Los Peñasquitos Creek WMA

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8.1 Los Peñasquitos Watershed Management Area Description

The Los Peñasquitos Creek Watershed Management Area (WMA) includes two hydrologic areas: Miramar Reservoir (HA 906.10) and Poway (HA 906.20) and is the second smallest watershed in the San Diego region. The Los Peñasquitos Creek WMA land area is 60,418 acres (Figure 8-1). The Los Peñasquitos WMA is drained by Los Peñasquitos Creek and drains into Los Peñasquitos Lagoon near the northern border of the City of San Diego within the Torrey Pines State Reserve. Los Peñasquitos lagoon also receives inputs from Carroll Canyon, just south of Los Peñasquitos Creek, and McGonigle Canyon to the north. Annual precipitation ranges from10.5 inches near the coast to 16.5 inches in the eastern portion of the watershed (Figure 8-1).

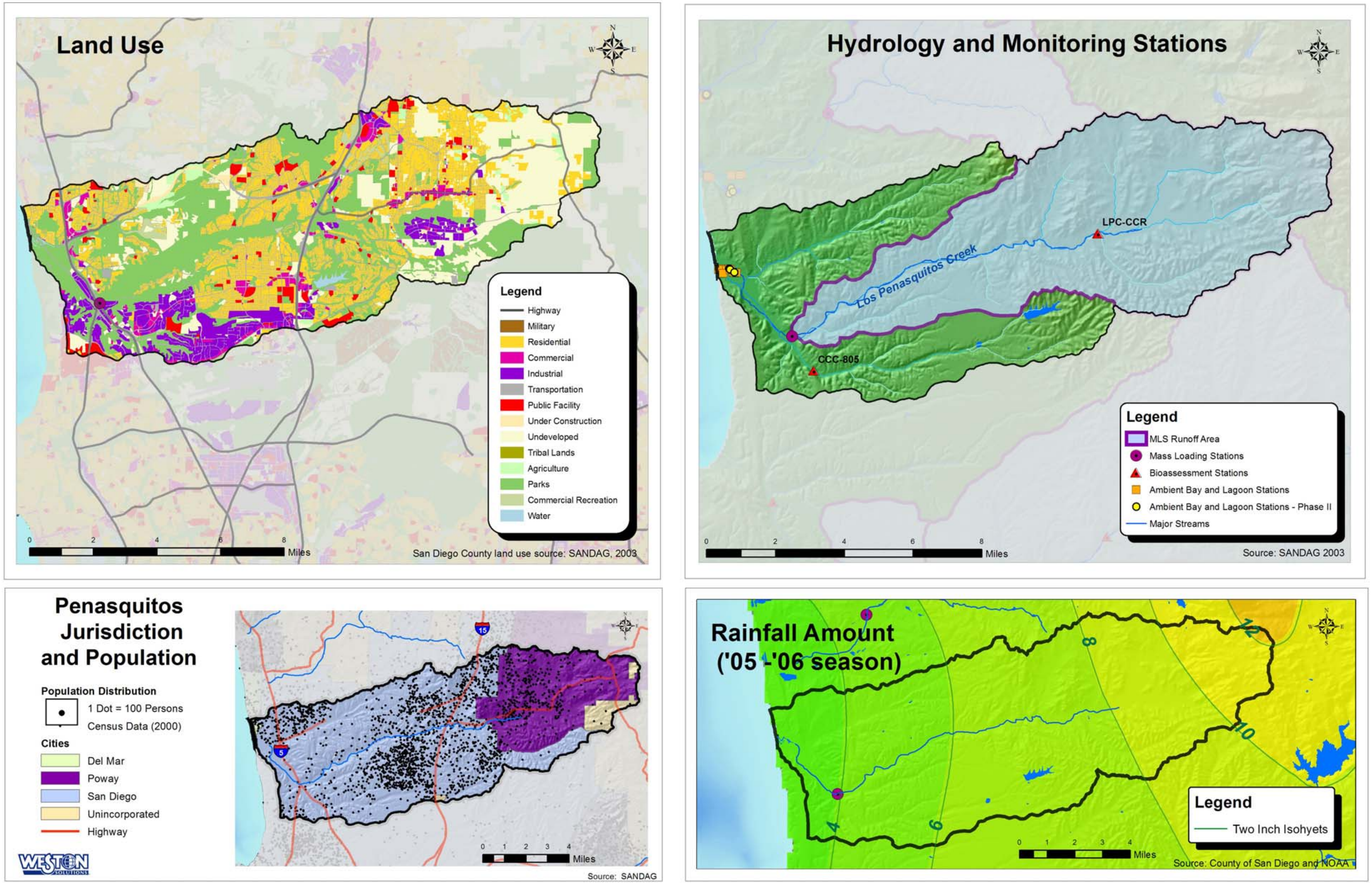

Figure 8-1. Los Peñasquitos Watershed Management Area.

8.1.1 Land Use

The Los Peñasquitos Creek Watershed is mostly contained in the City of San Diego: 83.2% of the watershed is contained in the City. The remaining areas of the watershed include the Cities of Poway (14.9%) and Del Mar (0.1%). Land use within the watershed is relatively equally divided between residential (24.7%), vacant/undeveloped (17.8%), and parks and recreation (29.2%). Other uses are comprised of public facilities/utilities (3%), industrial (7.3%), commercial (2.5%), transportation (11.9%), and agriculture (1.6%) (Figure 8-2) (SANDAG, 2003). Over 60% of the watershed is privately-owned land. The remaining portions are mostly locally-owned with a small percentage of land being state and federally-owned. The Los Peñasquitos Creek Watershed is the fourth most populated in the county containing over 442,731 people, yet it has the second highest population density of 4.27 persons per acre according to the 1990 Census and SANDAG's Population Estimates and Interim Series 8 Forecast (SANDAG, 1998).

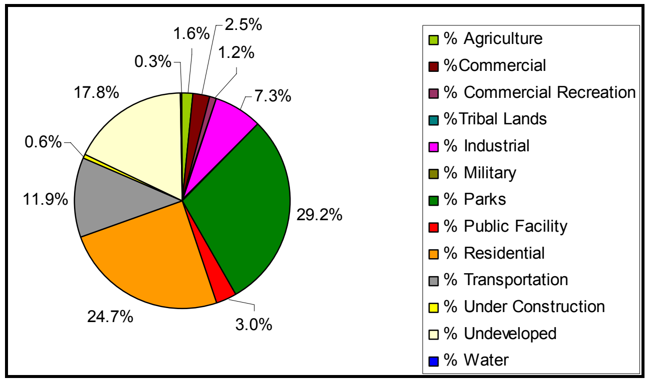

Figure 8-2. Percent Land Use for Los Peñasquitos Creek WMA

8.1.2 Beneficial Uses

The Los Peñasquitos Creek 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 8-1. The watershed contains the Lake Miramar and contains many parks and open space areas. Los Peñasquitos Lagoon is a 630-acre wetland that lies near the mouth of the Los Peñasquitos Creek and provides wetland habitat.

Table 8-1. Beneficial uses within the Los Peñasquitos Watershed.

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

[1] Shore and boat fishing only. Other REC1 uses prohibited.
Source: Basin Plan September 8, 1994 (Tables 2-2, 2-3, 2-4, 2-5)

8.1.3 Regulatory Water Quality Challenges

Table 8-2 presents the water bodies in the Los Peñasquitos Creek Watershed that have been placed on the SWRCB 303(d) list. Major impacts to the watershed include surface water quality degradation, beach closures, sedimentation, habitat degradation and loss, invasive species, and eutrophication (San Diego County, 2006). Constituents that have been placed on the SWRCB 2002 303(d) list for water bodies throughout the watershed are bacterial indicators and sedimentation. Urban runoff, sewage spills, dredging, landfill leachate, and natural sources are factors that may be impairing water quality within the Los Peñasquitos WMA (San Diego County, 2006).

Table 8-2. Water bodies on the SWRCB 303(d) list in the Los Peñasquitos Watershed.

Water Body Name	Hydrologic Sub Area (HSA)	HSA #	Pollutant/Stressor
Los Peñasquitos Lagoon	Miramar Reservoir	906.10	Sediment/Siltation
Pacific Ocean Shoreline	Miramar Reservoir	906.10	Bacteria Indicators

Source: SWRCB 2003

The Los Peñasquitos Lagoon is also 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. The Los Peñasquitos Lagoon is listed as impaired due to sedimentation/siltation. Investigation Order No. R9-2006-0076 requires the dischargers to develop a monitoring program and submit monitoring program reports. Responsible dischargers to the Los Peñasquitos Lagoon, as identified within the Lagoon Order, include the City of Del Mar, City of San Diego, City of Poway, San Diego County, and Caltrans. This order requires monitoring to begin during the 2007-2008 wet weather monitoring season.

The 2006 303(d) list is in the process of being finalized by the State Water Resources Control Board (SWRCB). The list includes several additions to the Los Peñasquitos Creek Watershed. This list has not been formally adopted by the SWRCB but can be found on the SWRCB website (http://www.waterboards.ca.gov/tmdl/303d_lists2006.html).

8.1.4 Mass Loading Station Site Description

The Los Peñasquitos Creek (PC) mass loading station is located in San Diego, at the North end of Sorrento Valley Court, under the Sorrento Valley Court Bridge. Los Peñasquitos Creek has an earthen bottom, and rip-rap along the sides of the channel. The contributing runoff area consists of over 36,700 acres and comprises approximately 60% of the Los Peñasquitos WMA. The major land uses within the contributing runoff area are parks (29%), residential (28%), and undeveloped (24%).

The mass loading station began the 2005-2006 wet weather monitoring season located in the site as previous years monitoring. However, during the 2005-2006 wet weather monitoring season the submerged pressure transducer area-velocity meter and sample strainer were relocated due to removal of an existing dam near Vista Sorrento Parkway Bridge in association with construction activities conducted on the Interstate 5 and Interstate 805 merge. The new location was selected as the best available point to monitor flow without substantially altering the location of the mass loading 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 associated with the dam removal. Flow measurements used for composite sample collection purposes during the 2005-2006 wet weather monitoring season were calculated utilizing a geometric equation. The equation produces an estimated flow rate using the stage of the stream, velocity of the stream, and the surveyed dimensions of the channel.

8.1.5 Stream Bioassessment Site Description

Stream bioassessment in the Los Peñasquitos Creek WMA includes three urban affected sites. The site furthest upstream is in the City of Poway at Cobblestone Creek Road. A second stream bioassessment site is downstream of the Black Mountain Road crossing in the Los Peñasquitos Canyon Preserve. This monitoring reach has a fairly low gradient and an unimpaired stream bed and riparian zone. The in-stream substrate at this site is dominated by compacted clay and lacks stable rocky substrate. The most downstream bioassessment site is located along Sorrento Valley Road near the Interstate 805 exit. The habitat quality at this site is described as fairly good, with thick riparian vegetation and a cobble dominated substrate. The cobble is generally small and unconsolidated, and substantial disruption can occur during periods of high flow.

8.1.6 Ambient Bay and Lagoon Monitoring Site Description

The Los Peñasquitos Lagoon is included in the Ambient Bay and Lagoon Monitoring (ABLM) monitoring program. The Lagoon is located at the northwestern border of the City of San Diego within the Torrey Pines State Reserve. The main source of fresh water to Los Peñasquitos Lagoon is Los Peñasquitos Creek and Carmel Creek. There are approximately 630 acres of wetland habitat in the Lagoon system, but only 30 acres that are classified as open water (Coastal Conservancy, 2000). Most of the open water habitat lies within two main arms of the Lagoon situated between Torrey Pines Road (Highway 1) and Carmel Valley Road. The arms are interconnected by a series of narrow, sinuous channels. Tidal influence is restricted by the Highway 1 crossing and without mechanical clearing would be blocked with sediment for extended periods.

Historically, treated sewage was discharged to the Lagoon from 1962 to 1972. Currently, the Lagoon is crossed by sewage pipelines, but the adjacent land use is primarily residential and open space. Three ABLM sites were sampled in Los Peñasquitos Lagoon (Figure 8-1). All three of the Ambient Bay and Lagoon monitoring sites were located within the northern arm (Figure 8-1). Los Peñasquitos Lagoon is listed on the SWRCB's 2002 303(d) list for sediment/siltation (Table 8-2).

8.2 Watershed Water Quality Monitoring

Watershed water quality monitoring data is one leg of the triad approach used in performing the watershed management assessments. This includes the analysis of chemistry, bacteria, and toxicity data collected from three storm water events at the MLS, dry weather data collected during the 2005 dry weather monitoring program, and available third party data.

8.2.1 2005-2006 Storm Water Monitoring and Results

Annual storm water monitoring has occurred at the Los Peñasquitos Creek MLS since the 2001-2002 wet weather monitoring season. Three storm events were monitored at the MLS during the 2005-2006 wet weather monitoring period occurring on October 17, 2005, February 20, 2006 and February 28, 2006.

