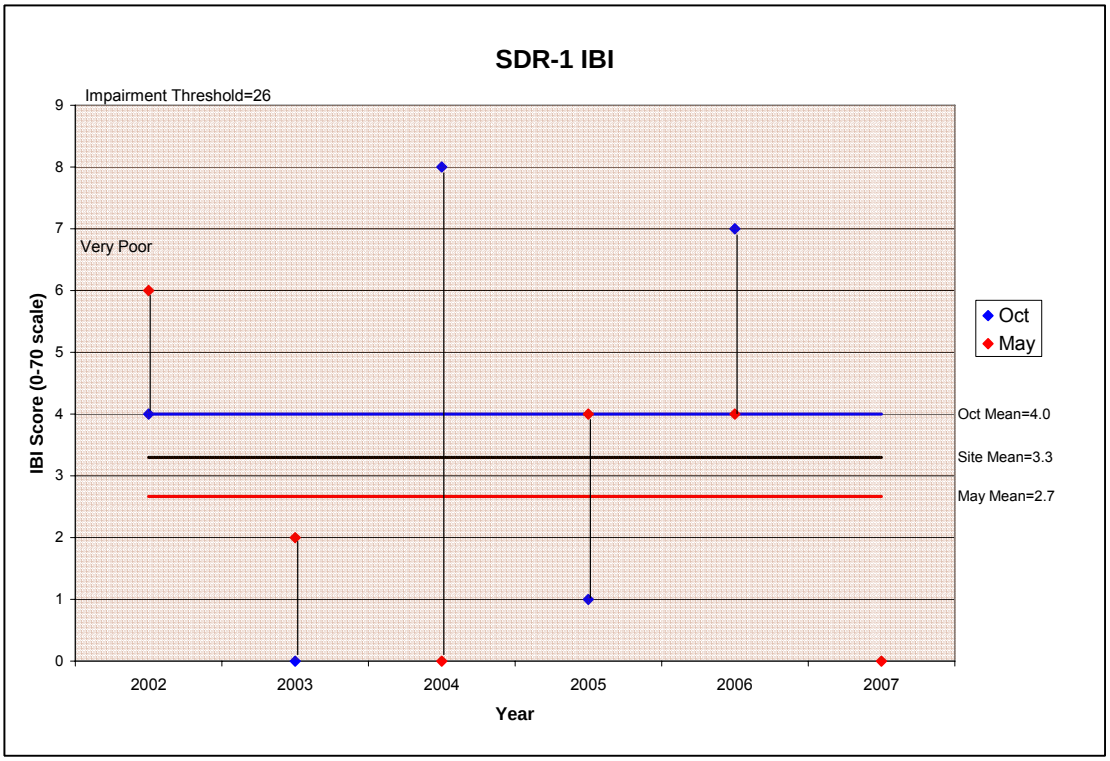


Figure 10-9. Index of Biotic Integrity for San Diego River at Morena Blvd. (SDR-1).

