

LOS PEÑASQUITOS CREEK WMA EXECUTIVE SUMMARY

ES8.0 LOS PEÑASQUITOS CREEK WMA EXECUTIVE SUMMARY

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

Watershed Monitoring

Wet weather and stream bioassessment monitoring sites within the Los Peñasquitos Creek WMA are depicted in Figure ES8-1 (dry weather stations are not shown). Activities included:

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

Storm Water Runoff

The Los Peñasquitos Creek (LPC) mass loading station (MLS) is located in San Diego, at the North end of Sorrento Valley Court, under the Sorrento Valley Court Bridge (Figure ES8-2). The contributing runoff area consists of more than 36,700 acres, which covers over 60% of the Los Peñasquitos Creek Watershed. The major land uses within the WMA are residential (38%), parks (29%), and undeveloped (21%) (Figure ES8-3).

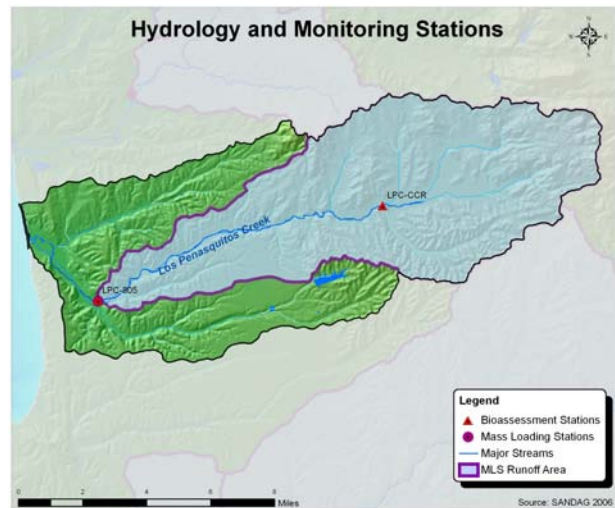


Figure ES8-1. Los Peñasquitos Creek WMA Monitoring Locations.



Figure ES8-2. Los Peñasquitos Creek MLS Site.

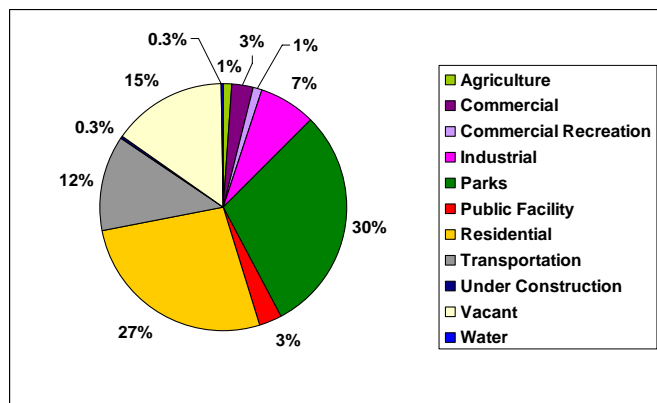


Figure ES8-3. Los Peñasquitos WMA Land Use.

Figure ES8-4 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.

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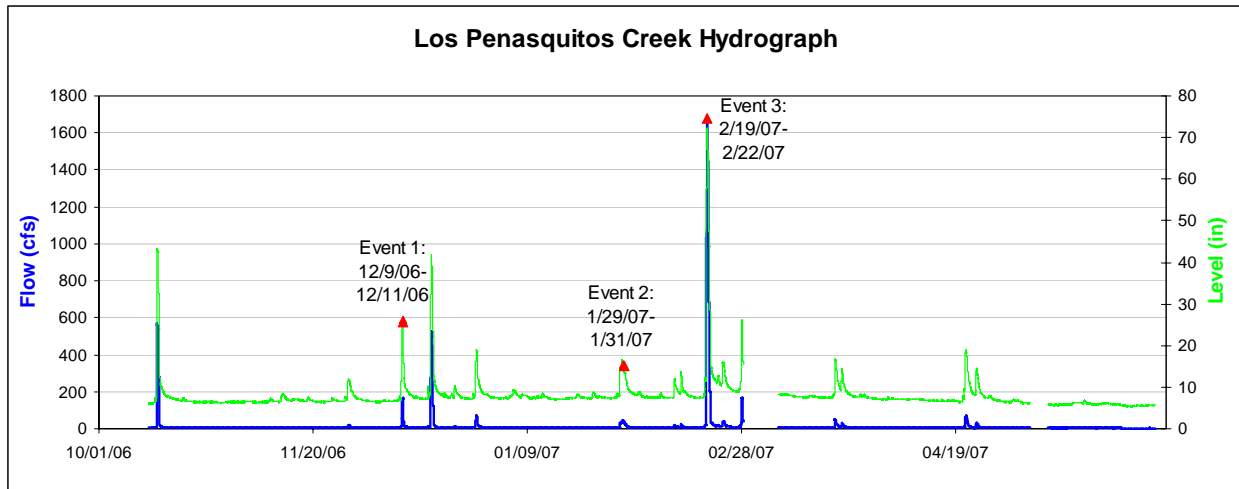


Figure ES8-4. Los Peñasquitos Creek 2006-2007 Wet Weather Monitoring Period Flow Record and Monitored Storm Events.

Table ES8-1 summarizes constituents with concentrations detected at levels above the water quality objective (WQO) benchmarks which are shown in bold. Pesticides, dissolved metals, and total metals were not detected at levels above benchmark WQOs.

Table ES8-1. Constituents With Results Above the Benchmark WQO During the 2006-2007 Monitoring Season at the Los Peñasquitos Creek MLS.

Analyte	Units	Bench mark WQO	Source	2006-2007 Storms		
				10/14/06	1/31/07	2/19/07
Fecal Coliform	MPN/100mL	400	Basin Plan	800	500	2,300
<i>Ceriodaphnia</i> 7-day reproduction	NOEC %	100		100	6.25	100
TDS	mg/L	500	Basin Plan by watershed	1,890	1,760	1,080
Turbidity	NTU	20	Basin Plan	6.9	3.6	70.8

The recent monitoring year and the mean historical ratios of the benchmark WQO from three monitored storm events per year between October 2001 and April 2007 were plotted and compared to the benchmark WQO (Figure ES8-5). The highest exceedances noted for the Los Peñasquitos Creek WMA were for fecal coliform and TDS. Turbidity and toxicity in the 7-day *Ceriodaphnia* bioassay using reproduction as the endpoint were above the benchmark WQO for a single monitored storm event.

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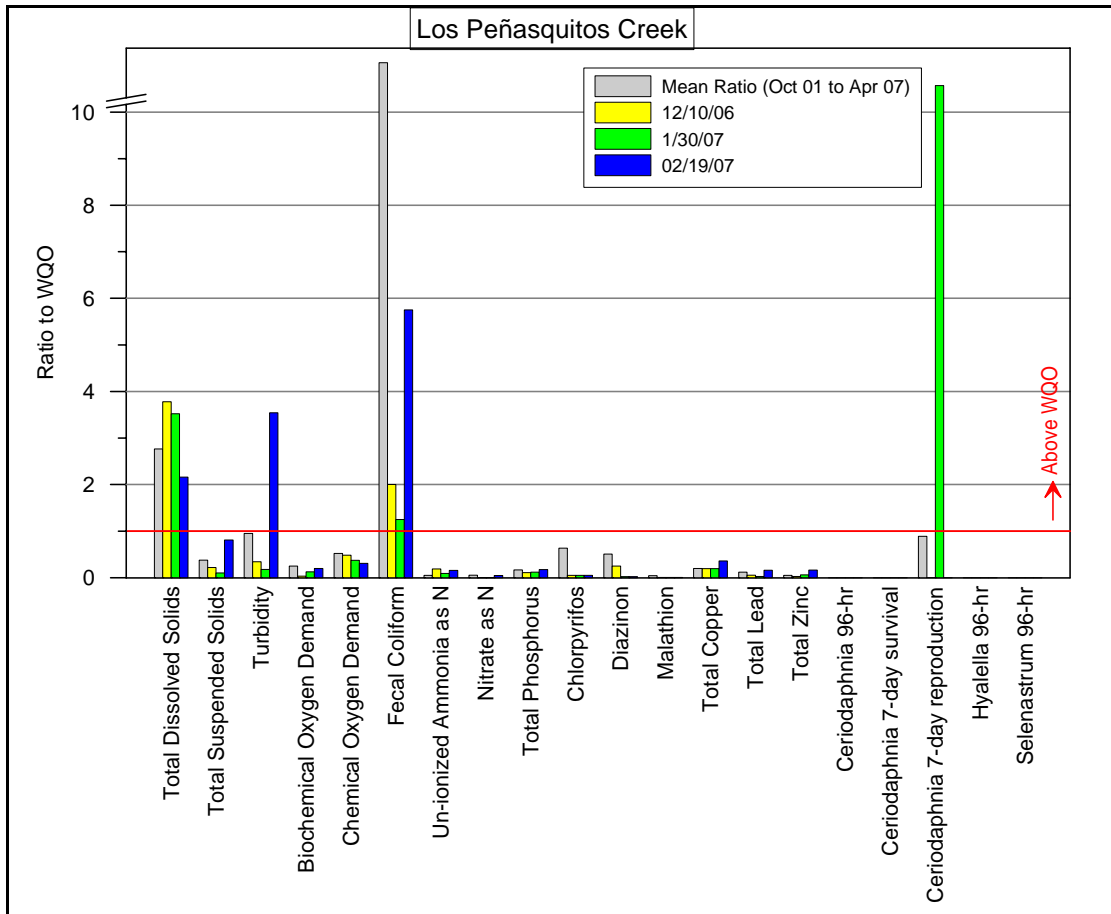


Figure ES8-5. Ratio of Results to Benchmark WQO for the San Luis Rey River Watershed Management Area.

Mann-Kendall trend analyses were performed to identify any long-term trends observed in the data. Although statistically significant increasing trends were identified for total nickel, concentrations in Los Peñasquitos Creek have been below the benchmark WQO for all monitored storm events since the 2001-2002 monitoring season.

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.

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Dry Weather Data

A separate dry weather monitoring program is carried out by each jurisdiction. Dry weather monitoring investigations were performed at 55 sites in the Los Peñasquitos Creek WMA during the summer of 2006. A total of 55 dry weather sites were located upstream of the mass loading station on Los Peñasquitos Creek. Constituents that were detected above the dry weather action levels are depicted in Table ES8-2.

Stream Bioassessment

Stream bioassessment monitoring was conducted at two urban affected sites in the Los Peñasquitos Creek WMA. The upstream site (LPC-CCR) was in Los Peñasquitos Canyon Creek at Cobblestone Creek Road, on the downstream side of the City of Poway, while the downstream site (LPC-805) was moved in October 2006 from the previous site in Carroll Canyon Creek to a site in the mainstem of Los Peñasquitos Creek, adjacent to the mass loading station.