8.2.1.1 Storm Water Monitoring Summary

The first storm of the 2005-2006 wet weather monitoring season occurred on October 18, 2005. On October 16, 2005 a storm approached northern San Diego County from the northeast. This northeasterly approaching storm was unusual for San Diego County, as typically storms approach southern California primarily from the northwest and occasionally from the southwest. Due to the unusual approach direction for this storm, it was characterized by rainfall that began in the east and spread generally southwest towards the coast. After 24 hours, the storm system produced sufficient rainfall in the Los Peñasquitos Creek WMA to provide runoff and wet weather monitoring was initiated. The storm produced 0.51" of rainfall. Rainfall statistics for monitored storm events for the Los Peñasquitos Creek MLS area are presented in Table 8-3. A total of 15 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 not conducive to composite sampling prior to the peak of the storm hydrograph. Monitoring was conducted over a 14-hour period which captured the rise and initial peak of the runoff produced by the storm.

Table 8-3. 2005-2006 Rainfall Statistics for the Los Peñasquitos Creek Mass Loading Station.

Date Start	Total Rain (in)	Duration (hr)	Intensity (in/hr)	Antecedent Dry Days
10/17/2005	0.51	45	0.01	27
2/20/2006	0.39	36	0.01	46
2/28/2006	1.04	17	0.06	8

The second storm monitored at the Los Peñasquitos MLS during the 2005-2006 wet weather monitoring season occurred on February 20, 2006. On February 17, 2006 a storm began to move into San Diego County. After monitoring the storm for 24 hours, the storm produced sufficient rainfall to provide runoff in the Peñasquitos Creek WMA and wet weather monitoring was initiated. The storm produced a total of 0.39" rainfall (Table 8-3). A total of 32 one-liter composite sample aliquots were collected at a rate such that one sample was collected for every 80,000 cubic feet of water that passed by the monitoring station. Additionally, grab samples were collected for those constituents not conducive to composite sampling prior to the peak of the storm hydrograph. Monitoring was conducted over a 35-hour period which captured the rise and initial peak of the runoff produced by the storm.

The third storm monitored at the Los Peñasquitos MLS during the 2005-2006 wet weather monitoring season occurred on February 28, 2006. On February 27, 2006 a fast moving storm moved into San Diego County. The storm quickly produced sufficient rainfall to provide runoff in the Los Peñasquitos Creek WMA and monitoring was initiated. The storm produced a total of 1.04” rainfall (Table 8-3). A total of 30 one-liter composite sample aliquots were collected at a rate such that one sample was collected for every 85,000 cubic feet of water that passed by the monitoring station. Additionally, grab samples were collected for those constituents not conducive to composite sampling prior to the peak of the storm hydrograph. Monitoring was conducted over a 9-hour period which captured the rise and initial peak of the runoff produced by the storm.

Hydrographs from each storm event are presented in Appendix A.

8.2.1.2 Storm Water Monitoring Results

Analytical results from the 2005-2006 wet weather monitoring period at the Los Peñasquitos Creek MLS are presented with the historical results in Table 8-4. Water quality objectives (WQO) and WQO sources are also provided. A detailed description of the WQO sources and the technical reasoning of how the results are compared to the 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.

Conventional constituent results were below their respective water quality objectives with the exception of total dissolved solids (TDS), total suspended solids (TSS) and turbidity. TDS results were above the water quality objective of 500 mg/L during the October 17, 2005 and February 20, 2006 monitoring events. TDS results for the October 17, 2005 event were 1,940 mg/L and 1,030 mg/L for the February 20, 2006 event. TSS was above the WQO of 100 mg/L during the February 28, 2006 monitoring event (182 mg/L). The turbidity result on the February 28, 2006 monitoring event (30.3 NTUs) was above the WQO of 20 NTUs.

Fecal coliform is the only bacterial indicator with a water quality objective for wet weather monitoring. Fecal coliform results were above the REC-1 WQO of 400 MPN/100 mL during all three monitoring events. Results for fecal coliform ranged from 1,112 MPN/100mL on February 20, 2006 to 170,000 MPN/100mL on October 17, 2005. All three bacterial indicators were considerably higher during the first rainfall event on October 17, 2005. The highest total coliform and enterococcus results measured at this site also occurred on this date (1,300,000 MPN/100mL and 1,300,000 MPN/100mL respectively).

The pesticides Chlorpyrifos and Diazinon were not detected in any sample during the 2005-2006 wet weather monitoring season. Malathion was detected but was below the WQO during all three monitored events.

Table 8-4. Analytes measured at the Los Peñasquitos Creek mass loading station.

ANALYTE	UNITS	WQO	SOURCE	2001-2002			2002-2003			2003-2004			2004-2005			2005-2006			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	2/18/04	10/17/04	2/11/05	2/18/05	10/17/05	2/20/06	2/28/06		
General / Physical / Organic																				
Electrical Conductivity	umhos/cm			2640	2700	1590	1827	1939	2600	2470	3060	3540	3270	2690	1213	2980	2440	113		
Oil And Grease	mg/L	15	USEPA Multi-Sector General Permit	<1	1	<1	3.24	<1.00	1.39	<1	<1	<1	<1	<1	<1	<1	1.05	<1	0%	0.05
pH	pH Units	6.5-8.5	Basin Plan	7.7	7.8	7.5	7.46	7.63	7.78	6.91	7.83	8.29	7.76	7.48	6.85	7.32	6.66	6.79	0%	0.00
Bacteriological																				
Enterococci	MPN/100 mL			500	1,700	3,000	230,000	500	22,000	700	1,700	500	1,112	3,000	8,000	1,300,000	2,300	30,000		
Fecal Coliform	MPN/100 mL	400	Basin Plan	130	**500**	300	**30,000**	**500**	**1,700**	**1,300**	130	130	**500**	**500**	**2,200**	**170,000**	**1,112**	**5,000**	73%	35.67
Total Coliform	MPN/100 mL			1,700	3,000	500	500,000	1,400	50,000	5,000	13,000	230	17,000	13,000	50,000	1,300,000	30,000	30,000		
Wet Chemistry																				
Ammonia As N	mg/L			0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	0.3	0.11		
Un-ionized Ammonia as N	µg/L	25 (a)	Basin Plan				<0.84	<1.13	<1.35	0.11	0.73	2.02	0.9	0.3	0.1	0.3	0.3	0.2	0%	0.03
Biochemical Oxygen Demand	mg/L	30	USEPA Multi-Sector General Permit	3.1	5.6	21.3	5.55	<2.0	8.31	3.28	28.6	5.28	23.7	3.75	2.31	6.16	<2	5.24	0%	0.28
Chemical Oxygen Demand	mg/L	120	USEPA Multi-Sector General Permit	<25	50	54	73	53	115	47	108	56	**143**	62	36	63	42	76	7%	0.55
Dissolved Organic Carbon	mg/L						16.8	11.0	11.2	14	6.41	77.2	27.2	4.44	4.66	10.6	14.4	12.2		
Dissolved Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	0.9	<0.05	0.15	0.52	0.40	0.28	0.21	0.13	0.11	0.14	0.1	0.51	0.29	0.45	0.37	0%	0.15
Nitrate As N	mg/L	10	Basin Plan	0.2	0.3	0.3	1.32	0.98	0.60	0.28	0.11	<0.05	0.09	0.6	1.06	1.24	0.94	0.9	0%	0.06
Nitrite As N	mg/L	1	Basin Plan	<0.05	<0.05	<0.05	0.11	<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	<0.5	<0.5	0.2	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0%	0.44
Total Dissolved Solids	mg/L	500	Basin Plan by watershed	**1580**	**1590**	**1010**	**955**	**1280**	**997**	**1380**	**1890**	**2040**	**2120**	**1500**	**804**	**1940**	**1030**	52	93%	2.69
Total Kjeldahl Nitrogen	mg/L			1.7	1	1.2	1.9	0.8	1.2	1.2	2.5	2.1	1.6	1.9	0.8	1	2.5	1.1		
Total Organic Carbon	mg/L						22.7	57.4	13.6	10.5	8.86	95.6	29.9	9.51	10.8	22.1	14.5	14.9		
Total Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	0.1	0.15	0.23	0.73	0.60	0.39	0.23	0.2	0.17	0.14	0.28	0.69	0.48	0.47	0.38	0%	0.17
Total Suspended Solids	mg/L	100	USEPA Multi-Sector General Permit	<20	<20	<20	35	58	38	27	<20	<20	<20	<20	**108**	20	30	**182**	13%	0.38
Turbidity	NTU	20	Basin Plan	3.8	3.33	5.05	17.1	**45.4**	**29.9**	7.53	8.98	2.74	7.89	9.05	**56.4**	16.4	17.1	**30.3**	27%	0.87
Pesticides																				
Chlorpyrifos	µg/L	0.02	CA Dept. of Fish & Game	<0.03*	<0.03*	<0.03*	**0.055**	**0.067**	<0.03*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	18%	0.80
Diazinon	µg/L	0.08	CA Dept. of Fish & Game	**0.12**	0.06	**0.13**	**0.231**	0.040	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	20%	0.59
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	0.045	0.028	0.039	0%	0.06
Hardness																				
Total Hardness	mg CaCO3/L			808	815	551	428	602	602	692	805	880	1000	707	379	932	563	373		
Total Metals																				
Antimony	mg/L	0.006	Basin Plan	<0.002	<0.002	<0.002	<0.002	0.005	**0.009**	<0.005	<0.005	<0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	7%	0.46
Arsenic	mg/L	0.34/0.05	40 CFR 131/ Basin Plan	0.002	0.002	0.003	0.012	0.005	0.003	<0.002	0.006	0.005	0.005	0.004	<0.002	0.006	0.004	0.007	0%	0.09
Cadmium	mg/L	0.0046	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	0.002	<0.001	0%	0.08
Chromium	mg/L	0.016	CTR (Cr VI)	<0.005	<0.005	<0.005	0.008	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%	0.00
Copper	mg/L	0.0135	40 CFR 131	<0.005	<0.005	0.008	0.021	0.004	0.010	<0.005	0.008	0.006	<0.005	<0.005	<0.005	0.005	0.005	0.006	0%	0.19
Lead	mg/L	0.082	40 CFR 131	<0.002	<0.002	0.003	0.011	0.004	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	0.003	0%	0.13
Nickel	mg/L	0.47/0.1	40 CFR 131/ Basin Plan	<0.002	<0.002	<0.002	0.026	<0.002	0.002	0.003	<0.002	<0.002	0.003	0.002	0.002	0.005	0.004	0.003	0%	0.02
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%	0.11
Zinc	mg/L	0.122	40 CFR 131	<0.020	<0.020	0.020	0.058	0.006	<0.020	0.028	<0.02	<0.02	<0.02	<0.02	<0.02	0.039	<0.02	<0.02	0%	0.04
Dissolved Metals																				
Antimony	mg/L	(e)	40 CFR 131	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.005	<0.005	<0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Arsenic	mg/L	0.34 (c)	40 CFR 131	0.002	<0.001	0.003	0.004	0.003	0.003	0.002	0.004	0.004	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	0%	0.01
Cadmium	mg/L	(b)	40 CFR 131	<0.001	<0.001	<0.001	0.0002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0%	0.08
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%	0.01
Copper	mg/L	(b)	40 CFR 131	<0.005	<0.005	<0.005	0.007	<0.005	0.027	<0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	0%	0.17
Lead	mg/L	(b)	40 CFR 131	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0%	0.10
Nickel	mg/L	(b)	40 CFR 131	<0.002	0.003	<0.002	0.003	<0.002	0.002	0.002	0.002	<0.002	0.003	0.002	0.002	0.003	0.003	0.002	0%	0.01
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%	0.01
Zinc	mg/L	(b)	40 CFR 131	<0.020	<0.020	<0.020	<0.020	0.020	0.106	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.036	<0.02	<0.02	0%	0.05
Toxicity																				
Ceriodaphnia 96-hr	LC50 (%)	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	0%	0.00
Ceriodaphnia 7-day reproduction	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0%	0.00
Hyalella 96-hr	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0%	0.00
Selenastrum 96-hr	NOEC (%)	100		100	100	100	100	100	100	100	100	100	100	100	100	100**	100	100	0%	0.00

See last page for footnotes and source references.

Table 8-4. Analytes measured at the Los Peñasquitos Creek mass loading station.

Blank spaces have been verified and no data is available due to changes in the monitoring 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 exceed the **CCC** water quality objective and bold/underlined results exceed the **CMC** water quality objective.

* Indicates detection limit exceeds water quality objective.
** Indicates results should be interpreted with care due to method protocol descrepancy.

<u>Sources</u>

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000. Table 3 - Parameter benchmark values.
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.

Several total metals were detected in storm water samples collected during the 2005-2006 wet weather monitoring season but were below their respective hardness-based WQO. In all three storm water monitoring events (October 17, 2005, February 20, 2006, and February 28, 2006) the total metals copper (0.005 mg/L, 0.005 mg/L, 0.006 mg/L, respectively) and nickel (0.005 mg/L, 0.004 mg/L, 0.003 mg/L, respectively) were detected. Total arsenic was detected in samples from the monitoring events which occurred on October 17, 2005 (0.006 mg/L) and on February 20, 2006 (0.004 mg/L) but was below the respective hardness-based WQO in both events. Total zinc was detected in only one monitoring event which occurred on October 17, 2005 (0.039 mg/L) but was below the respective hardness-based WQO. Total cadmium was detected in only one monitoring event which occurred on February 20, 2006 (0.002 mg/L) but was below the respective hardness-based WQO. Total lead was detected in only one monitoring event which occurred on February 28, 2006 (0.003 mg/L) but was below the respective hardness-based WQO.