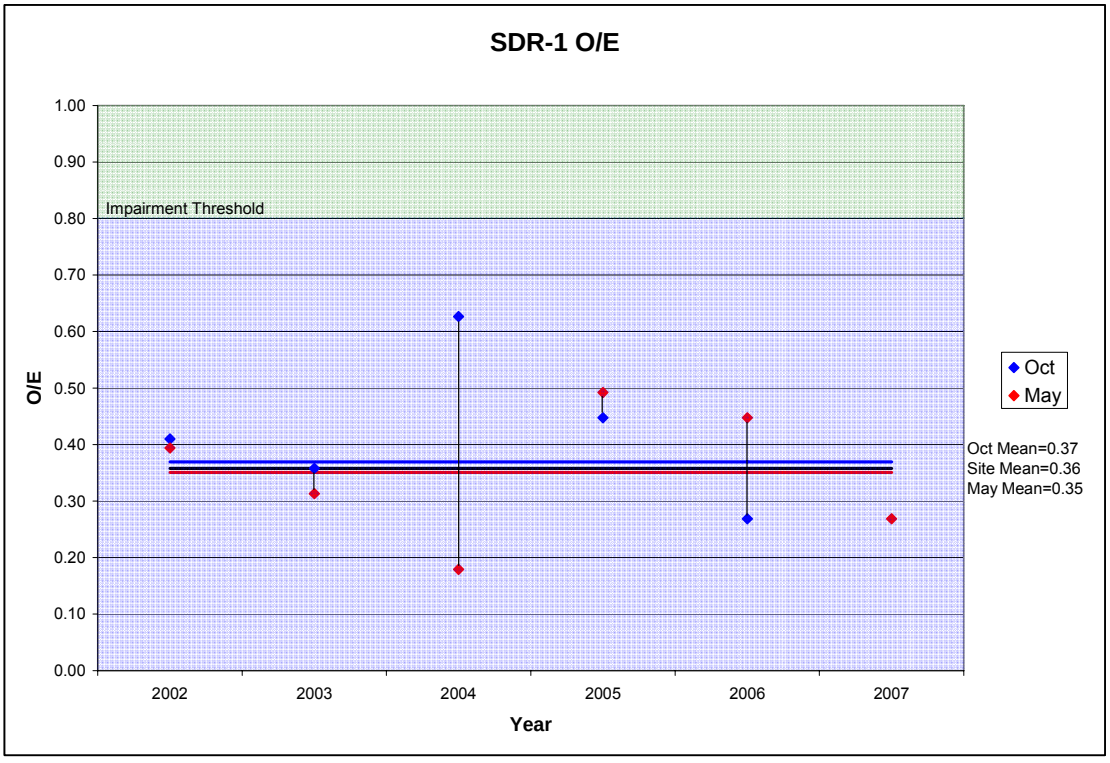


Figure 10-10. O/E Ratio for San Diego River at Morena Blvd. (SDR-1).

10.3.2 Third Party Bioassessment Data

Third party bioassessment data were assessed from three different projects (Table 10-10). Padre Dam Municipal District sampled two sites in the San Diego River main stem in Santee (at Carlton Hills Blvd. and at Old Mission Dam) as part of an NPDES permit requirement (Weston, 2007). The City of Santee sampled two sites in Forrester Creek in support of a grant funded restoration project (City of Santee, unpublished data), and the County of San Diego sampled an unnamed tributary to Las Coches Creek/San Diego River as part of a BMP effectiveness study in Woodside Basin in Lakeside. Weston Solutions, Inc. collected and processed all of the data from these projects (Weston, 2007).

The Padre Dam monitoring sites typically had lower IBI scores than the nearest County bioassessment site in Mission Trails Park, which was further downstream. The mean IBI scores were 3.7 and 5.6 at Carlton Hills Blvd. and Old Mission Dam, respectively. The mean IBI score in Mission Trails Park was 10.0. This may indicate some water quality recovery from the urban effects of El Cajon, Santee, and Lakeside, as IBI scores increased with distance from these cities. IBI scores in Forrester Creek and Las Coches Creek were consistently higher than the Padre Dam monitoring sites, with mean values ranging from 10.0 to 16.5. These two tributaries enter the San Diego River relatively near the Padre Dam sites. Although the macroinvertebrate communities in these tributaries were classified as impaired, they also indicate that the tributaries probably had slightly better water quality than the receiving waters of the San Diego River.

Table 10-10. Third Party Data, Index of Biotic Integrity Scores for San Diego River Monitoring Sites.

Program	Site ID	2004		2005		2006		2007	Mean
		Spring	Fall	Spring	Fall	Spring	Fall	Spring	
Padre Dam NPDES Monitoring (San Diego River)	SDR-CHB	1	9	2	3	2	5	4	3.7
	SDR-OMD	4	8	2	4	6	8	7	5.6
SD County-Woodside Basin (unnamed trib. to Las Coches Creek)	WB-US			17			3		10.0
	WB-DS			20			13		16.5
City of Santee (Forrester Creek)	FC-US			12	9	18	4		10.8
	FC-DS			11	9	21	8		12.3

Boulder Creek Reference Site: REF-BCR

The Boulder Creek reference monitoring site had a benthic community with IBI scores of 35 and 28 and quality ratings of Fair for the October 2006 and May 2007 surveys (Table 10-8). The results of the O/E analysis show that the Boulder Creek Reference monitoring site had O/E ratios of 1.02 in October and 0.86 in May. This implies that the benthic community ranged from being virtually as expected to having lost an estimated 14 percent of the biodiversity expected to occur at the site.

There were 28 and 24 different taxa collected, with 9 and 11 different EPT taxa in October and May, respectively. There were two sensitive EPT taxa collected in October, and five collected in May. Organisms that are highly intolerant (sensitive) to impairment accounted for 0.4 percent of the community in October and 1.2 percent in May.

The benthic community was dominated by chironomid midges in each survey, but other major constituents of the community showed seasonal variability. In the October survey, the snails, *Physa* and *Gyraulus*, and hydropsychid caddisflies were much more abundant than in the May survey. Baetid mayflies (*Baetis* and *Fallceon quilleri*), the microcaddisfly, *Ochrotrichia*, and the damselfly, *Argia* were more abundant in May (Table 10-9). A number of rare and/or sensitive taxa were collected at the site including ephemerellid and hegtageniid mayflies, the caddisfly, *Helicopsyche borealis*, and belostomatid water bugs.

The stream habitat was optimal, with an oak and sycamore riparian zone and a substrate of layered cobble and boulder. The site lacked heavy canopy cover, which allowed for a fair amount of springtime algae growth. Specific conductance values were 0.432 and 0.330 ms/cm and pH values were 8.1 and 8.0.

Summary Indices Results Over Time

The Boulder Creek reference site has been sampled 4 times since the beginning of the program. The mean IBI scores have shown some seasonal variation, with mean values of 30.0 for October surveys and 29.5 for May surveys (Figure 10-11). There has been little variation for May surveys while October surveys have been less consistent.