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 ES8-3 footnotes for scoring criteria).

Table ES8-2. Los Peñasquitos WMA 2006 Dry Weather Exceedances.

Analyte	Number of Action Level Exceedances	Total Samples
Conductivity	3	83
Oil and Grease	2	22
pH	2	83
Enterococcus	10	22
Fecal Coliform	6	22
Total Coliform	9	22
Ammonia (NH ₃ -N)	2	81
Orthophosphate (PO ₄ -P)	1	78
Nitrate (NO ₃ -N)	1	81
MBAS	3	22
Turbidity	34	81



Figure ES8-6. Los Peñasquitos Canyon Creek Site.



Figure ES8-7. Los Peñasquitos Creek Highway 805 Site.

The Los Peñasquitos WMA was sampled for stream macroinvertebrates at two sites in October 2006 and May 2007. The upstream site was in Los Peñasquitos Creek in Poway, and the downstream site was in Los Peñasquitos Creek adjacent to the MLS. Both of the bioassessment sites had Index of Biotic Integrity ratings that were in the Very Poor category for the spring and fall surveys (Table ES8-3). Observed to expected (O/E) ratios at each site indicated degraded biotic conditions.

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Table ES8-3. Selected Biological Integrity Ratings and O/E Ratios for the Los Peñasquitos Creek WMA.

Los Peñasquitos Watershed Management Area	Los Peñasquitos Creek Canyon site (LPC-CCR)		Los Peñasquitos Creek Highway 805 Site (LPC-805)	
	Oct-06	May-07	Oct-06	May-07
Survey	8	1	9	4
Index of Biotic Integrity/ Qualitative Rating*	Very Poor	Very Poor	Very Poor	Very Poor
O/E Ratio**	0.63	0.42	0.30	0.34

*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

Since the beginning of the program in 2001, the upstream Los Peñasquitos Creek site (LPC-CCR) had a mean Index of Biotic Integrity (IBI) score of 9.6 and a mean O/E ratio of 0.67. The O/E rated the site unimpaired for the October 2001 and October 2005 surveys. The Los Peñasquitos watershed's downstream site (CCC-805, LPC-805) had a mean IBI score of 11.7 and a mean O/E ratio of 0.58. The O/E rated the site unimpaired for the October 2002 and October 2004 surveys.

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 Los Peñasquitos Creek 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:

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

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

- Total nickel (increasing but below the benchmark WQO)

Constituents of concern identified for the Los Peñasquitos Creek WMA are summarized in Table ES8-4.

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Table ES8-4. Constituent of Concern Rating Table Summary for the Los Peñasquitos Creek WMA.

Constituents With Any Wet Weather (MLS) Benchmark WQO or Dry Weather Action Level Exceedance	Frequency of Occurrence Rating	Criterion Basis
Total Dissolved Solids	High	Mass loading station tests results exceed benchmark WQO in greater than or equal to 80% of samples.
Fecal Coliform	High	Six of the last consecutive storm samples at the MLS exceed benchmark WQO.
Turbidity	Low	Dry weather sample exceedances in 10 to 50% of the samples in the past year.
Enterococcus	Low	
Total Coliform	Low	

Although the watershed assessment process did not identify phosphorus, it is also considered a potential constituent of concern due to its listing on the 2006 SWRCB 303(d) list.

Recommendations

The recommendations for this watershed are to continue monitoring at the MLS to determine long-term trends, 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. The implementation of the new monitoring permit cycle will allow for assessing the watershed during both dry weather and wet weather conditions. With the monitoring efforts to be conducted for the Lagoon TMDL Monitoring, additional valuable information will be available in future years for the Los Peñasquitos Creek WMA.

8.0 LOS PEÑASQUITOS CREEK WATERSHED MANAGEMENT AREA

This section presents the Los Peñasquitos Creek 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 determined as a constituent of concern in some watersheds where in prior years it was not identified as a constituent of concern.

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 from 10.5 inches near the coast to 16.5 inches in the eastern portion of the watershed. Locations of wet weather and bioassessment monitoring stations are depicted in Figure 8-1 (dry weather stations are not shown).

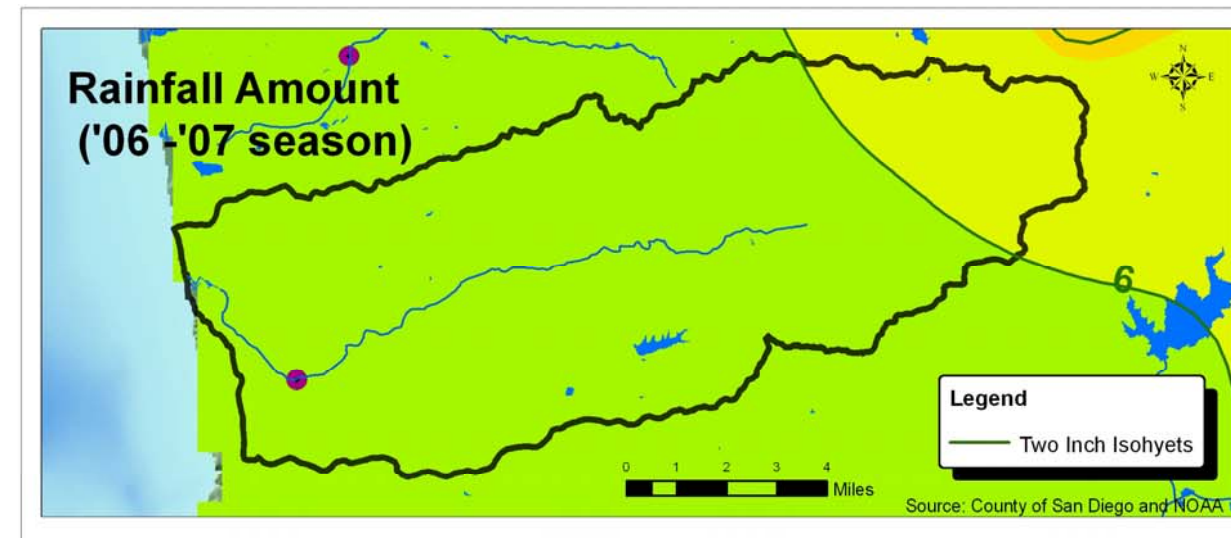
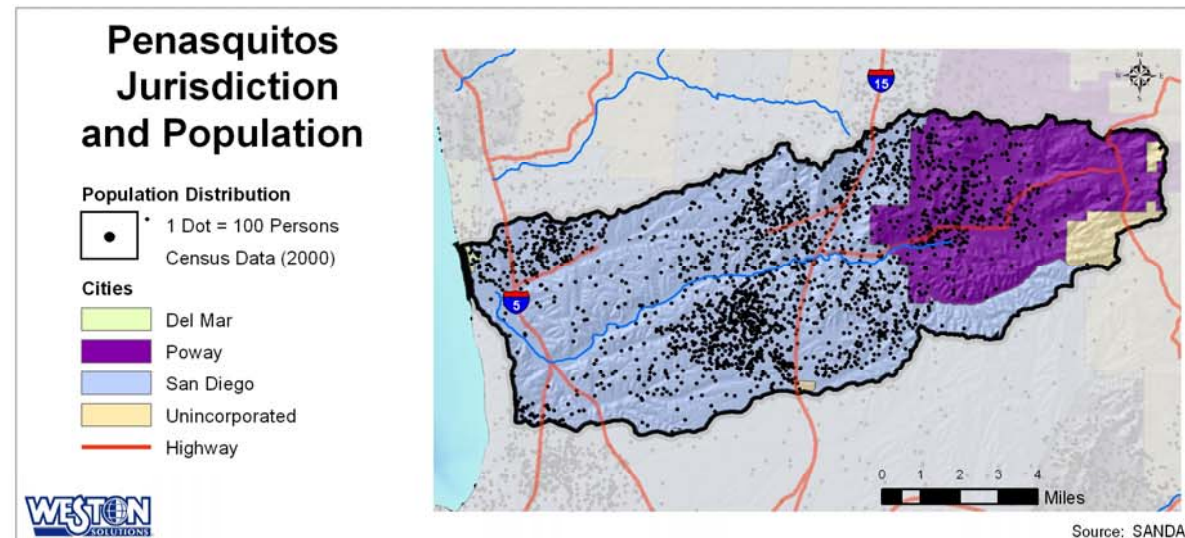
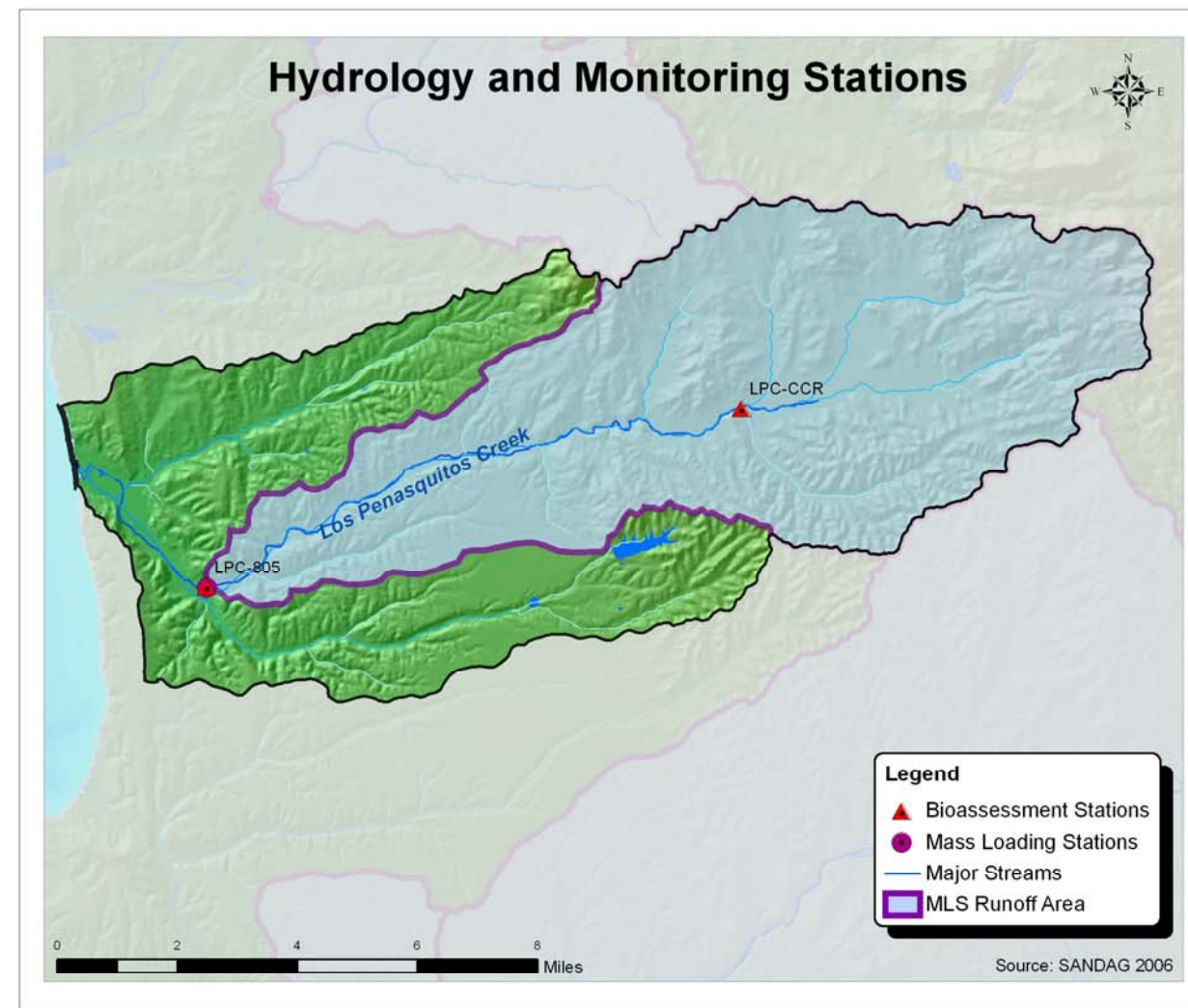
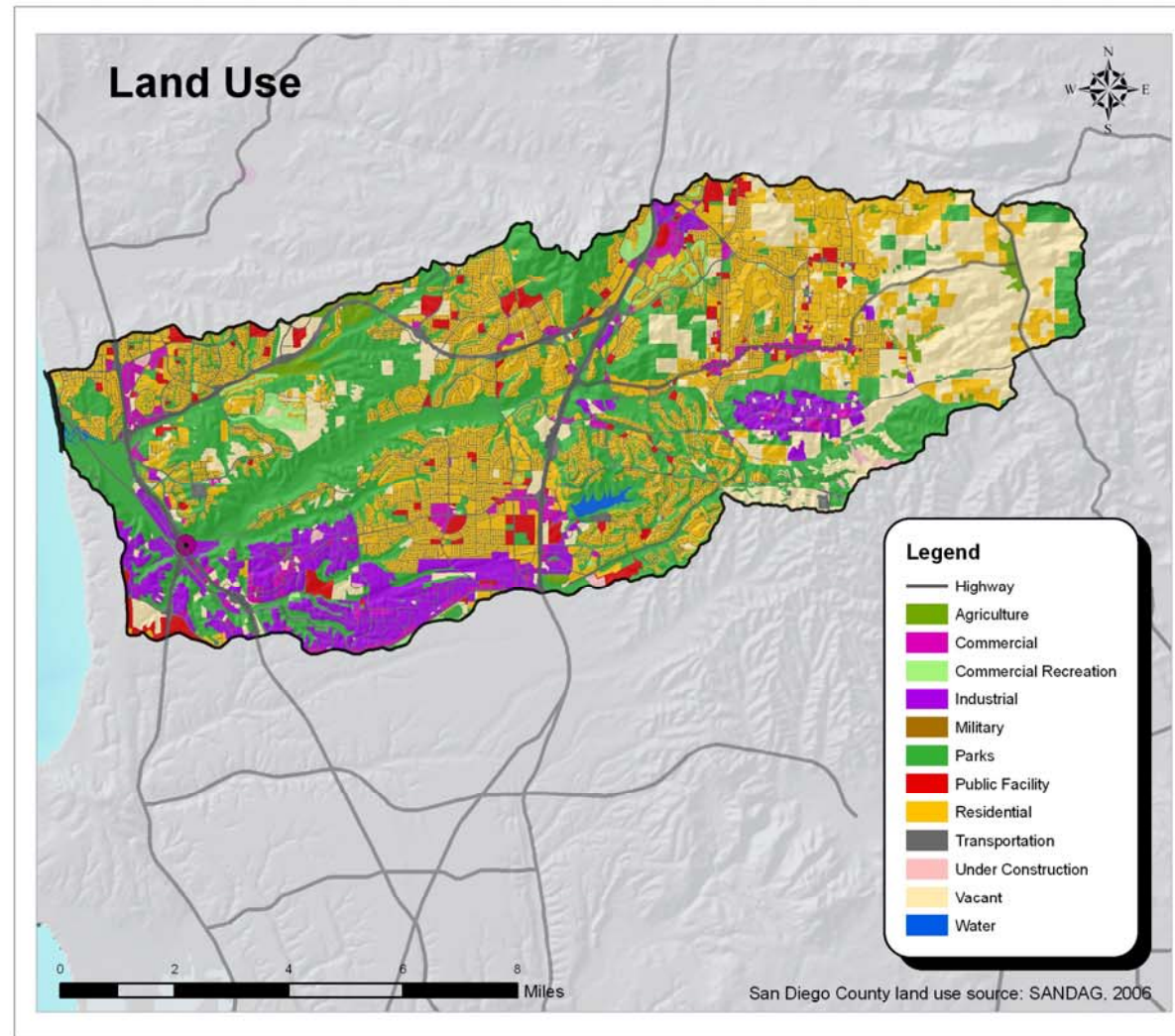