Several dissolved metals were detected in storm water samples collected during the 2005-2006 wet weather monitoring season but were below their respective hardness-based WQO. In all three storm water monitoring events (October 17, 2005, February 20, 2006, and February 28, 2006) the dissolved metal nickel (0.003 mg/L, 0.003 mg/L, 0.002 mg/L, respectively) was detected. The dissolved metals arsenic (0.002 mg/L) and zinc (0.036 mg/L) were only detected in the weather monitoring event on October 17, 2005. The dissolved metals cadmium (0.001 mg/L) and copper (0.005 mg/L) were only detected in the weather monitoring event on February 20, 2006.

Toxicity was not observed for the species *Ceriodaphnia dubia, Hyalella,* or *Selenastrum* during any of the storm water monitoring events during the 2005-2006 wet weather monitoring season. However, the *Selenastrum* 96-hr test performed on the sample from the October 17, 2006 test deviated slightly from the accepted test protocol. As a result the ability to detect toxic responses may have been compromised and the results should be interpreted with care.

8.2.2 Relationships/Analyses

An evaluation of storm water monitoring data collected at the Los Peñasquitos Creek MLS over the past five years was performed. Several constituents have had analytical results frequently measured above their respective WQO. Fecal coliform and Total Dissolved Solids (TDS) are two constituents that have had results above their respective WQO. Fecal coliform results have consistently been above the WQO for a total of 11 of 15 storm events (73%). TDS results were measured above the WQO during 14 of 15 storm events (93%).

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

- Chemical Oxygen Demand (COD)
- Total Suspended Solids (TSS)
- Turbidity

There is no pattern or trend evident with the results for these constituents with the exception of TDS. TDS results are typically above the WQO during all storms of the season.

Fecal coliform has exceeded the WQO during all monitored events for the past two years. Total coliform and Enterococcus have also had consistently elevated levels for all events monitored during the past two years.

Chlorpyrifos and Diazinon were not detected during any storm events monitored during the 2005-2006 monitoring season. Chlorpyrifos results were above the WQO during the 2002-2003 monitoring season. However, Chlorpyrifos has not been detected over the past three monitoring seasons. Diazinon results were above the water quality objective during the 2001-2002 and 2002-2003 wet weather monitoring seasons. However, Diazinon has not been detected over the past three monitoring seasons. Analysis of the results indicate that there is a significant decreasing trend in Diazinon (R^2=0.45) concentrations. Malathion was detected at the Los Peñasquitos Creek MLS for the first three years of monitoring but was detected in all three events in the 2005-2006 monitoring season.

During the last five years of monitoring, only the total metal antimony has had results above the WQO. One result for total antimony was above both the acute and chronic basin plan WQO during the 2002-2003 monitoring season.

Results for dissolved metals have never been above their respective hardness based acute or chronic WQO over the past five years of monitoring at the Los Peñasquitos Creek MLS. There are no significant upward or downward trends evident for dissolved metals at the Los Peñasquitos Creek MLS.

Toxicity has not been observed over the past five years of monitoring at the Los Peñasquitos Creek MLS.

In order to illustrate the magnitude of the water quality exceedances for the 2005-2006 wet weather monitoring season, the ratio of water quality results to the WQOs were plotted for common constituents of concern (Figure 8-3). The average magnitude of water quality exceedances was also determined for each constituent by calculating the mean ratio of water quality results to the WQOs from all storm events from October 2001 through April 2005.

The conventional constituent total dissolved solids was found to exceed the WQO by nearly 4 times during the storm event on October 17, 2005 and by over two times during the storm event on February 20, 2006. This is consistent with the average results for storm events monitored from October 2001-April 2004 where TDS results exceeded the WQO by at least 4 times. Total suspended solids also noticeably exceeded the WQO (1.8 times the WQO) during the February 28, 2006 storm event but has not historically exceeded the WQO. There was also a noticeable single exceedance for turbidity (1.5 times the WQO) during the February 28, 2006 monitoring event but turbidity has not historically exceeded the WQO.

Fecal coliform exceeded the WQO during all three monitoring events (an average of 1.5 times the WQO) for the 2005-2006 monitoring season. The fecal coliform magnitude of exceedance observed for the 2005-2006 monitoring season is slightly greater than the historical magnitude of exceedance for monitoring events at the Los Peñasquitos Creek MLS from October 2001 through April 2004 (Average ratio of exceedance=1.2).

The pesticides Chlorpyrifos, Diazinon, and Malathion did not exceed the water quality objective during the 2005-2006 monitoring season.

Total and dissolved metals results did not exceed the water quality objectives during the 2005-2006 monitoring season.

Toxicity results did not exceed the water quality objectives during the 2005-2006 monitoring season.

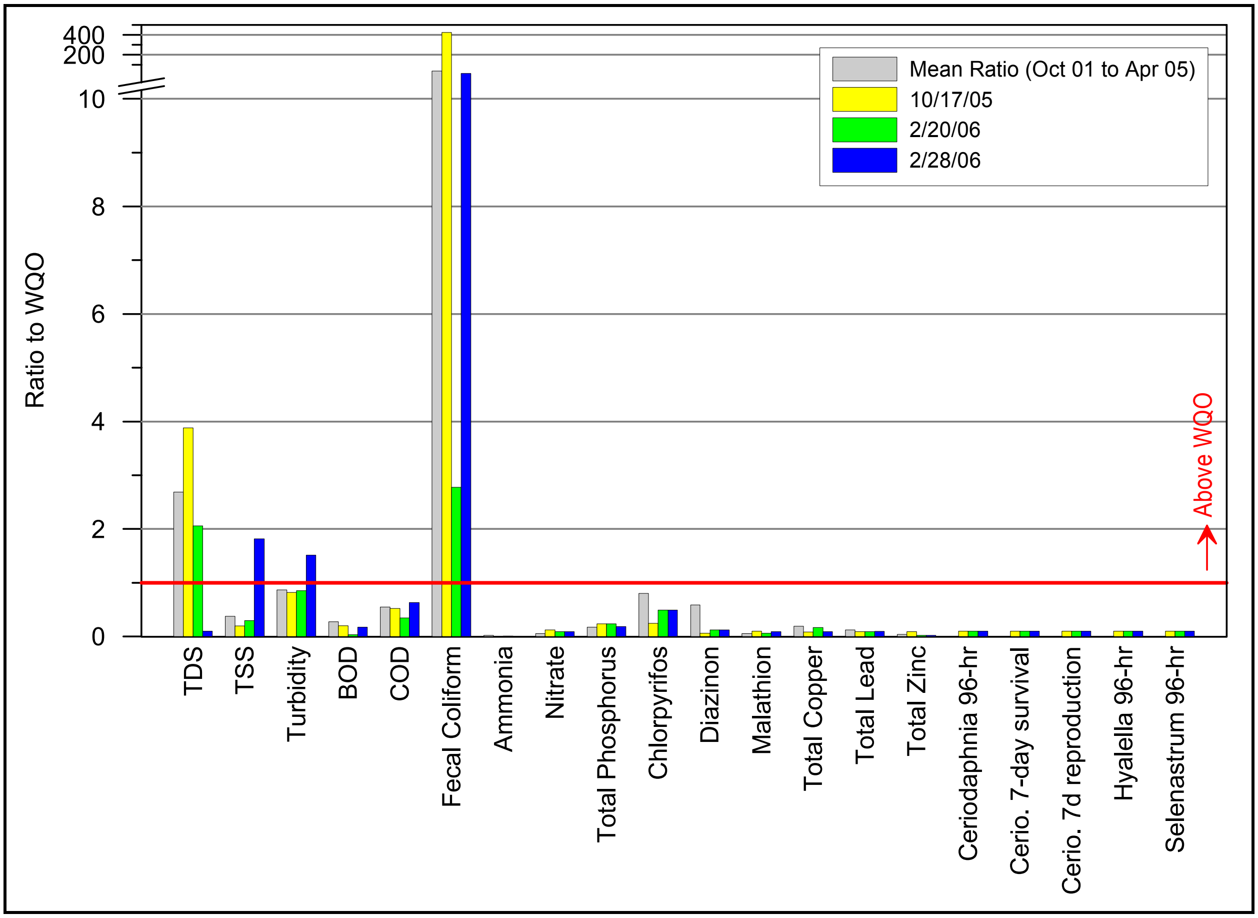

Figure 8-3. Los Peñasquitos Creek water quality ratios.

8.2.3 Wet Weather Constituent Loadings Analysis

Loading values for each constituent sampled were derived using the event mean concentration (EMC) values obtained from composite samples collected at the Los Peñasquitos Creek MLS site and the recorded volume of water discharged during the sampling period. For each of the three storm events, the mean and coefficient of variation were calculated and are reported in Table 8-5.

The constituent EMC loads at the Los Peñasquitos Creek MLS site were compared to the mean WQO loads, calculated using the mean flow (Table 8-5) multiplied by constituent WQOs. This comparison shows that fecal coliform, TDS, and TSS EMC loads were greater than the corresponding mean WQO loads. The EMC load for fecal coliform was 32.6 trillion MPN/day, compared to the WQO load of 419 billion MPN/day. The EMC load for TDS was 53,447 kg/day, compared to the WQO load of 52,389 kg/day. The EMC load for TSS was 13,839 kg/day, higher than the WQO load of 10,478 kg/day. This corresponds to EMC WQO exceedances for all three constituents. The TDS EMC was above its WQO during two of three wet weather sampling events, and TSS during one of three events. However, the magnitude of constituent concentrations was such that the EMC load was still greater than the WQO load.

Table 8-5. Loading Statistics for Los Peñasquitos Creek (PC) mass loading station.

Constituent	Units	Mean PC Load	Coefficient of Variation (%)	Mean PC WQO Load
General/ Physical/Organic				
Flow	cfs	43	91	-
Oil and Grease (O&G)	kg/day	61	68	1,572
Bacteriological				
Total Coliform	MPN/day	2.47E+14	146	na
Fecal Coliform	MPN/day	**3.26E+13**	144	4.19E+11
Enterococci	MPN/day	2.42E+14	150	na
Wet Chemistry				
Total Dissolved Solids (TDS)	kg/day	**53,447**	82	52,389
Total Suspended Solids (TSS)	kg/day	**13,839**	158	10,478
Phosphorus, Total	kg/day	43	78	210
Phosphorus, Dissolved	kg/day	39	91	210
Nitrate	kg/day	101	80	1,048
Nitrite	kg/day	3	91	105
Total Kjeldahl Nitrogen (TKN)	kg/day	136	68	na
Ammonia	kg/day	14	78	na
Biochemical Oxygen Demand, 5-day (BOD_5)	kg/day	504	109	3,143
Chemical Oxygen Demand (COD)	kg/day	7,187	110	12,573
Total Organic Carbon (TOC)	kg/day	1,677	79	na
Dissolved Organic Carbon (DOC)	kg/day	1,287	90	na
Methylene Blue Active Substances (MBAS)	kg/day	26	91	52
Pesticides				
Diazinon	kg/day	0.001	91	0.008
Chlorpyrifos	kg/day	0.001	91	0.002
Malathion	kg/day	0.004	95	0.045
Total Metals				
Antimony (Sb), Total	kg/day	0.26	91	0.63
Arsenic (As), Total	kg/day	0.67	108	5.24
Cadmium (Cd), Total	kg/day	0.08	58	0.74
Chromium (Cr), Total	kg/day	0.26	91	64.94
Copper (Cu), Total	kg/day	0.60	101	3.07
Lead (Pb), Total	kg/day	0.25	138	1.83
Nickel (Ni), Total	kg/day	0.36	67	16.97
Selenium (Se), Total	kg/day	0.26	91	2.10
Zinc (Zn), Total	kg/day	1.54	59	39.04
Dissolved Metals				
Antimony (Sb), Dissolved	kg/day	0.26	91	na
Arsenic (As), Dissolved	kg/day	0.12	69	35.62
Cadmium (Cd), Dissolved	kg/day	0.06	70	0.63
Chromium (Cr), Dissolved	kg/day	0.26	91	20.52
Copper (Cu), Dissolved	kg/day	0.30	70	2.95
Lead (Pb), Dissolved	kg/day	0.10	91	1.09
Nickel (Ni), Dissolved	kg/day	0.24	66	16.93
Selenium (Se), Dissolved	kg/day	0.26	91	2.10
Zinc (Zn), Dissolved	kg/day	1.49	59	38.18

These loading estimates do not include additional loading delivered to the receiving water after the composite sample collection was completed since continual base flows have not been monitored under this program. Continual flow monitoring will be performed during the 2006-2007 wet weather monitoring season in order to capture the annual base flow conditions. Constituent concentrations during base flow conditions will not be monitored until the 2007-2008 season after the adoption of the revised storm water permit (Order R9-2006-0011). Annual loading estimates will be performed in future reports when this data is available.

8.2.4 Watershed Storm Water Modeling

The estimated average pollutant storm load and the expected loads are compared in this section and are based on the modeling methods provided in Section 3. This comparison can provide watershed managers with additional information on what pollutants are causing unexpectedly high loads.