The mean O/E ratios for Boulder Creek were 1.02 for October surveys and 0.75 for May surveys, with an overall site mean of 0.89 (Figure 10-12). One of the four surveys (May 2006) had O/E results that rated the benthic communities impaired, although the IBI score for this survey did not indicate an impaired benthic community.

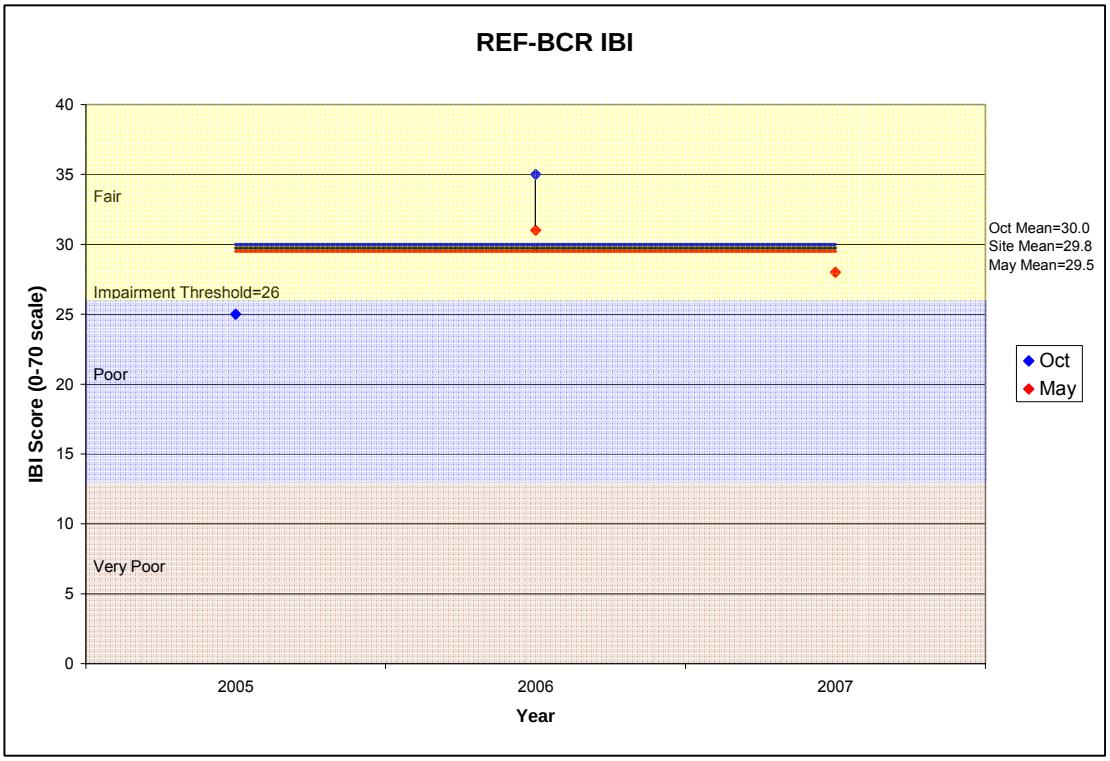


Figure 10-11. Index of Biotic Integrity for San Diego River at Boulder Creek Reference Site (REF-BCR).