Figure 8-1. Los Peñasquitos Watershed Management Area.

Los Peñasquitos Creek WMA

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 parks and recreation (30%), residential (27%), and vacant/undeveloped (15%). Other uses are comprised of transportation (12%), industrial (7%), public facilities/utilities (3%), commercial (3%), and agriculture (1%) (Figure 8-2) (SANDAG, 2006). 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 253,910 people, yet it has the second highest population density of 4.20 persons per acre according to SANDAG's Population Estimates (SANDAG, 2005).

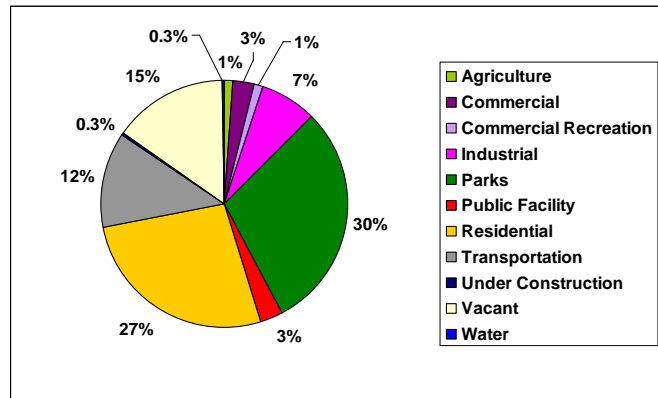


Figure 8-2. Percent Land Use for Los Peñasquitos Creek WMA

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 is presented in Table 8-1. The watershed contains Lake Miramar and has 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 coastal wetland habitat.

Table 8-1. Beneficial Uses Within the Los Peñasquitos 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	●				
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		●	●		

● = Existing

¹ Shore and boat fishing only. Other RECI uses prohibited.

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.

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 State Water Resources Control Board (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 2006 303(d) list for water bodies throughout the watershed are sedimentation/siltation, phosphate, and total dissolved solids (TDS). Bacterial indicators were removed from the 303(d) list based on the delisting recommendations during the development of the 2006 303(d) list. 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
Los Peñasquitos Creek	Miramar Reservoir	906.10	Phosphate, TDS

Source: SWRCB, 2006

Los Peñasquitos Creek WMA

The Los Peñasquitos Lagoon is also identified in the 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.

8.1.4 Mass Loading Station Site Description



The Los Peñasquitos Creek mass loading station (MLS) 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 (28.6%), residential (30.7%), and undeveloped (21.4%).

The mass loading station remained in the same location (upstream of the Hwy 805 overpass) for the 2006-2007 season as in the previous wet weather monitoring season. Flow measurements used for composite sample collection purposes during the 2006-2007 wet weather monitoring season were calculated using a rating curve. The rating curve 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 surveys in the Los Peñasquitos Creek WMA were conducted at two urban affected sites. The upstream site is in the City of Poway at Cobblestone Creek Road. This site had optimal physical habitat with a cobble dominated substrate and good canopy cover comprised of native vegetation. The downstream bioassessment site was previously located in Carroll Canyon Creek along Sorrento Valley Road near the Interstate 805 exit. For the 2006-2007 surveys, this site was moved to the main stem of Los Peñasquitos Creek adjacent to the mass loading station. The habitat quality at this site is sub-optimal with a substrate of consolidated clay and gravel with emergent vegetation (*Typha* sp.) and with a good riparian corridor upstream of Highway 805.

8.1.6 Ambient Bay and Lagoon Monitoring Site Description

The Ambient Bay and Lagoon Monitoring (ABLM) program was not conducted in 2006-2007.

8.2 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.

8.2.1 2006-2007 Storm Water Monitoring and Results

Annual storm water monitoring has been conducted at the Los Peñasquitos Creek 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 December 10, 2006, January 30, 2007 and February 19, 2007. Rainfall statistics for each of the monitored storm events for the Los Peñasquitos Creek MLS area are presented in Table 8-3. Figure 8-3 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 8-3. 2006-2007 Rainfall Statistics for the Los Peñasquitos Creek Mass Loading Station.

Date Start	Total Rain (in)	Duration (hr)	Intensity (in/hr)	Antecedent Dry Days
12/10/2006	0.31	23	0.02	13
1/30/2007	0.40	25	0.02	25
2/19/2007	1.32	21	0.06	6

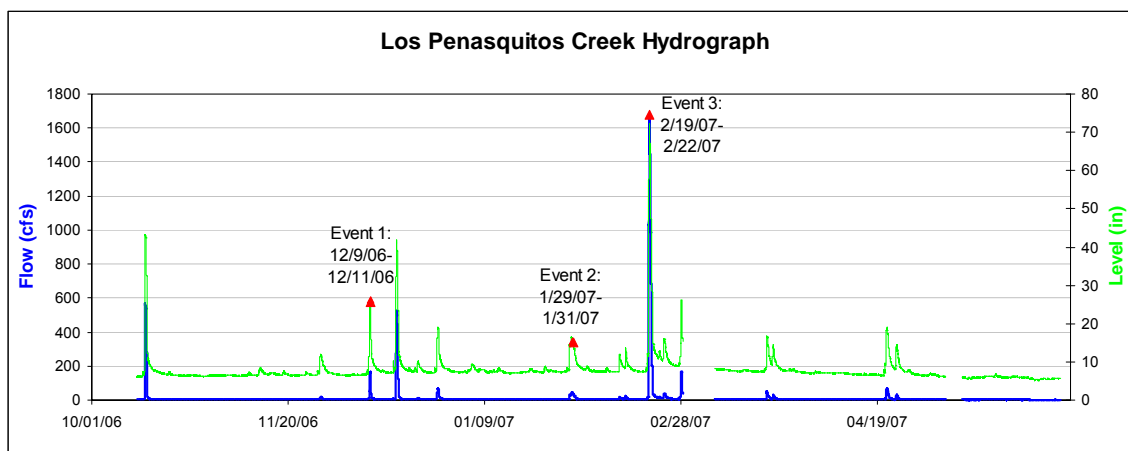


Figure 8-3. Los Peñasquitos River 2006-2007 Wet Weather Monitoring Period Flow Record and Monitored Storm Events.