Figure 8-4 shows the mean modeled loads calculated in GIS for the Peñasquitos Creek Watershed based on the rainfall from the three monitored events, land use impervious values, and assumed constituent concentrations. Both load estimates base the runoff volume on the storm rainfall interpolated across the watershed from the County's ALERT rain gage network and the watershed's imperviousness. The loads represent the average amount during the monitored events. The measured loads are calculated by using the mean measured concentrations found during the 2005-2006 storm season. The modeled loads are calculated by assuming the concentrations running off of the different land uses in the watershed correspond to the median land use event mean concentrations found in the National Stormwater Quality Database. A more detailed description of the modeling methods is provided in Section 3.

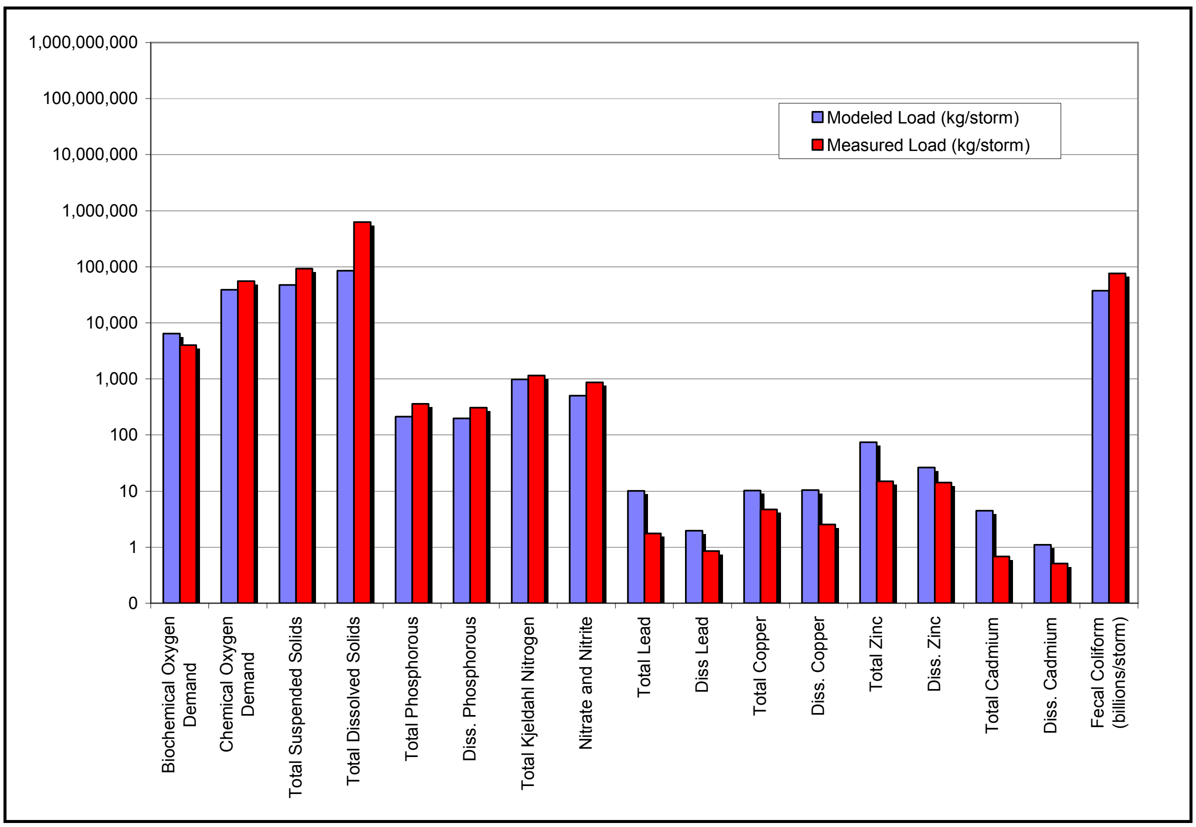

Figure 8-4. Mean modeled and measured loads for the Peñasquitos Creek Watershed.

The land use based and measurement based loads are similar. However, the total dissolved solids loads based on measured concentrations are several times higher than those based on land use. Total dissolved solids was also a listed constituent of concern in the BLTEA and watershed assessment. The metals loads are all less than might be expected from the land use in the Los Peñasquitos Creek Watershed.

8.2.5 2005 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. Dry weather monitoring sites with field parameter and chemistry results are presented in this section and are shown on Figure 8-5.

Water quality monitoring was performed at 84 locations in Los Peñasquitos Creek WMA during the 2005 dry weather monitoring program. Of these, 53 sites are located upstream of the mass loading station on Los Peñasquitos Creek. A summary of the 2005 dry weather monitoring results for the Los Peñasquitos Creek WMA is provided below in Table 8-6.

Table 8-6. Summary of the 2005 Dry Weather Monitoring Results in the Los Peñasquitos Creek WMA

Analyte	Units	DW Action Level	No. Samples	Minimum	Mean	Maximum
Conductivity*	mS/cm		84	0.3	2.0	5.0
Oil & Grease	mg/L	15	22	1.7	2.5	4.6
pH	pH units	6.5-8.5	84	6.4	7.9	8.9
Enterococcus	MPN/100mL	10,000	22	230	11,824	78,000
Fecal Coliform	MPN/100mL	20,000	22	40	84,846	1,600,000
Total Coliform	MPN/100mL	50,000	22	220	233,646	1,600,000
Ammonia (NH3-N)	mg/L	1	76	<0.1	0.5	7.0
Nitrate (NO3-N)	mg/L	10	84	0.0	1.6	20.0
MBAS	mg/L	1	22	0.1	0.3	2.2
Ortho-phosphate (PO4-P)	mg/L	2	83	<0.05	0.5	3.6
Turbidity	NTU	20	80	0.1	115.3	6,710
Chlorpyrifos	ug/L	0.5	22	<0.05	<0.05	<0.05
Diazinon	ug/L	0.5	22	<0.05	na	0.060
Total Hardness	mg CaCO3/L		22	275	799	3,130
Cadmium, Diss	ug/L	(a)	22	<5	na	<5
Copper, Diss	ug/L	(a)	22	<5	8.43	35.40
Lead, Diss	ug/L	(a)	22	<5	na	<5
Zinc, Diss	ug/L	(a)	22	<20	14.65	39.90

* All data are as reported by co-permittees. No unit conversions were made

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

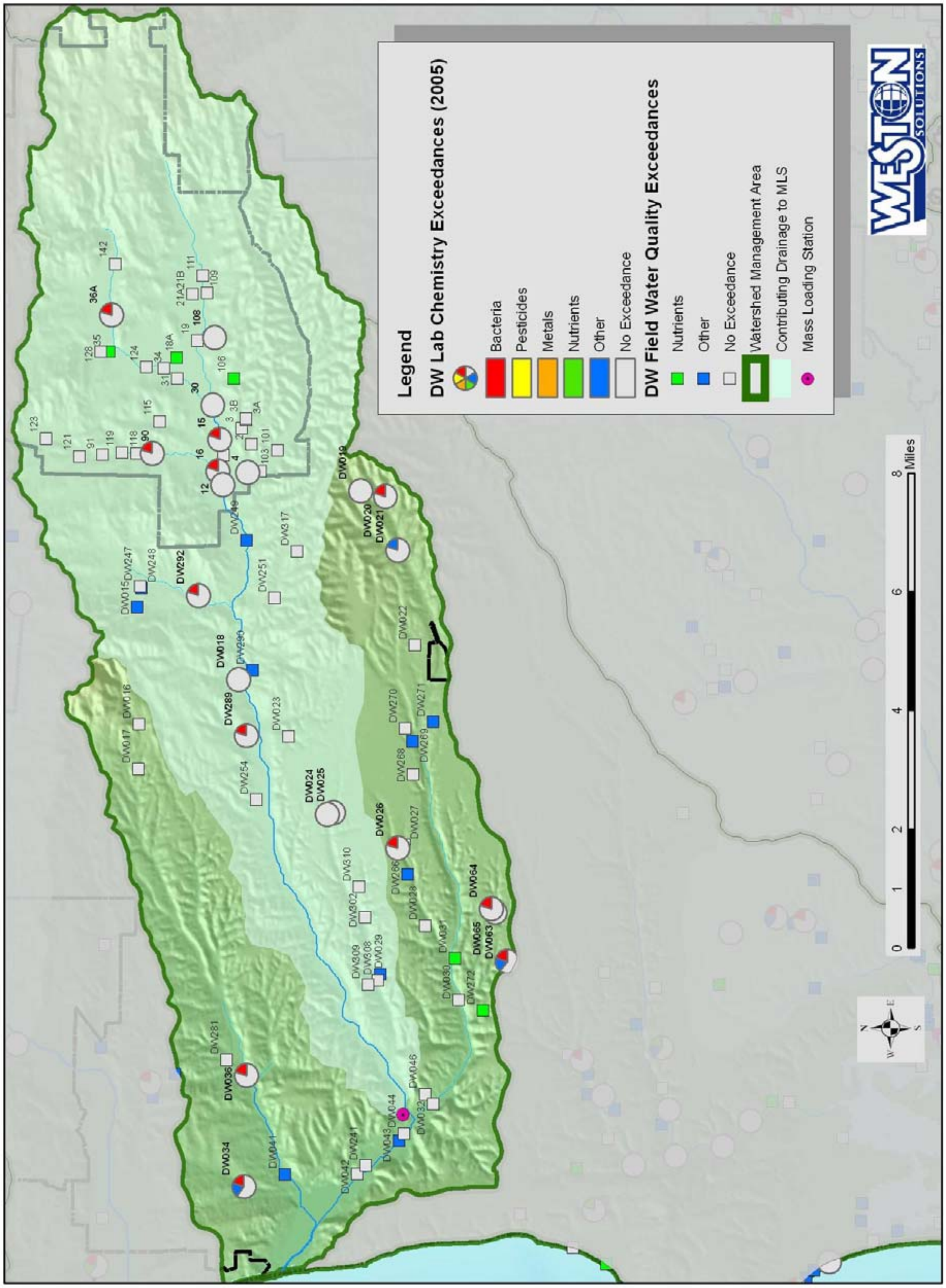

Figure 8-5. Los Peñasquitos WMA dry weather exceedance map.

Table 8-7 summarizes the 2005 Dry Weather Program constituent exceedances. Constituent results that were above the dry weather action level at the dry weather monitoring sites include ammonia, total and fecal coliform, enterococcus, MBAS, nitrate, ortho-phosphate, pH, and turbidity.

Table 8-7. Los Peñasquitos WMA 2005 Dry Weather Exceedance Matrix.

Constituent	Number of Exceedances	Number of Samples Collected	Average Ratio of Exceedance*	St. Dev. Ratio of Exceedance
Ammonia	4	76	1.19	0.48
Total Coliform	11	22	9.16	4.67
Fecal Coliform	2	22	17.01	4.24
Enterococcus	6	22	1.83	1.18
MBAS	1	22	0.44	0.32
Nitrate	1	84	0.25	0.16
Ortho-phosphate	3	83	0.31	0.22
pH	1	84	0.11	0.05
Turbidity	16	80	37.78	5.69

* 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 more frequent and wider ranges of exceedances. Constituents with average ratios of exceedance and standard deviations less than one indicate exceedances that occur on a more random and infrequent basis. In the Los Peñasquitos Creek WMA, enterococcus, total and fecal coliform and turbidity had average ratios of exceedance greater than one.

Figure 8-5 depicts the 2005 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 action level exceedances. The colored slices of the pie show the different constituent groups that contributed to the exceedances.

8.2.6 Third Party Data

Third party data was collected from the Los Peñasquitos Watershed under the Surface Water Ambient Monitoring Program (SWAMP) in March, April, June, and September 2002 (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. Three sites were sampled within Los Peñasquitos Watershed, including Los Peñasquitos Creek, Soledad Canyon Creek and Poway Creek. At the station located in Los Peñasquitos Creek in the same vicinity as the mass loading station, parameters with results above the water quality objective (WQO) include turbidity, pH, sulfate, Diazinon, methyl parathion and toxicity. Results from the other two stations within Los Peñasquitos Watershed were similar to those found in Los Peñasquitos Creek. Sulfate, manganese and toxicity were above the WQO at all sites. Turbidity and Diazinon concentrations were above the WQO sporadically.

8.2.7 TIEs

TIE testing was not performed on Los Peñasquitos Creek samples. This mass loading station has not been identified as a TIE candidate site based upon the Triad Decision Matrix. Toxicity was not observed in any of the three storm events during the 2005-2006 monitoring season.

8.2.8 Watershed Water Quality Monitoring Summary

Total dissolved solids and elevated levels of bacterial indicators, specifically fecal coliform, appear to be the primary water quality concerns within the watershed. Based on the period of record, there appears to be a significant downward trend in Diazinon concentrations at the MLS.

Three sites were sampled under the SWAMP program within Los Peñasquitos Watershed in 2002, including Los Peñasquitos Creek, Soledad Canyon Creek and Poway Creek. At the station located in Los Peñasquitos Creek in the same vicinity as the mass loading station, parameters with results above the water quality objective (WQO) include turbidity, pH, sulfate, Diazinon, methyl parathion and toxicity. Results from the other two stations within Los Peñasquitos Watershed were similar to those found in Los Peñasquitos Creek. Sulfate, manganese and toxicity were above the WQO at all sites. Turbidity and Diazinon concentrations were above the WQO sporadically.