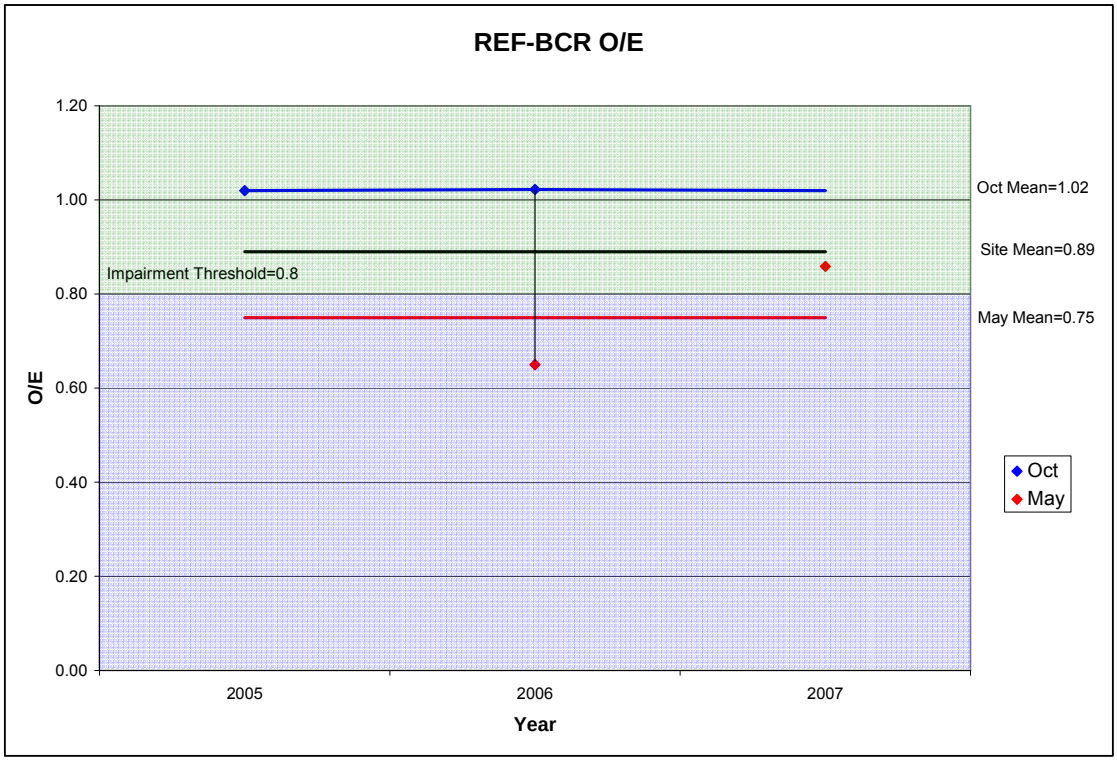


Figure 10-12. O/E Ratio for San Diego River at Boulder Creek Reference Site (REF-BCR).

10.3.3 Stream Bioassessment Summary

The San Diego River WMA was sampled at three monitoring sites, including two urban sites and one reference site. The reference site on Boulder Creek had IBI ratings of Fair for both surveys, and O/E ratios indicating unimpaired benthic communities. The urban sites included one site in Mission Trails Regional Park and one site near Morena Blvd. in Mission Valley. The Mission Trails site had an IBI rating of Very Poor, but O/E ratios that indicated less impairment to the benthic communities. The October survey O/E ratio was above the impairment threshold (i.e. unimpaired), although other aspects of the benthic community indicated some level of impairment. The Mission Valley site had IBI ratings and O/E ratios that indicated highly degraded benthic communities.

Since the beginning of the program, the Mission Trails site has had a mean IBI score of 12.0 and a mean observed to expected taxa ratio of 0.65. The O/E has rated the site unimpaired for three of the surveys. The Mission Valley site has had a mean IBI score of 3.3 and a mean O/E ratio of 0.36. Both of these indices indicate that the biological community in Mission Valley has been highly degraded throughout the duration of the monitoring program.

10.4 San Diego River WMA Assessment

The San Diego River Watershed Management Area was assessed utilizing chemistry and toxicity data collected during storm events from a single MLS, field and chemistry data collected from up to 106 dry weather monitoring sites upstream of the MLS, six locations from third party data provided by Padre Dam Municipal Water District, and IBI scores generated at two bioassessment sites (Table 10-11). Third party data sample results provided by Padre Dam Municipal Water District were collected from six locations on a monthly basis from January 2006 through December 2006 and were located upstream of the MLS. The data from Padre Dam was incorporated into the dry weather data for the triad assessment. Third party data provided from the City of La Mesa was not included in the WMA assessment process because of the differences in collection method and comparability of the data to the downstream MLS. Third party dry weather data provided from the City of La Mesa was not included in the WMA assessment because it was collected during the 2007 dry weather monitoring season and is not comparable to the 2006 dry weather data set. This data will be included in future WMA assessments for this watershed. SWAMP third party data was not used in the WMA assessment because it was collected outside of the 2006-2007 monitoring season. The watershed management area assessment methods presented in Section 3.4 were applied to these data to determine which constituents were of concern and to develop a high, medium, or low frequency of occurrence for these constituents. The results of this assessment are presented in Table 10-12.

Table 10-11. Watershed Data Assessment Set

Program Data Set	Data Collection Period	Constituents Assessed
Mass Loading Stations (MLS) Storm Event Monitoring	November 29, 2001- February 19, 2007	Toxicity, Chemistry
Rapid Stream Bioassessments	October 2006 and May 2007	Benthic Macroinvertebrates
Dry Weather Monitoring (DWM)	May 2006 – September 30, 2006	Chemistry
Padre Dam Municipal Water District Receiving Water Ambient Monitoring	January 2006 – December 2006	Chemistry

10.4.1 San Diego River WMA Criterion Assessment

Two constituents were found to have a high frequency of occurrence in the San Diego River Watershed. Fecal coliform received three diamonds based on Criterion No. 1 and turbidity received three diamonds based on Criterion No. 2. Criterion No. 1 occurs when mass loading station test results exceed the benchmark WQO in greater than or equal to 80% of the samples. Criterion No. 2 occurs when six of the last consecutive storm samples at the MLS exceed the benchmark WQO.

Three constituents were found to have low frequencies of occurrence. Total coliform and enterococcus were assigned a rating of one diamond based on Criterion No. 8. Criterion No. 8 occurs when dry weather site (DWS) exceedances in 10 to 50% of the samples occur in the past year. Total dissolved solids was assigned a rating of one diamond based on Criterion No. 9. Criterion No. 9 occurs when MLS exceedances occur in 25% to less than or equal to 50% of the samples and at least one exceedances found in the last 2 years at the MLS (with or without DWS exceedances in the past year).