The first storm event of the year, which occurred on October 14, 2006 was not captured due to sample equipment malfunction. The first storm monitored during the 2006-2007 wet weather monitoring season occurred on December 10, 2006. On December 9, 2006 a storm was forecast to produce moderate amounts of rain over the southern portion of San Diego County. The actual storm was larger than it was originally forecast to be, and produced 0.31" of rainfall across the Los Peñasquitos Creek WMA. A total of 37 one-liter composite sample aliquots were collected at a rate such that one sample was collected for every 75,000 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. Sampling was conducted over a 17-hour period which captured the rise and initial peak of the runoff produced by the storm.

The second storm monitored at the Los Peñasquitos MLS during the 2006-2007 wet weather monitoring season occurred on January 30, 2007. A cutoff low was forecast in the area on the 27th of January. This storm was predicted to stay to the north and provide little to no rain south of Los Angeles. However by the morning of January 29th, the forecast had changed to a 70% chance of ~ 1" of rain over most of Southern California. The forecast was once again changed the day of the 29th and the storm forecast was downgraded to little rain for the San Diego area. However, the cutoff low moved south and circulation brought what was referred to as a "blob" of rain by the National Weather Service from Baja across San Diego. The majority of the rain from this storm stayed along the coast in a south to north pattern; little rain made it to the mountains. The rainfall totals for this storm were between 0.4" and 1.8". The storm produced a total of 0.40" rainfall (Table 8-3) at the Los Peñasquitos mass loading station. A total of 27 one-liter composite sample aliquots were collected at a rate such that one sample was collected for every 150,000 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. Sampling was conducted over a 21-hour period, and captured the rise and initial peak of the runoff produced by the storm.

The third storm monitored at the Los Peñasquitos MLS during the 2006-2007 wet weather monitoring season occurred on February 19, 2007. A cut off low pressure formed off the coast and moved directly over Orange County area on February 17th. Although rain was forecast to begin falling on the morning of February 20th, it began falling the night of February 19th. This storm consisted mainly of fast moving showers, and dropped a substantial amount of rainfall in San Diego County. The storm produced a total of 1.32" rainfall (Table 8-3). A total of 25 one-liter composite sample aliquots was collected at a rate such that one sample was collected for every 150,000 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. Sampling was conducted over a 15-hour period, and captured the rise and initial peak of the runoff produced by the storm.

Analytical results from the 2006-2007 wet weather monitoring period at the Los Peñasquitos Creek MLS are presented with the historical results in Table 8-4. 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. A comparison of these results to previous years' data is presented in Section 8.2.2.

Table 8-4. Analytes Measured at the Los Peñasquitos Creek 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	2/18/04	10/17/04	2/11/05	2/18/05	10/17/05	2/20/06	2/28/06	12/10/06	1/30/07	2/19/07			
General / Physical / Organic																								
Electrical Conductivity	umhos/cm			2640	2700	1590	1827	1939	2600	2470	3060	3540	3270	2690	1213	2980	2440	1130	3300	3270	974			
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	1.05	<1	<5	<5	<5		0%	0.07	
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	7.73	8.08	7.21		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	230	300	13,000			
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	800	500	2,300	78%	30.22	
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	1,300	800	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	0.37	<0.1	0.94			
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	4.7	2.2	3.9	0%	0.05	
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	<2	3.87	6.01	0%	0.25	
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	58	45	37	6%	0.52	
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	11.6	10.4	11			
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	0.09	0.1	0.26	0%	0.14	
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	<0.05	<0.05	0.47	0%	0.05	
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	<0.05	<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	<0.5	<0.5	<0.5	0%	0.45	
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	1890	1760	1080	94%	2.77	
Total Kjeldahl Nitrogen	mg/L			1.7	1.0	1.2	1.9	0.8	1.2	1.2	2.5	2.1	1.6	1.9	0.8	1.0	2.5	1.1	0.5	0.6	2.1			
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	11.6	11.2	11.9			
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	0.22	0.24	0.35	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	22	<20	81	11%	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	6.86	3.6	70.8	28%	0.95	
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	<0.002	<0.002	<0.002	14%	0.63	
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	0.020	<0.004	<0.004	17%	0.51	
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	<0.006	<0.006	<0.006	0%	0.05	
Hardness																								
Total Hardness	mg CaCO3/L			808	815	551	428	602	602	692	805	880	1000	707	379	932	563	373	1080	908	572			
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	<0.002	<0.002	0.002	6%	0.42	
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	<0.001	<0.001	0.003	0%	0.08	
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	0.002	<0.001	0.007	<0.001	<0.001	0%	0.13	
Chromium	mg/L	(b)	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	<0.005	<0.005	<0.005	0%	0.00	
Copper	mg/L	(b)	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	0.006	0.006	0.011	0%	0.20	
Lead	mg/L	(b)	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	0.001	<0.001	0.003	0%	0.12	
Nickel	mg/L	(b)/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	0.004	0.004	0.005	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	<0.004	<0.004	<0.004	0%	0.10	
Zinc	mg/L	(b)	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	<0.02	<0.02	0.024	0%	0.05	
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	<0.002	<0.002	0.002			
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	<0.001	<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	<0.001	<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	<0.005	<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	0.002	0.003	0.003	0%	0.16	
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	<0.001	<0.001	<0.001	<0.001	0%	0.09	
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	0.003	0.002	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	<0.004	<0.004	<0.004	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	<0.02	<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	>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</																						

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.

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 $\mu\text{g/L}$.
- (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.

** Indicates results should be interpreted with care due to method protocol discrepancy.

Sources

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.

Conventional constituent results were below their respective benchmark WQO with the exception of total dissolved solids (TDS) and turbidity. TDS results were above the benchmark WQO of 500 mg/L during each of the 2006-2007 monitoring events. TDS results for the December 10, 2006 event were 1,890 mg/L, while the January 30, 2007 and the February 19, 2007 results were 1,760 mg/L, and 1,080 mg/L, respectively. The turbidity result from water collected during the February 19, 2007 monitoring event (70.8 NTUs) was above the benchmark WQO of 20 NTUs.

Fecal coliform is the only bacterial indicator with a benchmark WQO for wet weather monitoring. Fecal coliform results were above the REC-I benchmark WQO of 400 MPN/100 mL during all three monitoring events. Results for fecal coliform ranged from 500 MPN/100mL on January 10, 2007 to 2,300 MPN/100mL on February 19, 2007. All three bacterial indicators were considerably higher during the last rainfall event on February 19, 2007. Across the three monitoring dates, total coliform concentrations ranged from 800 to 30,000 MPN/100mL, while enterococci concentrations ranged from 230 to 13,000 MPN/100mL.

The pesticides Chlorpyrifos and Malathion were not detected in any sample during the 2006-2007 wet weather monitoring season. Diazinon was detected during the December 10, 2006 monitoring event (0.020 µg/L), but was below the benchmark WQO of 0.080 µg/L.

Several total metals were detected in storm water samples collected during the 2006-2007 wet weather monitoring season but were below their respective hardness-based benchmark WQO. In all three storm water monitoring events (December 10, 2006, January 30, 2007, and February 19, 2007) total copper (0.006 mg/L, 0.006 mg/L, 0.011 mg/L, respectively) and total nickel (0.004 mg/L, 0.004 mg/L, 0.005 mg/L, respectively) were detected. Total arsenic and antimony were detected in samples from the February 19, 2007 monitoring event (0.002 and 0.003 mg/L, respectively) but were below the respective hardness-based benchmark WQOs. Total cadmium was detected in water collected during the December 10, 2006 monitoring event (0.007 mg/L) but was below the respective hardness-based benchmark WQO. Total lead was detected in water samples collected during the December 10, 2006 and the February 19, 2007 monitoring events (0.001 mg/L and 0.003 mg/L, respectively) but was below the respective hardness-based benchmark WQO. Total zinc was detected in samples collected during the January 30, 2007 and the February 19, 2007 monitoring events (0.024 mg/L and 0.064 mg/L, respectively) but was below the respective hardness-based benchmark WQO.

Several dissolved metals were detected in storm water samples collected during the 2006-2007 wet weather monitoring season but all were below their respective acute or chronic hardness-based benchmark WQO. In all three storm water monitoring events (December 10, 2006, January 30, 2007, and February 19, 2007) dissolved nickel (0.003 mg/L, 0.002 mg/L, 0.002 mg/L, respectively) and dissolved copper (0.002 mg/L, 0.003 mg/L, 0.003 mg/L, respectively) were detected. Dissolved antimony (0.002 mg/L) was detected in water collected during the February 19, 2007 monitoring event.

Toxicity to storm water was not observed to *Hyalella azteca* or *Selenastrum capricornutum* during any of the 2006-2007 wet weather season storm water monitoring events. However, toxicity was observed during the January 30, 2007 storm event in the 7-day reproductive endpoint test for *Ceriodaphnia dubia*. In this test, the No Observed Effect Concentration (NOEC) value for *C. dubia* was observed to be 6.25 percent.

8.2.2 Monitoring Results: Comparison to Benchmarks/Statistical Analyses/Trends

An evaluation of storm water monitoring data collected at the Los Peñasquitos Creek MLS over the past six 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.

8.2.2.1 Comparison to Benchmarks

Several constituents had analytical results frequently measured above their respective benchmark WQO. Fecal coliform and Total Dissolved Solids (TDS) are two constituents that have had results above their respective benchmark WQO. Fecal coliform results were above the benchmark WQO for a total of 14 of 18 storm events (78%). TDS results were measured above the benchmark WQO during 17 of 18 storm events (94%).

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

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

Chemical oxygen demand results were above the benchmark WQO in only 1 of 18 storm events (6%), while Turbidity results were measured above the benchmark WQO during 5 of 18 storm events (28%). TSS results were above the benchmark WQO in 11 percent of monitored storm events.

Fecal coliform results have been above the benchmark WQO during all monitored events for the past three years. Although Total Coliform and Enterococci levels have been consistently elevated for most of the monitored storm events during the past three years, enterococci levels measured in the first two monitored storms of the 2006-2007 storm season were the lowest among 18 monitored storm events. Similarly, total coliform values for the first two storm events of the season were among the 4 lowest measured values out of 18 monitored storms.