8.3 Stream Bioassessment

Stream bioassessment in the Los Peñasquitos Creek WMA included two urban affected monitoring sites. The upstream site was in Los Peñasquitos Canyon Creek at Cobblestone Creek Road (LPC-CCR), on the downstream side of the city of Poway. The downstream site was in Carroll Canyon Creek near the Highway 805 overcrossing in Sorrento Valley (CCC-805). The Carroll Canyon Creek site receives water from a separate portion of the watershed than the Los Peñasquitos site.

In addition to the Index of Biotic Integrity, a new analysis tool has recently become available for summarizing benthic macroinvertebrate communities in California. Known as the O/E ratio, it is the ratio of organisms observed at a site (O) to the organisms expected to occur at a site (E). The "expected" value is based on percent probability of capture of specific taxa under reference conditions and also accounts for factors such as temperature, precipitation, and geology. An O/E ratio of 0.80 or higher represents an unimpacted benthic community. This represents a 20 percent loss of the biodiversity expected in the benthic community.

8.3.1 Results and Discussion

Relative WMA Ranking and Trends Over Time

In order to graphically represent how each WMA test sites are ranked by benthic community quality within the County, rescaled IBIs based on the percent deviation from the median County score is presented in Figure 8-6 (see Section 3.2.7 for a detailed explanation of the re-scaling procedure). Relative ranking of the Peñasquitos WMA sites (highlighted in blue) show the Carroll Canyon Creek at Highway 805 (CCC-805) was ranked about seven percent above the County median, and the Los Peñasquitos Canyon Creek at Cobblestone Creek Road site (LPC-CCR) was ranked about 10 percent below the County median.

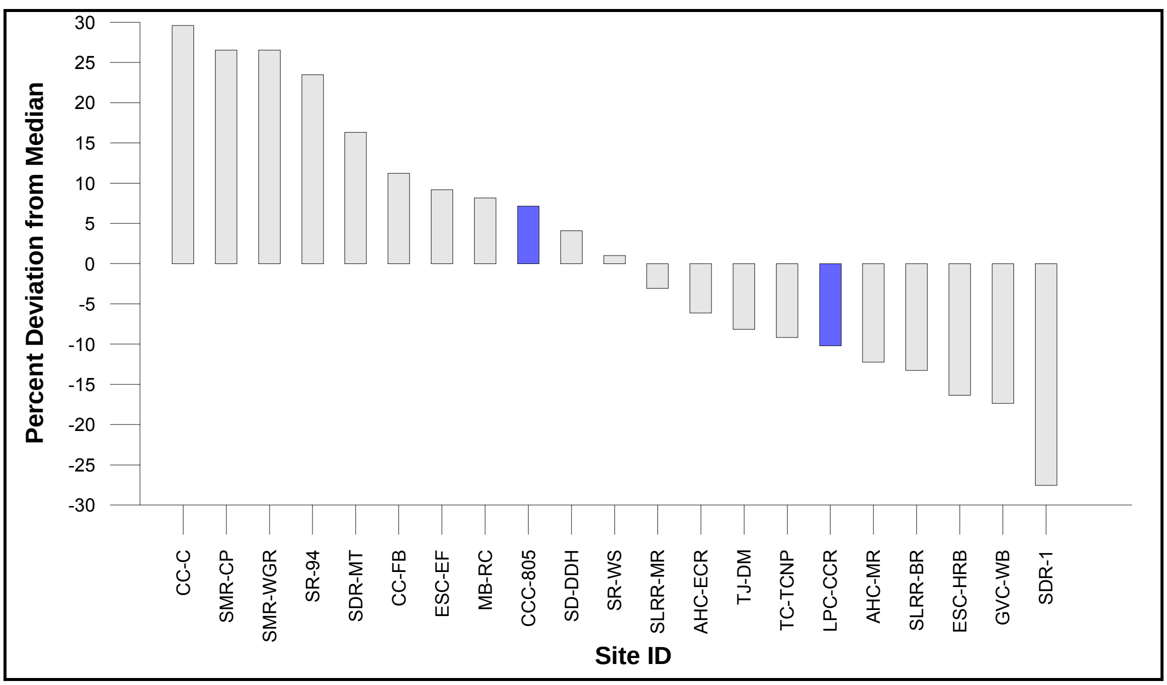

Figure 8-6. Relative Ranking of Rescaled IBI Scores for Los Peñasquitos WMA

Figure 8-7 shows the average IBI scores for the Los Peñasquitos WMA sites in comparison with the San Diego County-wide average IBI score, excluding reference sites. The Peñasquitos average IBI scores ranged from 3.0 in May 2002 to 15.0 in October 2003 and 2004. Since the beginning of the program in 2001, the average IBI scores of the Peñasquitos sites were consistently very similar to the average scores of other sites in the county.

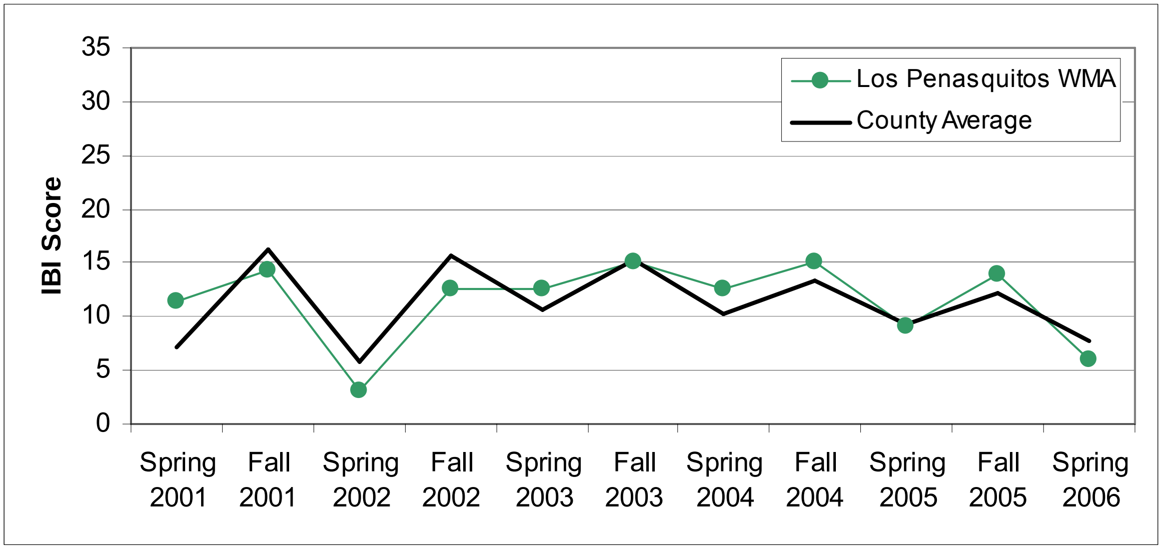

Figure 8-7. Index of Biotic Integrity Scores, WMA Average Over Time

Los Peñasquitos Canyon Creek Monitoring Site: LPC-CCR

The Los Peñasquitos Canyon Creek monitoring site had a benthic macroinvertebrate community with an Index of Biotic Integrity rating of Very Poor for both the October and May surveys, with IBI scores of 13 and 1, respectively (Table 8-8). Taxa richness for the two surveys was also variable, with 25 and 12 unique taxa collected, with 3 and 2 EPT taxa per each survey. There were no organisms collected that are highly intolerant to impairment, and organisms highly tolerant to impairment comprised 25 and 13 percent of the community in October and May, respectively.

Preliminary results of the O/E analysis show that the Los Peñasquitos Creek monitoring site had a ratio of 0.37 (Appendix B.9). This implies that the benthic community has lost an estimated 63 percent of the biodiversity expected to occur at the site.

Table 8-8. Selected Biological Metrics and Physical Measures of the Los Peñasquitos Watershed Management Area.

Los Peñasquitos Watershed Management Area	Los Peñasquitos Creek at Cobblestone Creek Road (LPC-CCR)		Carroll Canyon Creek at Highway 805 (CCC-805)	
Survey	**Oct-05**	**May-06**	**Oct-05**	**May-06**
Index of Biotic Integrity/ Qualitative Rating	**13 Very Poor**	**1 Very Poor**	**15 Poor**	**11 Very Poor**
O/E Ratio		**0.37**		**0.37**
Metrics				
Taxa Richness	25	12	19	12
EPT Taxa (mayflies, stoneflies, and caddisflies)	3	2	3	3
% Intolerant Taxa	0%	0%	0%	0%
% Tolerant Taxa	25%	14%	60%	7%
Average Tolerance Value	6.3	6.0	6.6	5.8
% Collector Filterers +Collector Gatherers	73%	98%	68%	99%
Physical Measures				
Elevation	440		80	
Physical Habitat Score	143	146	117	124
Riffle Velocity (ft/sec)	1.8	1.3	0.8	1.5
Substrate Composition				
Silt	5%	8%	8%	
Sand	5%	17%		7%
Gravel	25%	27%	15%	53%
Cobble	52%	40%	77%	40%
Boulder	3%	5%		
Roots	10%	3%		
Water Quality				
Temperature (°C)	15.8	17.9	20.7	20.0
pH	8.0	7.8	8.5	8.5
Specific Conductance (mS/cm)	2.681	2.766	3.280	3.135
Dissolved Oxygen (mg/L)	10.43	9.99	20.04	19.25

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

The physical habitat of the site was near optimal, with a substrate primarily of layered cobble, and there was a good oak and sycamore riparian zone. Development adjacent to the monitoring reach consisted of low density residential use that had retained much of the native flora. Specific conductance was relatively high, 2.681 and 2.766 mS/cm, and pH values were 8.0 and 7.8.

The benthic community was seasonally variable, dominated by the mayfly *Fallceon quilleri* and the damselfly *Argia* in October, and by Chironomid midges and the black fly *Simulium* in May (Table 8-9). This pattern was typical of the site, with much higher numbers of the predatory *Argia* collected during fall surveys.

Table 8-9. Macroinvertebrate Community Summary: Five Most Abundant Taxa for Los Peñasquitos Watershed Management Area

		Taxon	Common Name	Percent Composition	Tolerance Value	Functional Feeding Group
Los Peñasquitos Creek at Cobblestone Creek Road (LPC-CCR)	Oct-05	***Fallceon quilleri***	**minnow mayfly**	**20%**	**4**	**Collector Gatherer**
		Argia	dancer damselfly	14%	7	Predator
		Chironomidae	non-biting midges	13%	6	Collector Gatherer/Filterer
		Simulium	black fly	13%	6	Collector Filterer
		Corbicula	clam	12%	10	Collector Filterer
	May-06	**Chironomidae**	**non-biting midges**	**28%**	**6**	**Collector Gatherer/Filterer**
		Simulium	black fly	20%	6	Collector Filterer
		Baetis	minnow mayfly	16%	5	Collector Gatherer
		Oligochaeta	earthworm	13%	5	Collector Gatherer
		Ostracoda	seed shrimp	10%	8	Collector Gatherer
Carroll Canyon Creek at Highway 805 (CCC-805)	Oct-05	**Ostracoda**	**seed shrimp**	**40%**	**8**	**Collector Gatherer**
		Fallceon quilleri	minnow mayfly	16%	4	Collector Gatherer
		Prostoma	tongue worm	11%	8	Predator
		Turbellaria	flatworm	11%	4	Predator
		Baetis	minnow mayfly	6%	5	Collector Gatherer
	May-06	**Chironomidae**	**non-biting midges**	**40%**	**6**	**Collector Gatherer/Filterer**
		Baetis	minnow mayfly	24%	5	Collector Gatherer
		Simulium	black fly	21%	6	Collector Filterer
		Ostracoda	seed shrimp	7%	8	Collector Gatherer
		Fallceon quilleri	minnow mayfly	5%	4	Collector Gatherer

The Los Peñasquitos Creek mass loading station was too spatially disconnected from the bioassessment site to correlate any of the storm water information with the benthic community.

Carroll Canyon Creek Monitoring Site: CCC-805

The Carroll Canyon Creek monitoring site had a benthic macroinvertebrate community with Index of Biotic Integrity ratings of Poor and Very Poor in October 2005 and May 2006 and IBI scores of 15 and 11, respectively (Table 8-8). Taxa richness for the two surveys was 19 and 12, with 3 different EPT taxa collected per survey. There were no organisms collected that are highly intolerant to impairment, and the occurrence of organisms highly tolerant was variable, comprising 60 percent of the community in October, and 7 percent of the community in May.

Preliminary results of the O/E analysis show that the Carroll Canyon Creek monitoring site had a ratio of 0.37 (Appendix B.9). This implies that the benthic community has lost an estimated 63 percent of the biodiversity expected to occur at the site.

The physical habitat of the site was sub-optimal, with a substrate primarily of smooth layered cobble and large gravel. This substrate is very unconsolidated, and field biologists have noted that heavy winter storms alter the streambed considerably. The willow-dominated riparian zone was disturbed in some portions of the reach due to the proximity of commercial development and non-native *Arrundo donax* and pampas grass was well established. Specific conductance was fairly high, 3.280 and 3.135 ms/cm, and pH values were 8.5 for both surveys. Dissolved oxygen was consistently very high, with readings near 20 mg/l in each survey.