Table 10-12. Wet Weather Constituent Exceedances in the San Diego River WMA.

Constituents With Any Wet Weather (MLS) WQO or Dry Weather Action Level Exceedance	MLS (Wet Weather) Results														Dry Weather Results *		Frequency of Occurrence	Criterion No.
	2001/2002		2002/2003		2003/2004		2004/2005		2005/2006		2006/2007		CUMULATIVE		2006			
	#/3	%	#/3	%	#/3	%	#/3	%	#/3	%	#/3	%	#/18	%	#	%		
Conventional Parameters																		
Conductivity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	7	-	-
Oil and Grease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	-	-
Ammonia[1]	NA	NA	0	0	0	0	0	0	0	0	1	33	1	6	7	5	-	-
pH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	7	-	-
BOD	1	33	0	0	1	33	0	0	0	0	0	0	2	11	NA	NA	-	-
COD	1	33	0	0	0	0	1	33	0	0	0	0	2	11	NA	NA	-	-
Surfactants (MBAS)	1	33	0	0	0	0	0	0	0	0	0	0	1	6	4	7	-	-
Total Dissolved Solids	0	0	1	33	2	67	0	0	2	67	2	67	7	39	NA	NA	♦	9
Total Suspended Solids	0	0	1	33	0	0	1	33	0	0	2	67	4	22	NA	NA	-	-
Turbidity	0	0	3	100	2	67	2	67	3	100	3	100	13	72	29	24	♦♦♦	2
Nutrients																		
Ortho-phosphate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	2	2	-	-
Nitrate as N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5	-	-
Bacteriological																		
Total Coliform	1	33	2	67	1	33	2	67	2	67	0	0	8	44	21	39	♦	8
Fecal Coliform	1	33	3	100	3	100	3	100	3	100	3	100	16	89	7	13	♦♦♦	1
Enterococcus	0	0	2	67	2	67	2	67	1	33	1	33	8	44	15	26	♦	8
Pesticides																		
Chlorpyrifos	1	33	3	100	0	0	0	0	0	0	0	0	4	22	1	2	-	-
Diazinon	2	67	0	0	0	0	0	0	0	0	0	0	2	11	2	4	-	-
Total Metals																		
Antimony	0	0	1	33	0	0	0	0	0	0	0	0	1	6	NA	NA	-	-
Cadmium	0	0	0	0	0	0	0	0	1	33	0	0	1	6	NA	NA	-	-
Copper	0	0	0	0	0	0	1	33	0	0	1	33	2	11	NA	NA	-	-
Lead	0	0	1	33	0	0	1	33	0	0	1	33	3	17	NA	NA	-	-
Dissolved Metals																		
Cadmium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	-	-
Copper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6	-	-
Zinc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	-	-
Toxicity																	**EVIDENCE OF PERSISTENT TOXICITY?**	
Ceriodaphnia 7-day reproduction	0	0	0	0	0	0	0	0	1	33	0	0	1	6	NA	NA	No	
Hyalella 96-hour	0	0	0	0	0	0	0	0	0	0	1	33	1	6	NA	NA	No	
Selenastrum 96-hour	1	33	0	0	0	0	0	0	0	0	0	0	1	6	NA	NA	No	
Bioassessment	IBI Rating																**EVIDENCE OF BENTHIC ALTERATION?**	
San Diego River, at Mission Trails Park	Poor		Poor		Poor		Very Poor		Very Poor		Very Poor		Very Poor		NA		Yes	
San Diego River, at Mission Valley (DS)	Very Poor		Very Poor		Very Poor		Very Poor		Very Poor		Very Poor		Very Poor		NA			

* = Total number of observations varied among constituents (dry weather data upstream of MLS and Padre Dam data combined).
NA = Not assessed.
[1] Wet weather data is compared to the Basin Plan WQO for un-ionized ammonia, dry weather data is compared to the dry weather action levels.
- = Constituent results are below the defined requirements for a Low Frequency of Occurrence rating.
♦ = Low Frequency of Occurrence rating.
♦♦ = Medium Frequency of Occurrence rating.
♦♦♦ = High Frequency of Occurrence rating.
DS = Downstream of MLS.

Although the watershed assessment process did not indicate they were a COC, dissolved oxygen and phosphorus were considered potential contaminants of concern due to their listing on the 303(d) list for the lower San Diego River. Dissolved oxygen was above the Basin Plan benchmark WQO in 43% of samples provided by Padre Dam. Other water bodies within the San Diego River Watershed were 303(d) listed for constituents and conditions such as eutrophication at the Famosa Slough and Channel. Eutrophic conditions were indicative of elevated nutrient levels, which were not supported by the WMA assessment methodology in the San Diego River MLS, but may occur in localized site specific areas.