Chlorpyrifos was not detected during any storm events monitored during the 2006-2007 monitoring season. Diazinon was detected in the December 10, 2006 storm event, but was not detected above the benchmark WQO. In the other two monitored storm events during 2006-2007, Diazinon was not detected. Chlorpyrifos results were above the benchmark WQO during the 2002-2003 monitoring season and Diazinon results were above the benchmark WQO during the 2001-2002 and 2002-2003 wet weather monitoring seasons. Since 2003, however, Chlorpyrifos has not been detected and Diazinon was detected only once (at a concentration below the benchmark WQO). Malathion was not detected at the Los Peñasquitos Creek MLS for the first three years of monitoring, or during the 2006-2007 season, but was detected during each of the monitored events in the 2005-2006 season at concentrations below the benchmark WQO.

During the last six years of monitoring, only the total metal antimony has had results above the benchmark WQO. One result for total antimony was above the Basin Plan benchmark WQO during the 2002-2003 monitoring season.

Results for dissolved metals have never been above their respective hardness based acute or chronic benchmark WQO over the past six years of monitoring at the Los Peñasquitos Creek MLS.

Toxicity has not been observed in previous years of monitoring at the Los Peñasquitos Creek MLS. However, during the 2006-2007 monitoring season, toxicity to *Ceriodaphnia dubia* was observed in the 7-day chronic test (No Observed Effect Concentration of 6.25 percent).

8.2.2.2 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 not a predictive slope, but rather an estimate of the median true slope (change per unit 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 total nickel was the only significant trend identified for the Los Peñasquitos Creek WMA. Total nickel was determined to have an increasing trend (S Statistic= 71) (Figure 8-4). However, these values are well below the WQO benchmark of 0.169 mg/l based on the typical hardness concentrations detected at this MLS (benchmark WQO not depicted on graph).

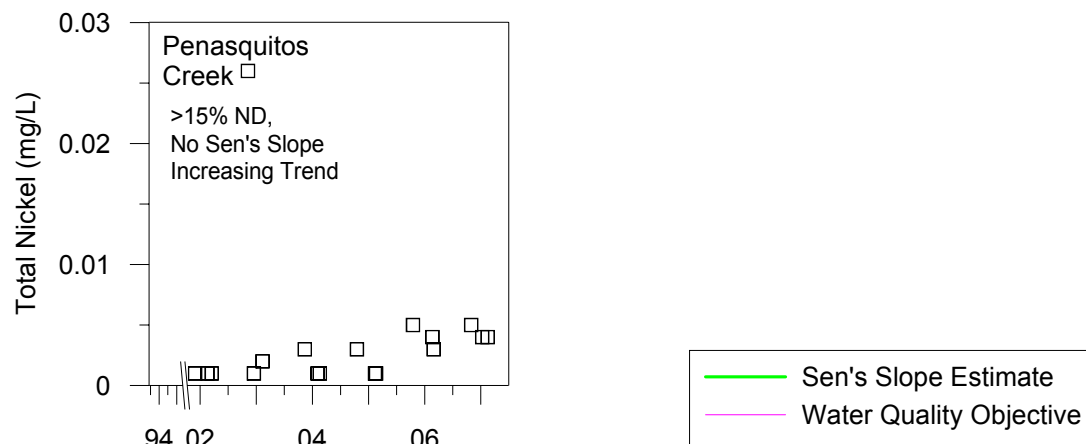


Figure 8-4. Scatterplots of Constituents with Significant Mann-Kendall Trends and Sen's Estimate of Slope.

Los Peñasquitos Creek WMA

8.2.2.3 Magnitude of Exceedance

In order to illustrate the magnitude of the water quality values measured above benchmark WQOs for the 2006-2007 wet weather monitoring season, the ratio of water quality results to the benchmark WQOs were plotted for common constituents of concern (Figure 8-5). The mean ratio of water quality results to the benchmark WQOs from all storm events from October 2001 through April 2006 was calculated to determine the magnitude that measured values were above the benchmark WQOs for each constituent.

The conventional constituent TDS was between 3 and 4 times the benchmark WQO during the storm event on December 10, 2006 January 30, 2007 and approximately 2 times the benchmark WQO during the storm event of February 19, 2007. These results are consistent with results from previously monitored storm events. The mean TDS results are approximately 1.4 times the benchmark WQO. in 17 out of 18 storms. Turbidity was measured at a concentration that was 3.5 times the benchmark WQO during the February 19, 2007 monitoring event. The mean turbidity results are just below the benchmark WQO.

Fecal coliform was above the benchmark WQO during all three monitoring events (an average of 3 times the benchmark WQO) for the 2006-2007 monitoring season. However, the 2006-2007 results are below the mean fecal coliform ratio of approximately 30.2 times the benchmark WQO.

The pesticides Chlorpyrifos, Diazinon, and Malathion were below the benchmark WQOs during the 2006-2007 monitoring season and concentrations were below the mean benchmark WQO ratio over the monitoring program record.

Total and dissolved metals results were below the benchmark WQOs during the 2006-2007 monitoring season. The mean benchmark WQO ratio for total and dissolved metals are also well below the benchmark WQO.

Toxicity was observed to *Ceriodaphnia dubia* (reproduction endpoint) during the storm event on January 20, 2007. No other toxicity was observed during the 2006-2007 monitoring season. Toxicity has not been observed during any other monitoring event at this MLS.

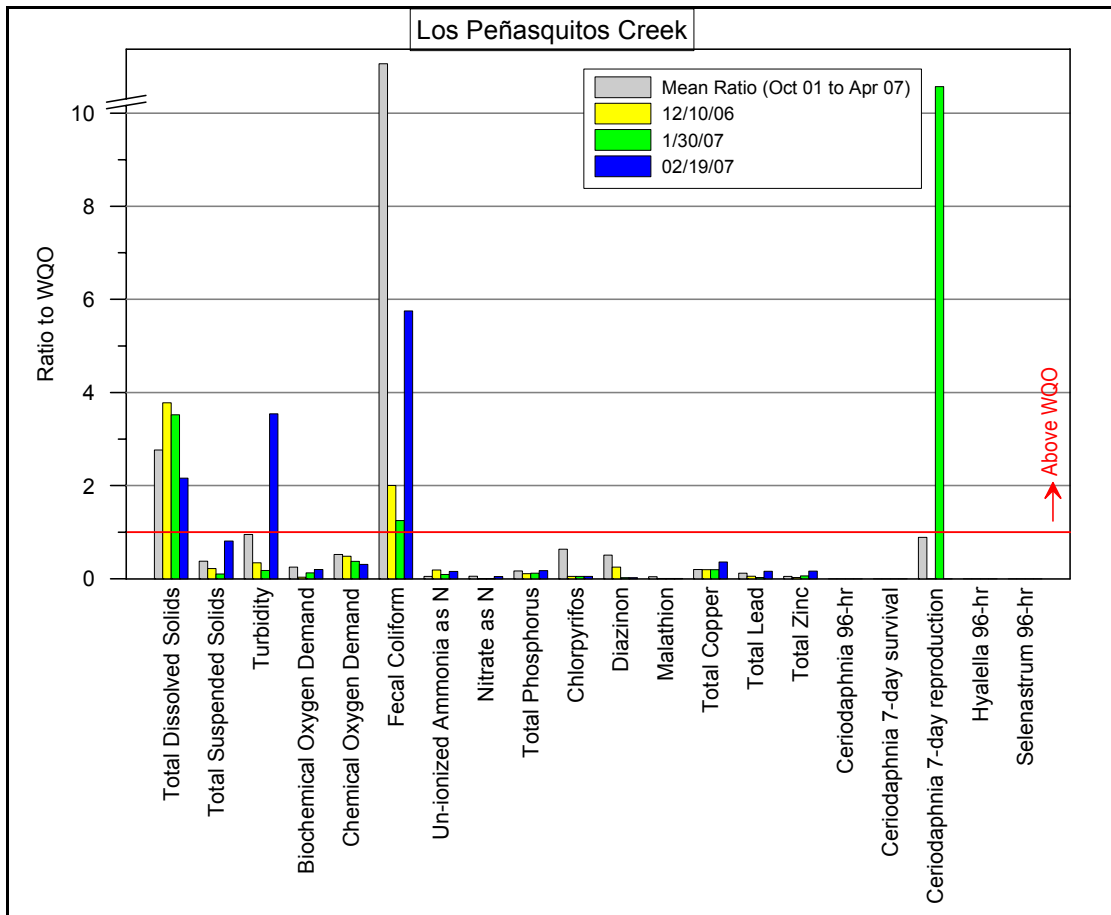


Figure 8-5. Los Peñasquitos Creek Water Quality Ratios.

8.2.3 Wet Weather Constituent Loadings 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. 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 AHC MLS 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 losses, 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 8-5). Measured loading values that were above the range of expected loads are identified in Table 8-5 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 wide difference between events. During the first two storm events, there was over 13 times more runoff than was sampled. The third storm measured nearly a quarter of the runoff. This variation is due to differences in the duration of composite sampling times between storm events which ranged from 14.9 hours to 18.8 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 8-5. Modeled Loading Values Compared to Measured Loading Values for Los Peñasquitos Creek (PC) Mass Loading Station.

MLS Station Event	PC-Event 1	PC-Event 2	PC-Event 3
Event Date	10-Dec-2006	30-Jan-2007	19-Feb-2007
Composite Duration (hours)	16.6	18.8	14.9
Modeled to Composite Runoff Ratio	12	9	5
Conventional Constituents			
Oil & Grease	0	0	0
Total Dissolved Solids	+	+	+
Total Suspended Solids	-	-	0
Biochemical Oxygen Demand, 5-day	-	-	0
Chemical Oxygen Demand	0	0	0
Nutrients			
Ammonia	0	-	+
Nitrate + Nitrite	-	-	0
Total Kjeldahl Nitrogen	-	-	0
Dissolved Phosphorus	0	0	0
Total Phosphorus	0	0	0
Metals			
Cadmium, Total	+	0	0
Cadmium, Dissolved	0	0	0
Chromium, Total	-	-	-
Chromium, Dissolved	0	0	0
Copper, Total	-	-	0
Copper, Dissolved	-	-	-
Lead, Total	-	-	-
Lead, Dissolved	-	-	-
Nickel, Total	0	0	0
Nickel, Dissolved	0	0	0
Zinc, Total	-	-	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

8.2.4 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 are 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 8-6.

Water quality monitoring was performed at 55 locations in the Los Peñasquitos Creek 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, 55 sites were located upstream of the mass loading station on Los Peñasquitos Creek. A summary of the 2006 dry weather monitoring results for the Los Peñasquitos Creek WMA is provided in Table 8-6.