The benthic community was seasonally variable, although Baetid mayflies (*Baetis* and *Fallceon quilleri*) were abundant in both surveys. In October the community was dominated by Ostracods, *Fallceon quilleri*, and the Nermertean *Prostoma* (tongue worms). In May, the community was dominated by Chironomid midges, *Baetis*, and the black fly *Simulium* (Table 8-9).

The Los Peñasquitos Creek mass loading station was located approximately one mile away from the bioassessment station on Carroll Canyon Creek, and water quality measures from storm water may have contained constituents that were not present in the bioassessment site. The ubiquity of total dissolved solids in all of the storm water samples in the region may imply that this was also a constituent of concern at the bioassessment site, which had high specific conductance readings. Pesticides, metals, and toxicity to *Ceriodaphnia* and *Hyalella* from storm water were generally undetectable at the MLS.

8.3.2 Stream Bioassessment Summary and Conclusions

The Los Peñasquitos WMA was sampled for stream macroinvertebrates at two sites. The upstream site was in Los Peñasquitos Creek in Poway, and the downstream site was in Carroll Canyon Creek in Sorrento Valley. Both of the sites had Index of Biotic Integrity ratings that were in the Very Poor or Poor categories. The Carroll Canyon Creek site was rated slightly higher than the upstream site on Los Peñasquitos Creek, possibly due to different watershed areas contributing to the different streams.

8.4 Ambient Bay and Lagoon Monitoring Program

8.4.1 Results and Discussion

8.4.1.1 Phase I Results and Discussion

Sediment samples were collected in the Los Peñasquitos Lagoon for the 2005 ABLM Program on June 15, 2005 (See Section 3.3 for details on the sampling approach). The nine sites sampled as part of the Phase I assessment are shown in Figure 8-8. The median grain size at the Los Peñasquitos Lagoon ranged from 6 μm at Site 2R-1 in the middle Lagoon, to 193 μm at Site 1M-4 in the outer Lagoon (Table 8-10). The grain size characteristics of the sediments in the three outer Lagoon sites (Sites 1L-4, 1M-4 and 1R-1) were distinctly different from those at the other sites in the Lagoon. Sites in the outer Lagoon were composed primarily of sand (92.5% to 97%) and had a much smaller proportion of fine grained sediments than the other sites. These three sites also had a much lower TOC content (0.06% to 0.27%) compared to the other sites in the Lagoon (0.43% to 1.2%). Site 2L-6 in the southern arm of the Lagoon had more similar sediment composition to the outer strata with 90% sand and a median grain size of 114 μm.

Sites 2M-1, 2R-1 in the middle stratum and Site 3R-1 in the inner stratum were selected for Phase II assessment (Table 8-10). Site 3M-1 also had a high TOC content but had a lower percentage of fine sediments than the other sites chosen.

Table 8-10. Results of Phase I sediment analyses and subsequent ranking for Phase II site selection at the Los Peñasquitos Lagoon.

Sampling Site	TOC and Grain Size Distribution in Phase I								Ranking for Phase II				
	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Median (µm)	Mean (µm)	Fines (%)	TOC (%)	Fines Rank	TOC Rank	Rank Sum	Highest Rank	Phase II
LPL 1L4	0.00	92.5	4.13	3.36	148	135	7.49	0.27	3	3	6		
LPL 1M4	0.02	94.5	2.99	2.47	193	185	5.46	0.06	2	1	3		
LPL 1R1	0.00	97.0	1.33	1.65	160	163	2.98	0.19	1	2	3		
LPL 2L6	0.00	90.0	4.28	5.68	114	111	9.95	0.36	4	4	8		
LPL 2M1	0.03	22.4	35.3	42.3	8.0	NC	77.58	0.46	7	6	13	*	Yes
LPL 2R1	0.05	19.8	34.8	45.3	6	NC	80.13	1.01	8	8	16	*	Yes
LPL 3L1	0.16	19.6	37.1	43.2	6.77	5.21	80.22	1.20	9	9	18	*	Yes
LPL 3M1	7.63	27.4	29.7	35.3	19.5	6.99	65.01	0.57	6	7	13	*	
LPL 3R1	9.81	62.4	13.0	14.8	98.9	46.8	27.80	0.43	5	5	10		
Mean of all sites	1.97	58.41	18.07	21.56	83.80	93.23	39.63	0.50					

NC = Not calculable (%silt + %clay > 84%)

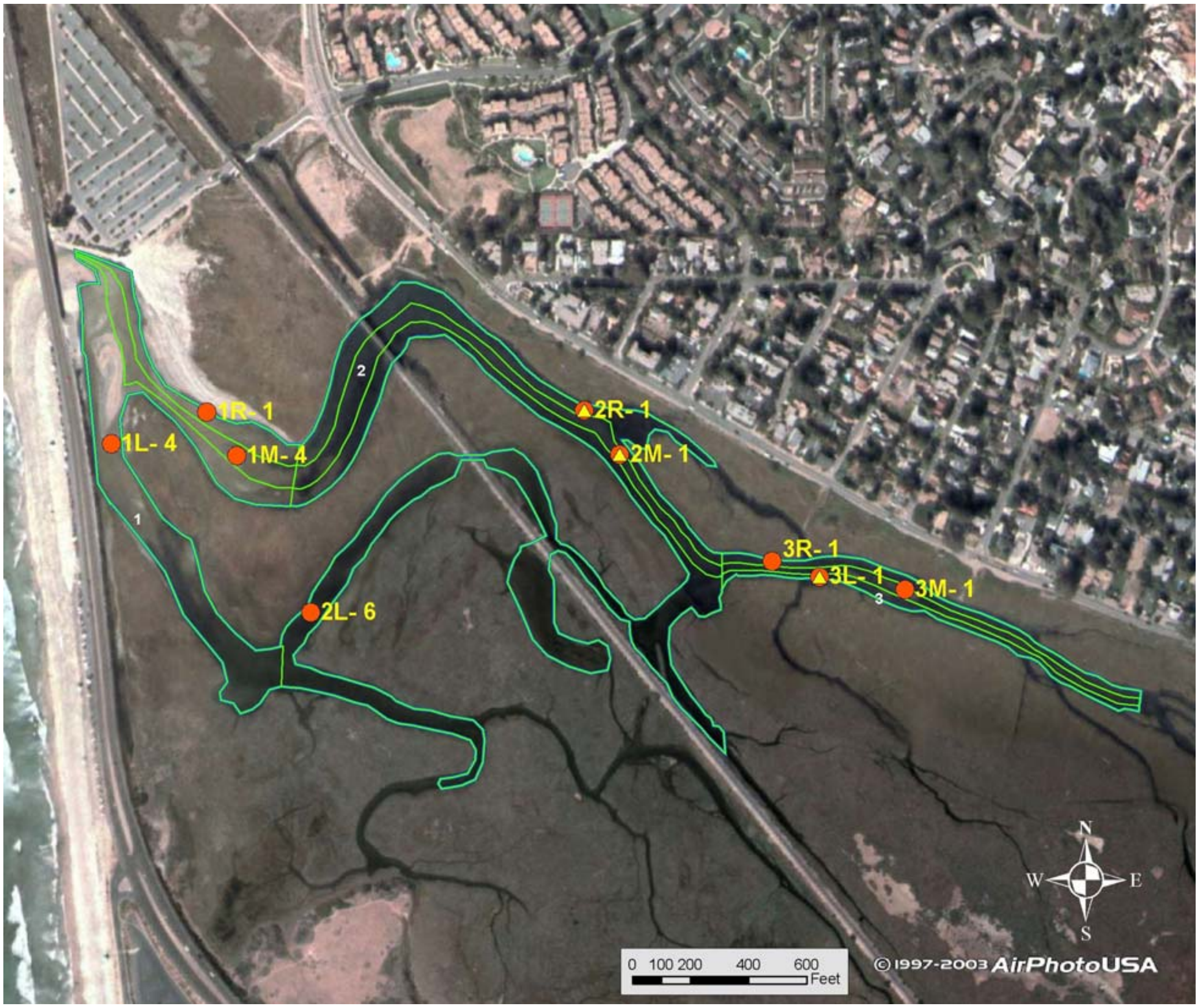

Figure 8-8. Map of Phase I site locations in Los Peñasquitos Lagoon. Sites with yellow triangles were selected for Phase II assessment.

8.4.1.2 Phase II Results and Discussion

The three sites selected in the Los Peñasquitos Lagoon as part of Phase I were sampled in Phase II on July 14, 2005. Sediments from Sites 2M-1, 2R-1 and 3L-1 were composited and analyzed for chemistry and toxicity; individual samples were analyzed for benthic community structure. The results are summarized in Table 8-11.

Table 8-11. Summary of chemistry, toxicity, and benthic community structure in the Los Peñasquitos Lagoon.

CHEMISTRY*					TOXICITY*	BENTHIC COMMUNITY						
Analyte	ERL	ERM	Result	ERM-Q	Percent Survival	Index	2M-1	2R-1	3L-1	Mean	St. Dev.	Total
METALS (mg/kg)					**91%** Not Significantly Different from Control	Abundance	763	2253	844	1287	838	3860
Antimony	NA	NA	<1.57	NA		Richness	20	21	22	21.00	1.00	34
Arsenic	8.2	70	7.84	0.112		Diversity	1.72	1.72	2.11	1.85	0.22	NA
Cadmium	1.2	9.6	0.279	0.03		Evenness	0.57	0.57	0.68	0.61	0.06	NA
Chromium	81	370	22.9	0.06		Dominance	3	3	5	3.67	1.15	NA
Copper	34	270	15.5	0.06								
Lead	46.7	218	19.5	0.09								
Nickel	20.9	51.6	7.58	0.15								
Selenium	NA	NA	<1.57	NA								
Zinc	150	410	79.3	0.19								
PCBs (µg/kg)	NA$_I$	NA$_I$	ND	NA								
PAHs (µg/kg)	NA$_I$	NA$_I$	ND	NA								
PESTICIDES (µg/kg)	NA$_I$	NA$_I$	ND	NA								
Mean ERM-Q				0.10								

* Analysis performed on composite samples from the three sites.
NA-Not applicable
NA$_I$- ERL and ERM values are presented for detected analytes only. Refer to sediment quality guidelines for individual values.
ND-Not detected
Bold – exceeds ERL or ERM value

Sediment Chemistry. Sediments from each of the 12 coastal embayments in the ABLM Program were analyzed for four basic constituents: metals, PCBs, PAHs, and pesticides. Of these, seven metals were detected above the detection limit in the Los Peñasquitos Lagoon: arsenic, cadmium, chromium, copper, lead, nickel and zinc (Table 8-11). This suite of metals was also found in all the other embayments assessed in the ABLM Program. Concentrations of metals were low in the Los Peñasquitos Lagoon samples and none exceeded their respective ERL and ERM sediment quality values. With the exception of cadmium, the same metals were detected above the detection limit during the 2003 and 2004 ABLM Programs. All metal concentrations were low and did not exceed the ERM values during the 2003 and 2004 monitoring events; however copper and zinc did exceed their respective ERL values in the 2003 sampling and selenium in 2004. There were no PAHs, PCBs, or pesticides found above the detection limit in the Los Peñasquitos Lagoon samples collected during the 2005 Program.

The mean ERM-Q value, which is a measure of the cumulative effects of the constituents for which ERM sediment quality values are available, was 0.10. This value did not exceed the threshold of 0.10. Sediments with mean ERM-Q values above this threshold have a higher probability of producing adverse biological effects than those with mean ERM-Q values below the threshold (Long et al., 1998). Although not above the threshold, the 2005 ERM-Q value for the Lagoon is similar to the 2003 and 2004 mean ERM-Q values of 0.11 in both years.

Toxicity. The mean percent survival of *E. estuarius* exposed to Los Peñasquitos Lagoon sediments in a 10-day acute toxicity test was 91% (Table 8-11). Percent survival was not significantly different from that of the Control (97%), suggesting that Los Peñasquitos Lagoon sediments were not toxic to the test organisms. During the 2003 ABLM Program toxicity was observed, but not in the 2004 ABLM sampling of the Lagoon.

Simultaneously Extracted Metals/Acid-Volatile Sulfides Ratio. In the Los Peñasquitos Lagoon sediment, the SEM:AVS ratio was 8.42, indicating that the concentration of SEM was significantly higher than the concentration of AVS in this sediment sample. These results indicate that not all of the metals in the Lagoon sediment were bound up by AVS and therefore may be bioavailable and potentially toxic to benthic organisms. No toxicity was observed in the 10-day solid phase toxicity test using *E. estuarius*; indicating that bioavailable metals found in the Los Peñasquitos Lagoon sediment were not toxic to the amphipod *E. estuarius*. It should be noted that the SEM:AVS ratio may inaccurately predict toxicity of a sediment sample such as Los Peñasquitos Lagoon, even when toxicity is not observed in toxicity tests, because of environmental factors including grain size, total organic carbon, salinity, and dissolved oxygen, which may interfere with the metal binding properties of AVS (Long et al., 1998).

Benthic Community Structure. A total of 3,860 organisms were collected from the Los Peñasquitos Lagoon, representing 34 taxa (Table 8-11). During the 2003 ABLM Program a total of 547 organisms were collected from the Lagoon, representing 13 taxa while in the 2004 ABLM Program a total of 2,433 organisms were collected, representing 49 taxa. Taxa evenness, diversity and richness were higher at Site 3L-1 than the other two sites, but abundance was lower than Site 2R-1. Dominance was close to the same at all sites.