Toxicity tests have shown evidence of toxicity for three separate species over the course of the last six years. However, it should be noted that toxicity was observed in only 3 tests out of 30. Toxicity was observed in one event to *Hyalella azteca* during the 2006-2007 monitoring season. Storm water runoff from one event in the 2001-2002 monitoring season exhibited toxicity for *Selenastrum capricornutum*, while one event in 2005-2006 exhibited toxicity for reproduction in *Ceriodaphnia dubia*. Toxicity was not observed in any other bioassay tests since 2001-2002. As a result, there was no evidence of persistent toxicity in the San Diego River Watershed.

IBI scores resulting from bioassessment monitoring on the San Diego River consistently indicated a rating of Very Poor at the Mission Valley bioassessment site. The Mission Trails Park site received a rating of poor the first three years of monitoring (2001-2003) and very poor for the last three years of monitoring (2004-2006). Therefore, there were indications of benthic alteration within the San Diego River Watershed.

Figure 10-13 summarizes the number of instances that water quality parameters have been above the benchmark WQO for six categories of constituents. Categories include conventional parameters, nutrients, bacteria, pesticides, metals and toxicity. The stacked bars were developed using number of exceedances from values of wet weather MLS results in Table 10-12 for each constituent category. The overall number of times water quality parameters have been above their respective benchmark WQO at the San Diego River MLS has remained relatively stable for the last three monitoring seasons, varying between 13 and 15 instances. The figure also indicates that bacteriological and conventional parameters were the constituent groups that were above the benchmark WQO the most frequently with few metals and toxicity exceedances.

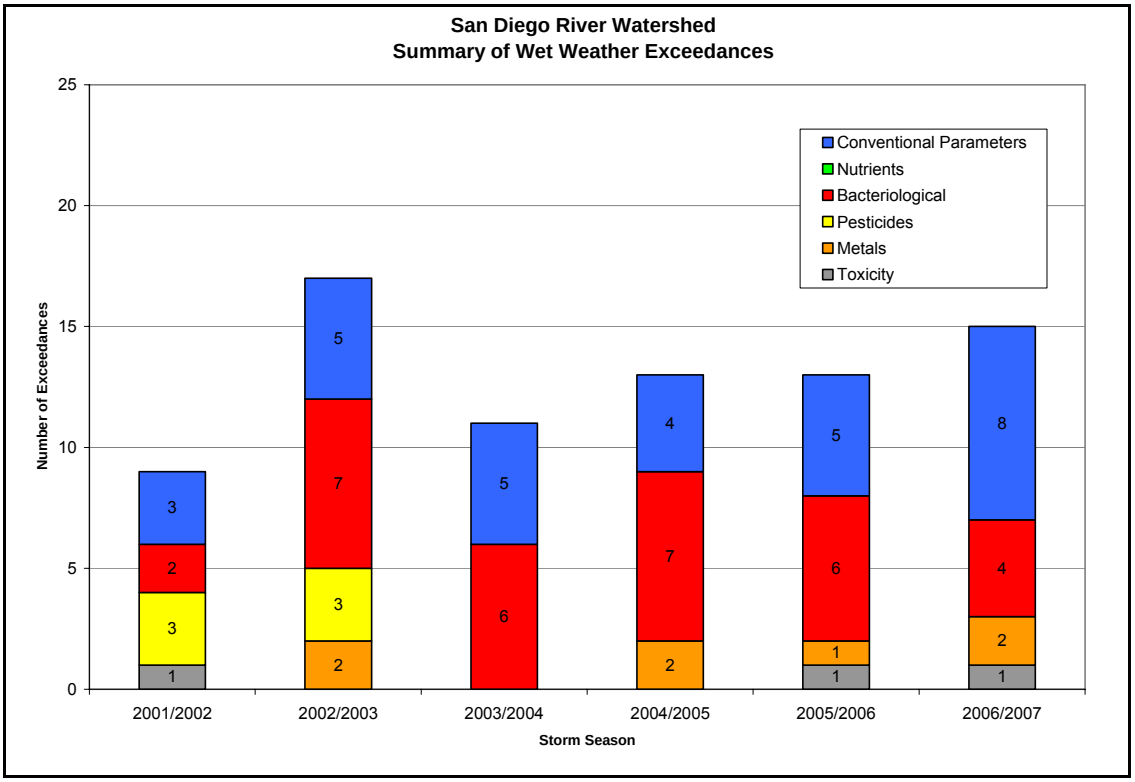


Figure 10-13. Stacked Bar Chart of the Number of Wet Weather Exceedances of Constituent Groups in San Diego River.

10.4.2 Triad Decision Matrix

The triad decision matrix combines the occurrence of COC with the toxicity and bioassessment results to determine possible conclusions about the watershed and provide possible actions for future monitoring or assessment. Table 10-13 summarizes these results and lists possible conclusions and actions.

Table 10-13. Triad Decision Matrix Results for the San Diego River WMA.