Table 8-6. Summary of the 2006 Dry Weather Monitoring Results in the Los Peñasquitos Creek WMA

Analyte	Units	DW Action Level	Number of Samples	RESULTS		
				Minimum	Mean	Maximum
Conductivity*	μS/cm	5,000	83	100	2,211	11,000
Oil & Grease	mg/L	15	22	1.54	13.50	225
pH	pH units	6.5-9	83	3.31	7.72	8.55
Enterococcus	MPN/100mL	10,000	22	20	23,029	150,000
Fecal Coliform	MPN/100mL	20,000	22	10	29,122	300,000
Total Coliform	MPN/100mL	50,000	22	40	420,733	5,000,000
Ammonia (NH ₃ -N)	mg/L	1	81	0.01	0.31	2
Orthophosphate (PO ₄ -P)	mg/L	2	78	0.02	0.41	2.12
Nitrate (NO ₃ -N)	mg/L	10	81	0.06	1.84	12.50
MBAS	mg/L	1	22	0.07	0.42	1.79
Turbidity**	NTU	20	81	0.03	56.10	1,000
Chlorpyrifos	μg/L	0.5	22	0	0.01	0.03
Diazinon	μg/L	0.5	22	0.03	0.03	0.03
Hardness	mg CaCO ₃ /L		22	260	680	1850
Cadmium Dissolved	μg/L	(a)	22	1.34	2.45	2.50
Copper Dissolved	μg/L	(a)	22	0.76	5.93	15.10
Lead Dissolved	μg/L	(a)	21	2.50	2.50	2.50
Zinc Dissolved	μg/L	(a)	22	5.69	23.95	79.50

* 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.

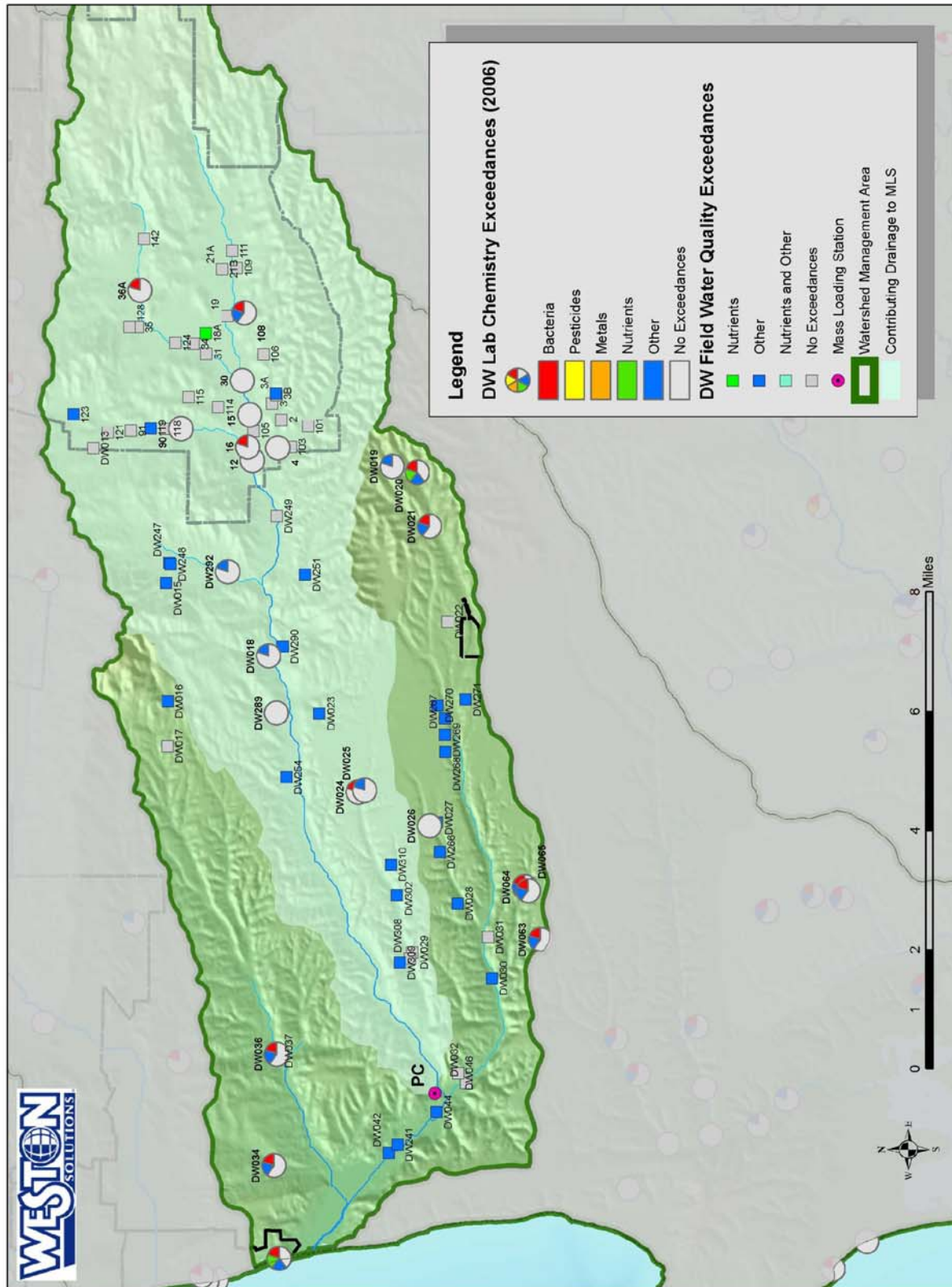


Figure 8-6. Los Peñasquitos Creek WMA Dry Weather Exceedance Map.

Table 8-7 summarizes the 2006 Dry Weather Program's list of constituents that were above the dry weather action levels. Constituent results that were above the dry weather action level at the dry weather monitoring sites include conductivity, oil and grease, pH, enterococcus, fecal coliform, total coliform, ammonia, orthophosphate, nitrate, MBAS and turbidity.

Constituents with average ratios that are above action levels and standard deviations greater than one indicate more frequent and wider ranges of values measured above action levels.

Constituents with average ratios of values 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 8-6 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 action level exceedances. The colored slices of the pie show the different constituent groups that contributed to the exceedances.

8.2.5 Third Party Data

No new third party data were received for the 2006-2007 monitoring season. Existing third party data were collected from the Los Peñasquitos Watershed under the Surface Water Ambient Monitoring Program (SWAMP) in March, April, June, and September 2002 (Appendix H). These data meet the acceptability for assessment under this program since they were collected 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 Section 3.1.1 of the Watershed Data Assessment Framework (MEC-Weston, 2004).

A full suite of constituents was 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 benchmark 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 near the MLS site. Sulfate, manganese and toxicity were above the benchmark WQO at all sites. Turbidity and Diazinon concentrations were above the benchmark WQO sporadically. It should be noted that Diazinon has not been detected at the MLS since the 2003-2004 season.

Table 8-7. Los Peñasquitos WMA 2006 Dry Weather Exceedance Matrix.

Analyte	Category	Total	Number of Exceedances	Average Ratio of Exceedance*	St. Dev. Ratio of Exceedance
Conductivity	Other	83	3	0.44	0.31
Oil & Grease	Other	22	2	0.90	3.16
pH	Other	83	2	0.07	0.18
Enterococcus	Bacteria	22	10	2.30	3.62
Fecal Coliform	Bacteria	22	6	1.46	3.24
Total Coliform	Bacteria	22	9	8.41	21.80
Ammonia (NH3-N)	Other	81	2	0.31	0.36
Orthophosphate (PO4-P)	Nutrients	78	1	0.21	0.19
Nitrate (NO3-N)	Nutrients	81	1	0.18	0.20
MBAS	Other	22	3	0.42	0.43
Turbidity	Other	81	34	2.80	7.95
Los Peñasquitos Total		728	73	0.86	4.92

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

8.2.6 TIEs

Toxicity identification evaluation (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.

8.2.7 Watershed Water Quality Monitoring Summary

Total dissolved solids, turbidity, and elevated levels of bacterial indicators, specifically fecal coliform, appear to be the primary water quality concerns within the watershed. A statistically significant increasing trend was only noted for total nickel. However, total nickel concentrations are well below, and have never exceeded the WQO benchmark. 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, most metals consistently showed lower than expected loads for all the storm events sampled.

Three sites were sampled under the SWAMP program within the 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 benchmark WQO included turbidity, pH, sulfate, Diazinon, methyl parathion and toxicity. Results from the other two stations within the Los Peñasquitos Watershed were similar to those found in Los Peñasquitos Creek. Sulfate, manganese and toxicity were above the benchmark WQO at all sites. Turbidity and Diazinon concentrations were above the benchmark WQO sporadically.

8.3 Stream Bioassessment

Stream bioassessment in the Los Peñasquitos Creek WMA included two urban affected monitoring sites. The upstream site (LPC-CCR) was in Los Peñasquitos Canyon Creek at Cobblestone Creek Road, on the downstream side of the City of Poway. The downstream site (LPC-805) was moved in October 2006 from the previous site in Carroll Canyon Creek to a site in the main stem of Los Peñasquitos Creek, adjacent to the mass loading station.

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.

8.3.1 Results and Discussion

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 8 and 1, respectively (Table 8-8). The results of the O/E analysis show that the Los Peñasquitos Creek monitoring site had O/E ratios of 0.63 in October and 0.42 in May. This implies that the benthic community has lost an estimated 37 to 58 percent of the biodiversity expected to occur at the site and represents degradation of the quality of the benthic community.

There were 19 different taxa collected in October, and 12 different taxa in May, with 3 and 2 ephemeroptera, plecoptera, and trichoptera (EPT) taxa collected per survey. There were no organisms collected that are highly intolerant (sensitive) to impairment, and organisms highly tolerant to impairment comprised 15 and 19 percent of the community in October and May, respectively.

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)		Los Peñasquitos Creek at Highway 805 (LPC-805)	
	Oct-06	May-07	Oct-06	May-07
Survey				
Index of Biotic Integrity/ Qualitative Rating	8 Very Poor	1 Very Poor	9 Very Poor	4 Very Poor
O/E Ratio	0.63	0.42	0.30	0.34
Metrics				
Taxa Richness	19	12	8	9
EPT Taxa (mayflies, stoneflies, and caddisflies)	3	2	2	3
% Intolerant Taxa	0%	0%	0%	0%
% Tolerant Taxa	15%	19%	78%	15%
Average Tolerance Value	6.2	6.2	7.4	6.1
% Collector Filterers + Collector Gatherers	91%	97%	95%	98%
Physical Measures				
Elevation	440		80	
Physical Habitat Score	147	142	113	121
Riffle Velocity (ft/sec)	1.3	1.3	1.7	1.2
Substrate Composition				
Silt	18%		20%	5%
Sand	14%	10%	3%	14%
Gravel	48%	20%	25%	27%
Cobble	15%	30%	13%	13%
Boulder		5%		4%
Roots			39%	37%
Water Quality				
Temperature (°C)	20.2	17.4	14.1	16.8
pH	7.9	7.4	8.1	7.9
Specific Conductance (mS/cm)	3.372	2.860	3.678	3.305
Dissolved Oxygen (mg/L)	8.87	7.58	nr	9.11

*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

nr= not recorded

The benthic community was not as seasonally variable as in past surveys. In both October and May the community was dominated by chironomid midges (Table 8-9). The black fly, *Simulium*, Baetid mayflies (*Baetis* and *Fallceon quilleri*), and *Hyaella* were also abundant in both surveys. The damselfly, *Argia* was collected in much higher numbers in October than in May, due to the natural seasonal variability for this organism. The site was heavily dominated by organisms in the Collector Gatherer plus Collector Filterer feeding groups, with 91 to 97 percent of the community utilizing these feeding strategies.