The mollusk *Acteocina inculta* was the most abundant species found in the benthic community in the Los Peñasquitos Lagoon, accounting for 28% of all the organisms collected (Table 8-12). The second most abundant species was the polychaete *Capitella capitata,* which accounted for 19% of the benthic community. Another polychaete *Polydora nuchalis* was the third most abundant, accounting for 11% of the total benthic community collected. In the 2004 sampling, the crustacean *Grandidierella japonica*, dominated the benthic community in the Los Peñasquitos Lagoon; the second most abundant species were the Phoronids, which accounted for 29.6% of the benthic community. The barley snail, *Barleeia sp*., was the third most abundant, accounting for 6.7% of the total abundance, which differs from the 2003 ABLM Program where *Barleeia sp*. dominated the benthic community accounting for 52.1% of all organisms collected.

Table 8-12. Dominant infaunal species found in the Los Peñasquitos Lagoon during the 2005 ABLM Program.

Embayment	Taxa (Species)	Higher Taxa	Abundance	Percent Composition
LPL	*Acteocina inculta*	Mollusca	1096	28
	Capitella capitata Cmplx	Polychaeta	716	19
	Polydora nuchalis	Polychaeta	427	11

* Values were calculated from the total of all sites assessed.

Lagoons were analyzed using the Benthic Response Index (BRI) and Relative Benthic Index (RBI) scores as a primary indicator of lagoon health. The BRI is the abundance-weighted average pollution tolerance score of organisms occurring in a sample and is most applicable to marine environments (Smith et al., 2001; Smith et al., 2003; Ranasinghe et al., 2004). The RBI is the weighted sum of three measures of abundance: 1) total number of species, number of crustacean species, number of crustacean individuals, and number of mollusk species; 2) abundance of three positive and 3) two negative indicator organisms (Hunt et al., 2001). The RBI was included because it is less dependent on marine benthic species, and more applicable to lagoons. The two indices provided some differences in benthic community health assessment; a lower BRI score indicates better conditions, while a higher RBI score relates to better conditions (Table 8-13). The assessment of biological health in Los Peñasquitos Lagoon varies from year to year, likely due to sampling in different areas of the lagoon.

Table 8-13. Indices of Sediment Biological Health found in the Los Peñasquitos Lagoon during the ABLM Program.

Index	2003	2004	2005
BRI	59	33	62
RBI	0.11	0.71	0.46

* BRI-Good <31, Fair 31-53, Poor >53
RBI-Good >0.61, Fair 0.31-0.60, Poor <0.30

Triad Relationships. The Triad method was used to assess the relationships between chemistry, biology, and toxicity for the lagoon sediments. This method is an integrated approach that depends on "weight of evidence" (Chapman, 1996) and integrates chemistry, biological observation, and toxicity endpoints, allowing the user to classify results based on a decision framework.

The results of the chemistry, toxicity, and benthic community assessments for the Los Peñasquitos Lagoon are presented in Figure 8-9 for the 2003, 2004 and 2005 ABLM Monitoring Programs. For the 2005 ABLM sampling, the Lagoon scored good for toxicology, poor/fair for biology and good for chemistry. The biology score has varied from poor to good over the three years while the toxicity and chemistry scores have been more consistent.

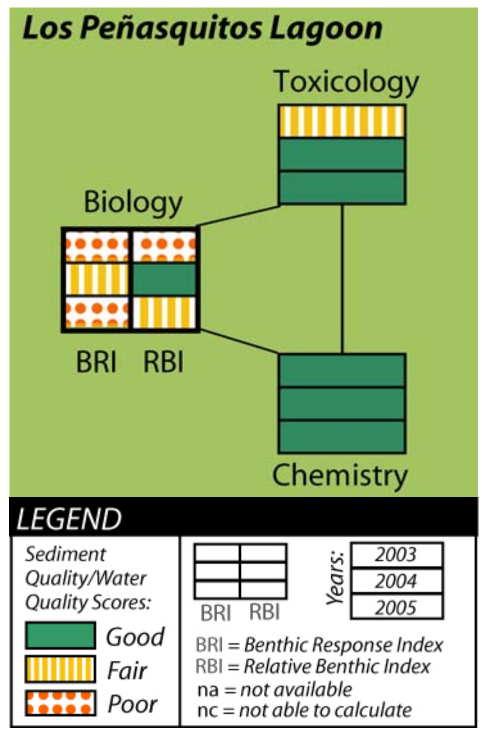

Figure 8-9. Triad relationships for the Los Peñasquitos Lagoon.

8.4.1.3 Los Peñasquitos Ambient Bay and Lagoon Summary and Conclusions

Sediments in the Los Peñasquitos Lagoon were monitored as part of the 2005 ABLM Program to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. In Phase I, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest TOC and smallest grain size): Sites 2M-1 and 2R-1 in the middle stratum and Site 3L-1 in the inner stratum. These sites were sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. The results of the chemistry assessment indicated that seven of the nine metals assessed were detected in the Los Peñasquitos sediments collected. No ERL or ERM sediment quality values were exceeded. The mean ERM-Q value for the Los Peñasquitos Lagoon was 0.10, which is at the published threshold value of 0.10 and therefore suggests no potential for increased toxicity. There were no PAHs, PCBs, or pesticides found above the detection limit in the Los Peñasquitos Lagoon during the

2005 Program. Percent survival of test organisms exposed to Los Peñasquitos Lagoon sediments was 91%, which was not significantly different from that of the Control (97%) and therefore test organisms displayed a non-toxic response. Correlated with the SEM:AVS Ratio, it was determined that bioavailable metals found in the Los Peñasquitos Lagoon sediment were not toxic to the amphipod *E. estuarius*. The benthic community was dominated by the mollusk *Acteocina inculta,* while the polychaete worms *Capitella capitata* and *Polydora nuchalis* made up the rest of the community collected at the Lagoon. For the 2005 ABLM sampling, the Lagoon scored good for toxicology, poor/fair for biology and good for chemistry.

8.5 Los Peñasquitos Creek WMA Assessment

The Los Peñasquitos Creek WMA was assessed utilizing chemistry and toxicity data collected during storm events from a single MLS, field and chemistry data collected from up to 53 dry weather monitoring sites upstream of the MLS, and IBI scores generated at two bioassessment sites. 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 8-14.

8.5.1 Los Peñasquitos Creek WMA Criterion Assessment

One constituent was found to have a high frequency of occurrence in the Los Peñasquitos Creek WMA. Total dissolved solids received a three diamond rating based on Criterion No. 1. Total dissolved solids met this criterion by wet weather MLS samples exceeding the WQO in 93% of the monitored events.

One constituent was found to have a medium frequency of occurrence. Fecal coliform received a two diamond rating based on Criterion No. 5. Fecal coliform met this criterion by wet weather MLS samples exceeding the WQO in 73% of the monitored events.

Table 8-14. Constituent exceedances in the Los Peñasquitos WMA.

Los Penasquitos Creek														
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		CUMULATIVE		2005			
	#/3	%	#/3	%	#/3	%	#/3	%	#/3	%	#/15	%	#	%		
Conventional Parameters																
COD	0	0	0	0	0	0	1	33	0	0	1	7	NA	NA	-	-
Total Dissolved Solids	3	100	3	100	3	100	3	100	2	67	14	93	NA	NA	♦♦♦	1
Total Suspended Solids	0	0	0	0	0	0	1	33	1	33	2	13	NA	NA	-	-
Turbidity	0	0	2	67	0	0	1	33	1	33	4	27	5	10	♦	9
pH	0	0	0	0	0	0	0	0	0	0	0	0	1	2	-	-
Ammonia	0	0	0	0	0	0	0	0	0	0	0	0	2	4	-	-
Nutrients																
Orthophosphate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	1	2	-	-
Nitrate	0	0	0	0	0	0	0	0	0	0	0	0	1	2	-	-
Bacteriological																
Total Coliform	0	0	2	67	0	0	1	33	1	33	4	27	6	46	♦	9
Fecal Coliform	1	33	3	100	1	33	3	100	3	100	11	73	0	0	♦♦	5
Enterococcus	0	0	2	67	0	0	0	0	2	67	4	27	2	15	♦	9
Pesticides																
Chlorpyrifos	0	0	2	67	0	0	0	0	0	0	2	13	0	0	-	-
Diazinon	2	67	1	33	0	0	0	0	0	0	3	20	0	0	-	-
Total Metals																
Antimony	0	0	1	33	0	0	0	0	0	0	1	7	NA	NA	-	-
Bioassessment	IBI Rating														EVIDENCE OF BENTHIC ALTERATION?	
Los Penasquitos Creek, at Cobblestone Creek Rd.	Very Poor		Very Poor		Very Poor		Very Poor		Very Poor		Very Poor		NA		Yes	
Carrol Canyon Creek, at Highway 805	Very Poor		Poor		Poor		Poor		Very Poor		Poor		NA			

* = Total number of observations varied among constituents.
NA = Not assessed
\- = 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

Three constituents were found to have a low frequency of occurrence. Turbidity, Total coliform, and enterococcus were assigned a one diamond rating based on Criterion No. 9.

Toxicity tests have not shown evidence of toxicity during any event of the 15 events monitored since 2001.

IBI scores resulting from bioassessment monitoring on Los Peñasquitos Creek WMA have consistently indicated a rating of Very Poor at the Cobblestone Creek Rd. bioassessment site. The Carroll Canyon Creek site received a rating of poor in three years of monitoring between 2002 and 2005 but received a very poor rating in the first year of monitoring and in the 2005-2006 monitoring. Therefore, there are indications of benthic alteration within the Los Peñasquitos Creek Watershed.

Figure 8-10 summarizes the number of water quality exceedances for six categories of constituents. The categories include conventional, nutrients, bacteria, pesticides, metals and toxicity. The stacked bars represent the number of exceedances using values from the wet weather MLS results in Table 8-14 for each constituent category. The overall number of water quality objective exceedances at the Los Peñasquitos Creek MLS has remained relatively low during the last three monitoring seasons. The figure also indicates that bacteriological and conventional parameters are the only constituent groups that frequently exceed the WQO.

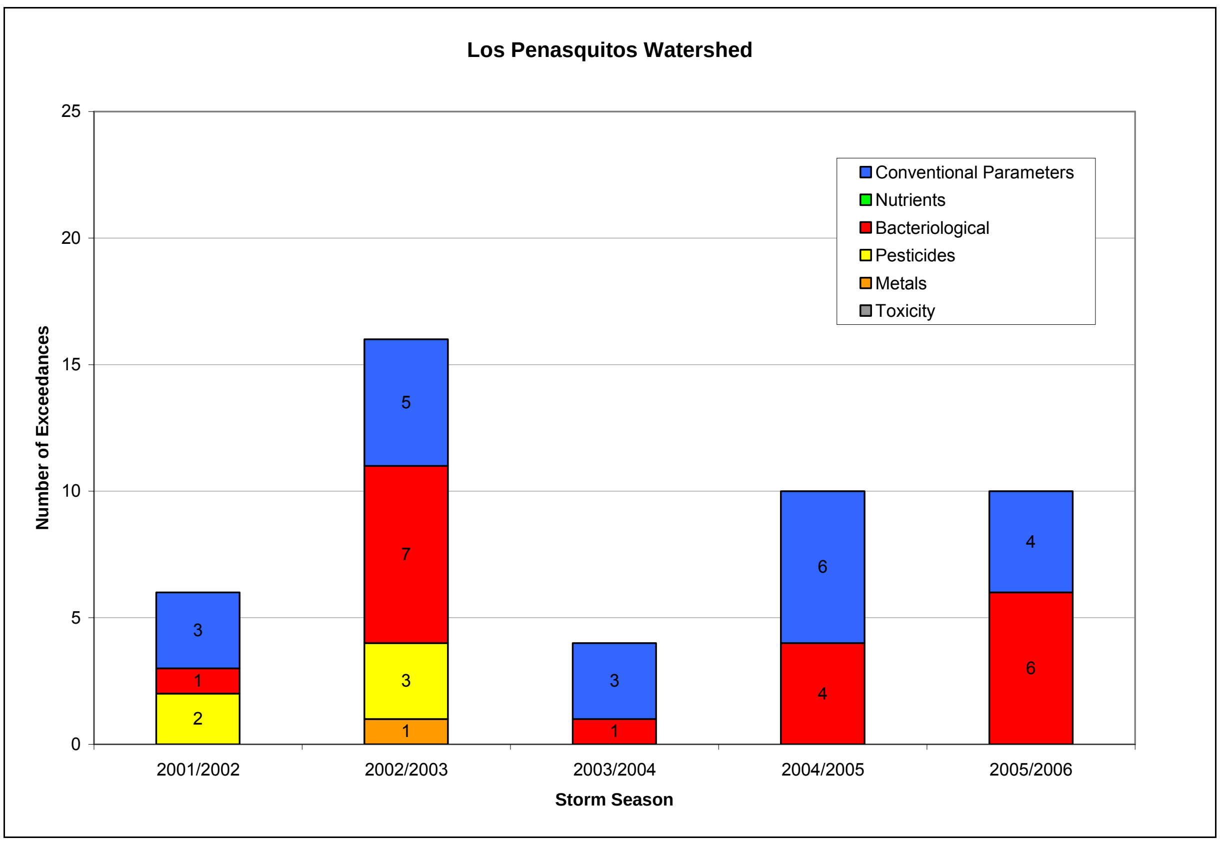

Figure 8-10. Stacked bar chart of the number of wet weather exceedances of constituent groups in Los Peñasquitos Creek.