Chemistry	Toxicity	Benthic Alteration	Possible Conclusion(s)	Possible Actions or Decisions
Persistent exceedances of benchmark WQOs (high frequency COC identified)	No evidence of persistent toxicity	Indications of alteration	Test organisms not sensitive to problem pollutants Benthic impact due to habitat disturbance, not toxicity	1) Continue monitoring to gather long-term trend information. 2) Evaluate upstream source identification as a high priority. 3) Consider whether different or additional test organisms should be evaluated. 4) Consider potential role of physical habitat disturbance. 5) TIE would not provide useful information with no evidence of toxicity.

Based on the triad decision matrix, persistent exceedances of turbidity, no evidence of persistent toxicity, and evidence of benthic alteration, it is recommended to investigate possible upstream sources that may cause increased turbidity. It is possible that land use activities may contribute to higher turbidity concentrations. It is also recommended to continue monitoring to gather long-term trend information and to consider the potential role of physical habitat disturbance as a factor influencing benthic alteration.

10.4.3 Water Quality Priority Ratings for the San Diego River WMA

The baseline water quality priority ratings presented in the 2005-2006 Urban Runoff Monitoring Report are also presented in this report in Table 10-14. These tables are tools that assist managers in prioritizing watershed activities or are used for identifying data gaps. The priority ratings are based on the methodology presented in the BLTEA report (WESTON, MOE, & LWA, 2005) and are summarized in the Methods Section 3.4.

Table 10-14. Updated Water Quality Priority Ratings for the San Diego River WMA

Watersheds/Sub-watersheds	Percentage of Total Area	Priority Ratings*										
		Constituent Groups									Stressor Groups	
		Heavy Metals	Dissolved Minerals	Organics	Oil and Grease	Sediments	Pesticides	Nutrients	Gross Pollutants	Bacteria/ Pathogens	Benthic Alterations	Toxicity
San Diego River WMA	**100%**	***D***	***B***	***D***	***D***	***B***	***C***	***C***	***C***	***A***	***A***	***D***
Lower San Diego HA (907.10)	40%	*D*	*A*	*D*	*D*	*B*	*C*	*A*	*A*	*A*	*A*	*D*
San Vicente HA (907.20)	17%	*D*	*B*	*D*	*D*	*C*	*C*	*D*	*D*	*C*	*B*	*D*
El Capitan HA (907.30)	20%	*D*	*B*	*D*	*D*	*C*	*B*	*D*	*D*	*B*	*B*	*D*
Boulder Creek HA (907.40)	23%	*D*	*C*	*D*	*D*	*A*	*B*	*D*	*D*	*B*	*B*	*D*
High Frequency of Occurrence Rating[1]						♦♦♦				♦♦♦		
Constituents of Concern						Turbidity				Total Coliform Fecal Coliform		

1. High frequency of occurrence ratings are derived from the constituent exceedances tables and are provided for comparison purposes.

Notes:

** = Rating Calculated Based on Area Weighted Averages of Score Value from the sub-watershed areas.*

*** = Priority Level (Highest-A to Lowest-D)*

High Priority Level Based on Data

303d listing

The LTEA ratings are used to guide long-term programmatic watershed activities and are performed on a 5-year cycle. The WMA assessments are used to guide annual water quality monitoring activities and to evaluate annual differences or changes through time. The WMA constituents of concern are compared to the LTEA ratings to evaluate if activities are showing improvements or impairments through the 5-year cycle.

Constituent groups and stressor groups are given a ranking from A to D with A being the highest priority rating and D the lowest priority rating. Items ranked with a D indicate that the constituent group or

stressor is a low priority or does not have sufficient data to support a higher ranking. The priority ratings were based on the data record from 2001-2006 from the following programs and will be updated on a 5-year cycle:

- Storm water Mass Loading Monitoring (MLS) – Wet Weather Data (1994-2006)
- Co-permittee Dry Weather Data Monitoring (2003-2005)
- Available Third Party Data (SWAMP, 2004 and Padre Dam, 2004-2005)
- Urban Stream Bioassessment Monitoring (2000-2006)
- Triad Assessment – Toxicity Testing of Storm water (2000-2006)
- 303(d) Listing (2003)

Only bacteria and benthic alterations were identified as a high priority (A rated) constituent for the overall San Diego River WMA followed by dissolved minerals and sediments which were assigned a B rating. All other constituents were given either a C or D rating. The complete tables used to calculate the ratings are presented in Appendix G.

The dissolved minerals category did not exist in the BLTEA report and was developed to address constituents that did not apply to the other constituent categories and to better assess the sediment category.

High frequency of occurrence ratings from the WMA criterion assessments were also included in the water quality priority rating summary table above. High frequency of occurrence ratings were determined for turbidity and total and fecal coliform for the San Diego River WMA. In comparison, the water quality priority ratings found a high priority (A) rating for bacteria but found a B priority rating for the sediments category. This is primarily driven by the wet weather exceedances of bacteria and the weighted averaging. Larger sub-watersheds will have a greater influence in the overall watershed rating. All other constituents were given either a C or D priority rating.