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, 3.372 and 2.860 mS/cm, and pH values were 7.9 and 7.4.

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.

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-06	Chironomidae	non-biting midges	57%	6	Collector Gatherer/Filterer
		<i>Hyalella</i>	amphipod	11%	8	Collector Gatherer
		<i>Simulium</i>	black fly	10%	6	Collector Filterer
		<i>Fallceon quilleri</i>	minnow mayfly	8%	4	Collector Gatherer
		<i>Argia</i>	dancer damselfly	6%	7	Predator
	May-07	Chironomidae	non-biting midges	33%	6	Collector Gatherer/Filterer
		<i>Simulium</i>	black fly	31%	6	Collector Filterer
		<i>Baetis</i>	minnow mayfly	13%	5	Collector Gatherer
		Ostracoda	seed shrimp	10%	8	Collector Gatherer
		<i>Hyalella</i>	amphipod	7%	8	Collector Gatherer
Los Peñasquitos Creek at Highway 805 (LPC-805)	Oct-06	<i>Hyalella</i>	amphipod	78%	8	Collector Gatherer
		Chironomidae	non-biting midges	8%	6	Collector Gatherer/Filterer
		<i>Simulium</i>	black fly	6%	6	Collector Filterer
		Turbellaria	flatworm	4%	4	Predator
		<i>Fallceon quilleri</i>	minnow mayfly	3%	4	Collector Gatherer
	May-07	Chironomidae	non-biting midges	63%	6	Collector Gatherer/Filterer
		Ostracoda	seed shrimp	8%	8	Collector Gatherer
		<i>Simulium</i>	black fly	8%	6	Collector Filterer
		<i>Hyalella</i>	amphipod	7%	8	Collector Gatherer
		<i>Fallceon quilleri</i>	minnow mayfly	6%	4	Collector Gatherer

Summary Indices Results Over Time

The upper Los Peñasquitos Creek site has been sampled 12 times since the beginning of the program. The IBI scores have been somewhat variable seasonally, with mean values of 12.6 for October surveys and 7.4 for May surveys (Figure 8-7). IBI scores have ranged from 1 to 18, with the highest score in October 2001 and the lowest scores in May of 2006 and 2007.

The mean O/E ratios for the site have been 0.77 for October surveys and 0.58 for May surveys (Figure 8-8). Two of the October surveys (2001 and 2005) were rated unimpaired, with a high score of 0.96. The lowest O/E ratios were in May 2001 and May 2007. The IBI and O/E results were generally comparable, with most surveys showing moderate to high levels of impairment; the exception being the two surveys showing unimpaired conditions while none of the IBI scores were above the impairment threshold.

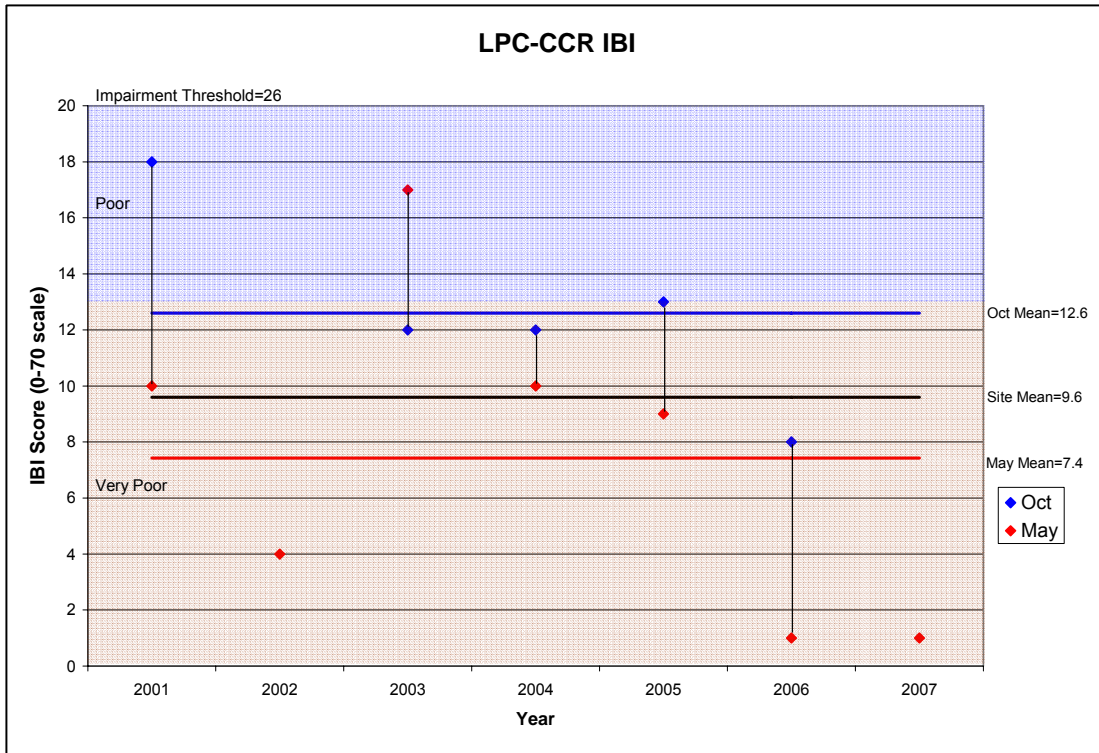


Figure 8-7. Index of Biotic Integrity for Los Peñasquitos Creek at Cobblestone Creek Road (LPC-CCR).

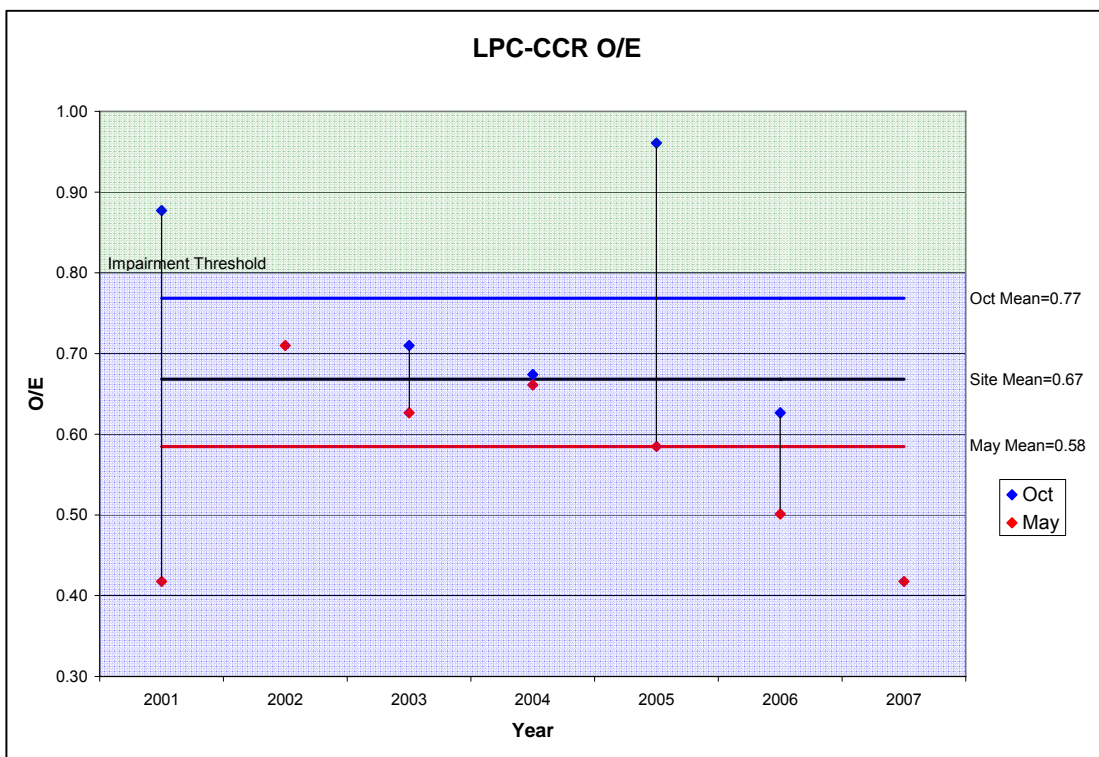


Figure 8-8. O/E Ratio for Los Peñasquitos Creek at Cobblestone Creek Road (LPC-CCR).

Highway 805 Monitoring Site: LPC-805



The Los Peñasquitos Creek monitoring site at Highway 805 had a benthic macroinvertebrate community with Index of Biotic Integrity ratings of Very Poor in October 2006 and May 2007 and IBI scores of 9 and 4, respectively (Table 8-8). The results of the O/E analysis show that the site had O/E ratios of 0.30 in October and 0.34 in May. This implies that the benthic community has lost an estimated 66 to 70 percent of the biodiversity expected to occur at the site.

Taxa richness for the two surveys was relatively low, with 8 and 9 different taxa collected and with 2 and 3 different EPT taxa collected per survey. There were no organisms collected that are highly intolerant (sensitive) to impairment, and the occurrence of organisms highly tolerant was variable, comprising 78 percent of the community in October, and 15 percent of the community in May. As in the upstream site, this site was heavily dominated by organisms in the Collector Gatherer plus Collector Filterer feeding groups, with 95 to 98 percent of the community utilizing these feeding strategies.

The benthic community had a high level of dominance by a single organism, with 78 percent of the community comprised of the amphipod, *Hyaella* in October, and 63 percent of the community comprised of chironomid midges in May (Table 8-9). Other organisms in the benthic community were present in relatively similar numbers in each survey (Appendix B.2-1, B.2-2).

The physical habitat of the site was marginal, with a substrate primarily of soft clay with some gravel, cobble, and emergent vegetation (*Typha*) providing habitat for macroinvertebrate colonization. The site was located very close to the I-805 overpass with little natural canopy cover. Specific conductance was fairly high, 3.678 and 3.305 mS/cm, and pH values were 8.1 and 7.9.

The Los Peñasquitos Creek mass loading station was located immediately upstream of the bioassessment station and water quality measures from storm water may be directly correlated with the biological community. 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* from storm water were generally low or not detected at the MLS.

Summary Indices Results Over Time

The lower Los Peñasquitos watershed has been sampled 13 times since the beginning of the program, and for this analysis the Carroll Canyon Creek site and the Los Peñasquitos Creek site were combined. The IBI scores have been fairly consistent, with mean values of 13.5 for October surveys and 10.1 for May surveys, with most surveys in the 9-16 point range (Figure 8-9). Overall, IBI scores have ranged from 2 to 18, with the highest score in October 2004 and the lowest score in May 2002.