Evaluation of scatterplots presented in Appendix C indicate that the pH of samples collected during wet weather monitoring events, although still within the WQO of 6.5 to 8.5, show a significant downward trend with time. A statistically significant decreasing trend for Diazinon (R^2=0.45) was also evident with no exceedances of the WQO since the 2002-2003 monitoring season. None of the constituents of concern found to have a high, medium or low diamond rating showed a statistically significant increasing or decreasing trend.

8.5.2 Los Peñasquitos Creek 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 8-15 summarizes these results and lists possible conclusions and actions.

Table 8-15. Triad Decision Matrix Results for the Los Peñasquitos WMA.

Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Example Actions or Decisions
No persistent exceedances of water quality objectives	No evidence of persistent toxicity	Indications of alteration	Alteration may be due to physical impacts, not toxic contamination Test organisms not sensitive to problem pollutants	1) No action necessary based on toxic chemicals. 2) Consider whether different or additional test organisms should be evaluated. 3) Consider potential role of physical habitat disturbance.

Based on the triad decision matrix, there was no evidence of persistent exceedances of WQO (TDS is not considered based on the methods section), or persistent toxicity, but there was evidence of benthic alteration. Based on these findings, no action is eminently needed. It is recommended to consider adding additional parameters, continue monitoring to gather long-term trend information, and to consider the potential role of physical habitat disturbance.

8.5.3 Water Quality Priority Ratings for the Los Peñasquitos WMA

The purpose of the water quality priority ratings is to identify water quality priorities within a watershed based on weighted averages of the sub-watershed ratings. Because it is a weighted average, larger sub-watersheds will have a greater influence in the overall watershed rating.

The water quality priority ratings presented in Table 8-16 are based on the methodology presented in the BLTEA report (WESTON, MOE, & LWA, 2005) and are presented in the Methods Section 3.4. 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 ratings were based on current results presented in this 2005-2006 annual report and data from the following programs:

- Storm water Mass Loading Monitoring (MLS) – Wet Weather Data (2000-2006)
- Co-permittee Dry Weather Data Monitoring (2003-2005)
- Available Third Party Data (SWAMP, 2002)
- Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring (2003-2005)

- Urban Stream Bioassessment Monitoring (2000-2006)
- Triad Assessment – Toxicity Testing of Storm water (2000-2006)
- 303(d) Listing (2003)

Table 8-16. Updated Water Quality Priority Ratings for the Los Peñasquitos 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
Los Peñasquitos WMA	**100%**	***D***	***A***	***D***	***D***	***A***	***D***	***D***	***D***	***A***	***A***	***C***
Miramar Reservoir HA (906.10)	55%	*C*	*A*	*D*	*D*	*A*	*D*	*C*	*C*	*A*	*A*	*C*
Poway HA (906.20)	45%	*D*	*A*	*D*	*D*	*C*	*D*	*D*	*D*	*B*	*B*	*C*
Frequency of Occurrence Rating High[1]			♦♦♦									
Constituents of Concern			TDS									

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

For the overall Los Peñasquitos Creek WMA, dissolved minerals, sediments, bacteria and benthic alteration were identified as a high priority (A) rated constituents. 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. All other constituents were given either C or D rating. A regional evaluation and summary of the BLTEA process is presented in the Regional Assessment Section 13. The complete tables used to calculate the ratings are presented in Appendix G.

The high priority (A) ratings for the overall watershed are primarily driven by the Miramar sub-watershed, which accounts for 55% of the Los Peñasquitos WMA. This subwatershed also had high priority (A) ratings for dissolved minerals, sediments, bacteria, and benthic alteration. The high priority (A) rating for dissolved minerals is primarily due to the wet weather exceedances for TDS and the limited third party SWAMP data where manganese and sulfate results were above the WQO. The high priority (A) rating for sediments was due to the wet weather monitoring data, third party SWAMP data where turbidity was above the WQO, and due to the 303(d) listings for sedimentation/siltation. The high priority (A) rating for bacteria was due to the medium frequency of occurrence wet weather monitoring data for fecal coliform and due to the 303(d) listings for bacteria. The high priority (A) rating for benthic alteration was due to the stream bioassessment findings.

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 total dissolved solids for the Los Peñasquitos WMA. In comparison, the water quality priority ratings found high priority (A) ratings for dissolved minerals, sediments, bacteria and benthic alteration.

A list of potential likely or unknown sources for the sediments and bacteria category in the Los Peñasquitos Creek WMA that are based on the threat to water quality inventory ratings tables from the BLTEA report (WESTON, MOE, & LWA, 2005) were ranked and are provided below in Table 8-17 and Table 8-18 respectively. The tables are not an all inclusive summary of sources in each WMA (e.g., does not consider naturally occurring sources). The tables are not an all inclusive summary of sources in each WMA (e.g., does not consider naturally occurring sources). The tables were developed from the following list of potential sources that were agreed upon by the Copermittee Long-Term Effectiveness workgroup:

- Copermittees developed inventories
- County Department of Environmental Health Hazardous Material Database
- County Agriculture, Weights & Measures Database
- County Department of Environmental Health Food and House Database
- Thomas Brothers Maps
- Online Yellow Pages
- State Water Board list of dischargers subject to construction and industrial storm water general permit.
- Pretreatment Records

The basis of the source list was to identify sources that can be regulated and have the potential to discharge the pollutant types that are of focus of the urban runoff management programs.

The high priority rating for dissolved minerals was based on the wet weather TDS exceedances and limited third party data (SWAMP) where manganese and sulfate results were above the WQO. Dissolved minerals are 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 is a high 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.

Table 8-17. List of potential likely and unknown sediment sources for the Los Peñasquitos WMA.

Potential Sediment Sources	Number of Sources	Source Loading Potential
General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-	Likely
Construction Sites	92	Likely
Animal Facilities	33	Likely
Landscaping - parks, golf courses, cemeteries, etc.	7	Likely
Botanical or zoological gardens and nurseries/greenhouses	7	Likely
Corporate yards (incl. maintenance/storage yards)	2	Likely
Mobile automobile or vehicle washing	-	Likely
Auto parking lots and storage facilities	-	Likely
Home automobile associated activities, home and garden care activities, waste disposal	-	Likely
Roads, streets, highways, and parking facilities	-	Likely
Flood management projects and flood control devices	-	Likely
MS4s	-	Likely
Retail or wholesale fueling	65	Unknown
Fabricated metal	50	Unknown
Chemical and allied products	30	Unknown
Motor Freight	27	Unknown
Development subject to SUSMPs	17	Unknown
Primary metal	5	Unknown
POTWs (water and wastewater)	4	Unknown
Active or closed municipal landfills	2	Unknown
Park and Recreational facilities	-	Unknown
Sites for disposing and treating sewage sludge	-	Unknown

Source: Baseline Long-Term Effectiveness Assessment Report (Weston, MOE, & LWA, 2005).
"-" signifies that no inventory information is available
Based on limited inventory data provided by Copermittees in 2005

Table 8-18. List of potential likely and unknown bacteria sources for the Los Peñasquitos WMA.

Potential Bacteria Sources	Number of Sources	Source Loading Potential
Eating or drinking establishments	829	Likely
Animal Facilities	33	Likely
Botanical or zoological gardens and nurseries/greenhouses	7	Likely
Landscaping - parks, golf courses, cemeteries, etc.	7	Likely
POTWs (water and wastewater)	4	Likely
Home automobile associated activities, home and garden care activities, waste disposal	-	Likely
Roads, streets, highways, and parking facilities	-	Likely
Sites for disposing and treating sewage sludge	-	Likely
Motor Freight	27	Unknown
Development subject to SUSMPs	17	Unknown
Active or closed municipal landfills	2	Unknown
Auto parking lots and storage facilities	-	Unknown
Pest Control Services	9	Unknown
Flood management projects and flood control devices	-	Unknown
MS4s	-	Unknown
Park and Recreational facilities	-	Unknown

Source: Baseline Long-Term Effectiveness Assessment Report (Weston, MOE, & LWA, 2005).
"-" signifies that no inventory information is available
Based on limited inventory data provided by Copermittees in 2005

8.6 Conclusions and Recommendations

The Los Peñasquitos Creek WMA is the second smallest watershed in San Diego County. The Los Peñasquitos Creek WMA total land area is 60,418 acres of which 60% of the area contributes runoff to the MLS. The major land uses within the watershed are residential (24.7%), vacant/undeveloped (17.8%), and parks and recreation (29.2%). The major land uses within the contributing runoff area are parks (29%), residential (28%), and undeveloped (24%).

For the Los Peñasquitos Creek MLS, total dissolved solids was identified as a high frequency of occurrence COC. Fecal coliform was identified as a medium frequency of occurrence COC. Turbidity, total coliform and enterococcus were all identified as low frequency COC. A review of the scatterplots and trends shows a statistically significant decreasing trend for both pH and Diazinon. Third party data collected in 2002 under SWAMP indicated that sulfate, manganese, and toxicity were also problems throughout Los Peñasquitos Watershed.

The constituent EMC loads at the Los Peñasquitos Creek MLS site were compared to the mean WQO loads, calculated using the mean flow multiplied by constituent WQOs. This comparison shows that fecal coliform, TDS, and TSS EMC loads were greater than the corresponding mean WQO loads. This corresponds to EMC WQO exceedances for all three constituents. The TDS EMC was above its WQO during two of three wet weather sampling events, and TSS during one of three events. However, the magnitude of constituent concentrations was such that the EMC load was still greater than the WQO load.

The mean modeled loads calculated in GIS for the Los Peñasquitos Watershed indicate total dissolved solids loads based on measured concentrations are several times higher than those based on land use. Total dissolved solids was also a listed constituent of concern in the BLTEA and watershed assessment. The metals loads are all less than what might be expected from the land use in the Los Peñasquitos Creek Watershed.

The Los Peñasquitos WMA was sampled for stream macroinvertebrates at two sites. The upstream site was in Los Peñasquitos Creek in Poway, and the downstream site was in Carroll Canyon Creek in Sorrento Valley. Both of the sites had Index of Biotic Integrity ratings that were in the upper range of Very Poor or lower Poor categories. The Carroll Canyon Creek site was rated slightly higher than the upstream site on Los Peñasquitos Creek, possibly due to different watershed areas contributing to the different streams.

The 2005 Ambient Bay and Lagoon Monitoring assessment for the Los Peñasquitos Lagoon analyzed sediment chemistry, toxicity, and benthic community structure. The results of the 2005 ABLM program for chemistry assessment indicated that seven metals common to all embayments were also found in the Los Peñasquitos sediments. Concentrations were low and none exceeded their respective ERL or ERM sediment quality values. The mean ERM-Q value for the Los Peñasquitos Lagoon was 0.10, which is equal to the threshold of 0.10. Test organisms did not display a toxic response to the Estuary sediment collected. Correlated with the SEM:AVS Ratio, it was determined that bioavailable metals found in the Los Peñasquitos Lagoon sediment were not toxic to the amphipod *E. estuarius*. The infaunal community was dominated by the mollusk *Acteocina inculta,* while the polychaete worms *Capitella capitata* and *Polydora nuchalis* made up the rest of the community collected at the Lagoon. For the 2005 ABLM sampling, the Lagoon scored good for toxicology, poor/fair for biology and good for chemistry.

In addition to the WMA assessment findings, the water quality priority ratings identified high priority (A) ratings for dissolved minerals, sediments, bacteria and benthic alteration. All other constituents were given either a C or D 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 reports also allow for an evaluation of where data gaps exist and where efforts should be targeted.

Utilizing 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.

Several considerations should be made with respect to the findings provided in this watershed management area assessment. The recommendations for this watershed are to continue monitoring to gather long-term trend information, identify where data gaps exist that do not allow for informed decision making, and consider where watershed resources may be more effectively targeted to reduce dissolved minerals, sediments, bacterial indicators, and impacts to the physical stream habitats. Assessment of water quality priority ratings should be continued on an annual basis. Storm water managers should be aware that several changes to the water quality priority ratings may be expected based on the additional parameters added in the proposed 2006 303(d) list. The draft monitoring order (R9-2006-0011) calls for two temporary watershed assessment stations for this watershed. These two stations should be placed with respect to addressing the spatial distribution of dissolved minerals, sediments, and bacteria. Future monitoring stations associated with the outfall monitoring and source identification studies should be located with respect to assessing the spatial distribution of constituents of concern and with respect to watershed priority activities. As watershed activities are developed based on the high water quality priority ratings, watershed monitoring stations may need to be located strategically to be able to effectively measure the pollutant load changes (either additions or reductions) with respect to location and sensitivity. In this manner, BMP strategies and decisions can be made to adjust and fine tune future BMP implementation in order to reach the desired load reductions necessary to meet the water quality objectives throughout the watershed and protect the beneficial uses.