Several high priority (A) ratings were identified in the Lower San Diego HA. These include dissolved minerals, nutrients, gross pollutants, and bacteria, all of which had 303(d) listings or data to support to the rating. Benthic alteration was also a high priority (A) rated constituent in this sub-watershed which was based primarily on the stream bioassessment findings.

The high priority rating in the Lower San Diego HA for dissolved minerals was based primarily on the 303(d) listings for total dissolved solids (TDS), third party data from Padre Dam, and limited third party data (SWAMP) where manganese and sulfate results were above the benchmark WQO. Dissolved minerals were typically associated with naturally occurring processes. However, land use activities may result in increased concentrations of these parameters.

There are currently no inventories of potential sources that may contribute dissolved minerals based on the threat to water quality ratings provided in the BLTEA report (WESTON, MOE, & LWA, 2005). However, naturally occurring groundwater discharges as a result of increased irrigation, importation of water, dry weather flows, and agricultural water use may contribute to increases in dissolved minerals throughout the watershed. TDS was identified as a medium frequency COC based on storm water monitoring data even though parameters such as sulfate, manganese, and chloride are currently not measured under this program or under the dry weather program as was done in the SWAMP monitoring program. Additionally, this program is primarily focused on addressing urban runoff pollution which should be considered when addressing naturally occurring groundwater associated discharges.

10.5 Conclusions and Recommendations

The San Diego River Watershed is the second largest watershed in San Diego County. The contributing runoff area to the MLS is approximately 39% of the San Diego River Watershed land area. The major land uses within the contributing runoff area are residential (30%), parks (25%), and undeveloped (19%).

For the San Diego River WMA, turbidity and fecal coliform were identified as high frequency of occurrence COCs followed by TDS as a medium frequency COC, and total coliform, and enterococcus, which were identified as low frequency of occurrence COCs. TDS during wet weather monitoring and monthly monitoring within the watershed by Padre Dam showed a medium frequency of occurrence but appears to be related to groundwater influences and local conditions. A review of the scatterplots and trends shows statistically significant decreasing trends for dissolved arsenic, dissolved copper, and nitrate. Turbidity and TSS had statistically significant increasing trends.

Measured storm event loads were compared to lading values derived from the National Stormwater Quality Database (NSQD) (Pitt et al., 2004). Measured loads for total dissolved solids and bacterial indicators were greater than expected for a majority of the storm events sampled. Most of the constituents measured were within the expected range or lower than expected. In particular, metals consistently showed lower than expected loads for all the storm events sampled.

Third party data provided by Padre Dam showed dissolved oxygen results did not meet the benchmark WQO standard of > 5.0 mg/l 43% of the time, while pH was outside the benchmark WQO standards in 3% of all samples. Third party data results from the San Diego River Watershed under the Surface Water Ambient Monitoring Program (SWAMP) in May 2004 found turbidity, sulfate, and manganese above the benchmark WQO. Results from the analyses of pesticides, herbicides, PAHs and PCBs were all below their respective benchmark WQO with only a few detections of herbicides and one pesticide compound.

Bioassessment monitoring in the San Diego River WMA occurred at three monitoring sites, including two urban sites and one reference site. The urban sites were in Mission Trails Regional Park and near Morena Blvd. in Mission Valley. The Mission Trails site had an Index of Biotic Integrity rating of Very Poor for both the October 2006 and May 2007 surveys; the Mission Valley site had an IBI rating of Very Poor for both the October 2006 and May 2007 surveys. The reference site on Boulder Creek had IBI ratings of Fair for both the October 2006 and May 2007 surveys. The reference site's O/E ratio indicated that the benthic community was unimpaired and that the water quality was likely very good.

In addition to the WMA assessment findings, the water quality priority ratings found a high priority (A) rating for bacteria and found a B priority rating for the sediments and dissolved minerals categories. All other constituents were given either a C or D priority rating which means the constituents were low priorities or lacked sufficient data to support a higher priority rating. In the Stressor Groups category, benthic alterations were also given an A priority rating.

The information provided from the triad matrix results used in conjunction with the water quality priority ratings can assist the jurisdictions in making informed decisions in developing their WURMP programs. The two assessments also allow for an evaluation of where data gaps exist and where efforts should be targeted.

Using the BLTEA rating methods for future data evaluations would also allow for long-term BMP effectiveness assessment. Incorporation of additional useable data from other third party sources such as POTWs and non-profit organizations would also help to increase the confidence of the water quality priority ratings and overall WMA assessments.

The recommendations for the San Diego River Watershed are to continue monitoring to gather long-term trend information, identify where data gaps exist and do not allow for informed decision making, and consider where watershed resources may be more effectively targeted to reduce turbidity, bacterial indicators, and impacts to the physical stream habitats. The new permit monitoring order (R9-2007-0001) calls for three temporary watershed assessment stations (TWAS) for this watershed. The additional upstream station will provide the ability to evaluate the spatial distribution of TDS, nutrients and bacteria. Additionally, the new permit calls for the evaluation of dry (ambient) conditions. This data will allow for the estimation of annual loading within the watershed.