The mean O/E ratios for the site have been 0.64 for October surveys and 0.52 for May surveys (Figure 8-10). The October surveys of 2002 and 2004 were rated slightly above the impairment threshold (i.e. unimpaired). The lowest O/E ratios were in October 2006 and May 2007 and these two surveys sampled Los Peñasquitos Creek proper and may reflect poorer water quality than Carroll Canyon Creek. The IBI and O/E results were contradictory for some surveys, although most surveys showed moderate to high levels of biological degradation by each index. The exceptions were the two surveys that the O/E indicated an unimpaired benthic community while none of the IBI scores were in the unimpaired range.

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 Los Peñasquitos Creek adjacent to the MLS. Both of the sites had Index of Biotic Integrity ratings that were in the Very Poor category for both surveys, and had O/E ratios that also indicated degraded biotic conditions.

Since the beginning of the program, the upstream Los Peñasquitos Creek site has had a mean IBI score of 9.6 and a mean O/E ratio of 0.67. The O/E rated the site unimpaired for the October 2001 and October 2005 surveys. The downstream Los Peñasquitos watershed site has had a mean IBI score of 11.7 and a mean O/E ratio of 0.58. The O/E rated the site unimpaired for the October 2002 and October 2004 surveys.

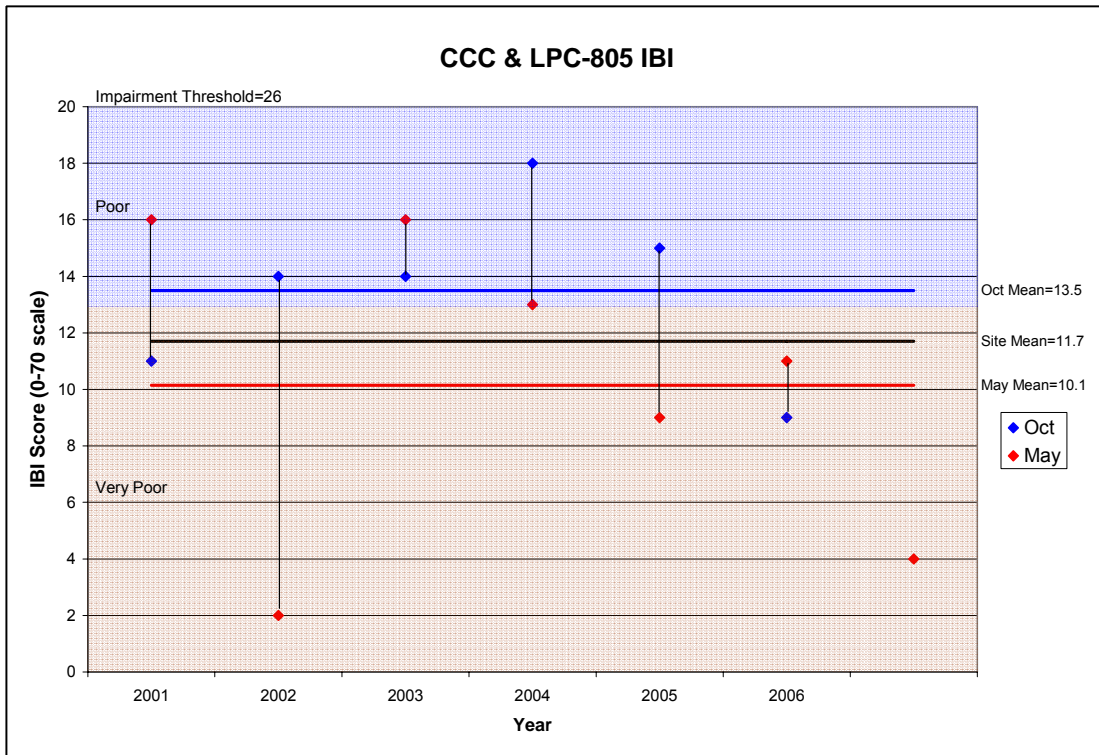


Figure 8-9. Index of Biotic Integrity for Carroll Canyon Creek and Los Peñasquitos Creek at Highway 805 (CCC & LPC-805).

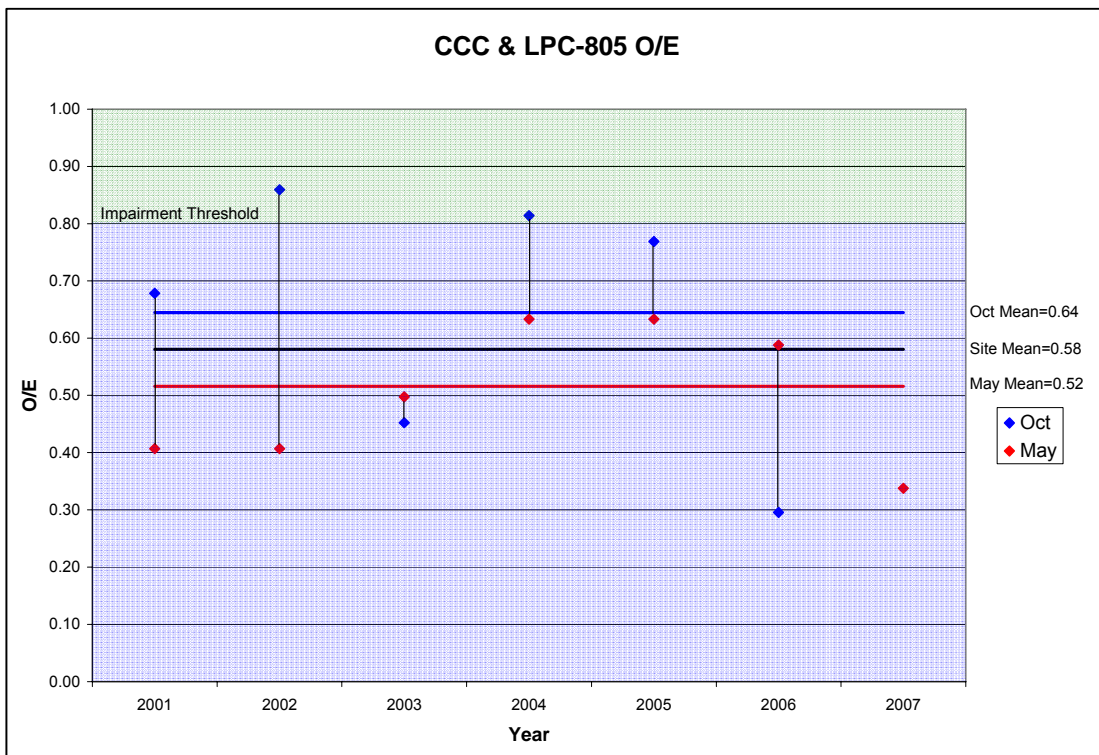


Figure 8-10. O/E Ratio for Carroll Canyon Creek and Los Peñasquitos Creek at Highway 805 (CCC & LPC-805).

Los Peñasquitos Creek WMA

8.4 Ambient Bay and Lagoon Monitoring Program

The Ambient Bay and Lagoon Monitoring Program was not conducted in 2006.

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 55 dry weather monitoring sites upstream of the MLS, and IBI scores generated at two bioassessment sites (Table 8-10). 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 8-11.

Table 8-10. Watershed Assessment Data 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

8.5.1 Los Peñasquitos Creek WMA Criterion Assessment

Two constituents were found to have high frequencies of occurrence in the Los Peñasquitos Creek WMA. Total dissolved solids received a three diamond rating based on Criterion No. 1. Criterion No. 1 is when mass loading station tests results exceed the benchmark WQO in greater than or equal to 80% of the samples. Total dissolved solids met Criterion No. 1 by wet weather MLS samples exceeding the benchmark WQO in 94% of the monitored events since the 2001-2002 storm monitoring season. Fecal coliforms received a three diamond rating based on Criterion No. 2. Criterion No. 2 is when six of the last consecutive storm samples at the MLS exceeded the benchmark WQOs.

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. 8. Criterion No. 8 is when dry weather station exceedances are found in 10 to 50% of the samples in the past year.

Through the 2005-2006 season, toxicity had not been observed in bioassay tests from any of the 12 events monitored since 2001. However, toxicity was observed in *Ceriodaphnia dubia* exposed to storm water collected on January 30, 2007. The water on this date was shown to elicit a toxic response in *Ceriodaphnia dubia* reproduction. Based on the historical record of wet weather monitoring data, persistent toxicity is not evident in this WMA.

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 year of monitoring. In 2006-2007 this site was moved to Los Peñasquitos Creek immediately downstream of the MLS. The newly located station received a very poor rating during the 2006-2007 monitoring year. Therefore, there are indications of benthic alteration within the Los Peñasquitos Creek Watershed.

Table 8-11. Wet Weather Constituent Exceedances in the Los Peñasquitos 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																		
COD	0	0	0	0	0	0	1	33	0	0	0	0	1	6	NA	NA		
Ammonia ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4		
Total Dissolved Solids	3	100	3	100	3	100	3	100	2	67	3	100	17	94	NA	NA		
Total Suspended Solids	0	0	0	0	0	0	1	33	1	33	1	33	3	17	NA	NA		
Turbidity	0	0	2	67	0	0	1	33	1	33	1	33	5	28	14	26		
pH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Nutrients																		
Orthophosphate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0	0		
Nitrate	0	0	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	0	0	4	22	3	23		
Fecal Coliform	1	33	3	100	1	33	3	100	3	100	3	100	14	78	1	8		
Enterococcus	0	0	2	67	0	0	0	0	2	67	1	33	5	28	3	23		
Pesticides																		
Chlorpyrifos	0	0	2	67	0	0	0	0	0	0	0	0	2	11	0	0		
Diazinon	2	67	1	33	0	0	0	0	0	0	0	0	3	17	0	0		
Total Metals																		
Antimony	0	0	1	33	0	0	0	0	0	0	0	0	1	6	NA	NA		
Dissolved Metals																		
Copper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Toxicity																		
	0	0	0	0	0	0	0	0	0	0	1	33	1	6	NA	NA		
Bioassessment	IBI Rating																	
Los Peñasquitos Creek, at Cobblestone Creek Rd.	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	NA		
Carroll Canyon Creek, at Highway 805 **	Very Poor	Very Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	NA		
	EVIDENCE OF BENTHIC ALTERATION?																	
	No																	
	Yes																	

* = Total number of observations varied among constituents.

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.

** Bioassessment station relocated during 2006-2007 to Los Peñasquitos Creek at 805.

Figure 8-11 summarizes the number of times constituents were measured above benchmark WQOs in six analytical categories. The categories include conventional, nutrients, bacteria, pesticides, metals and toxicity. The stacked bars represent the number of times constituent values from the wet weather MLS results were above benchmark WQOs for each constituent category. The overall number of times the water quality values were above the benchmark WQOs 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 are above the benchmark WQO with any type of regularity.

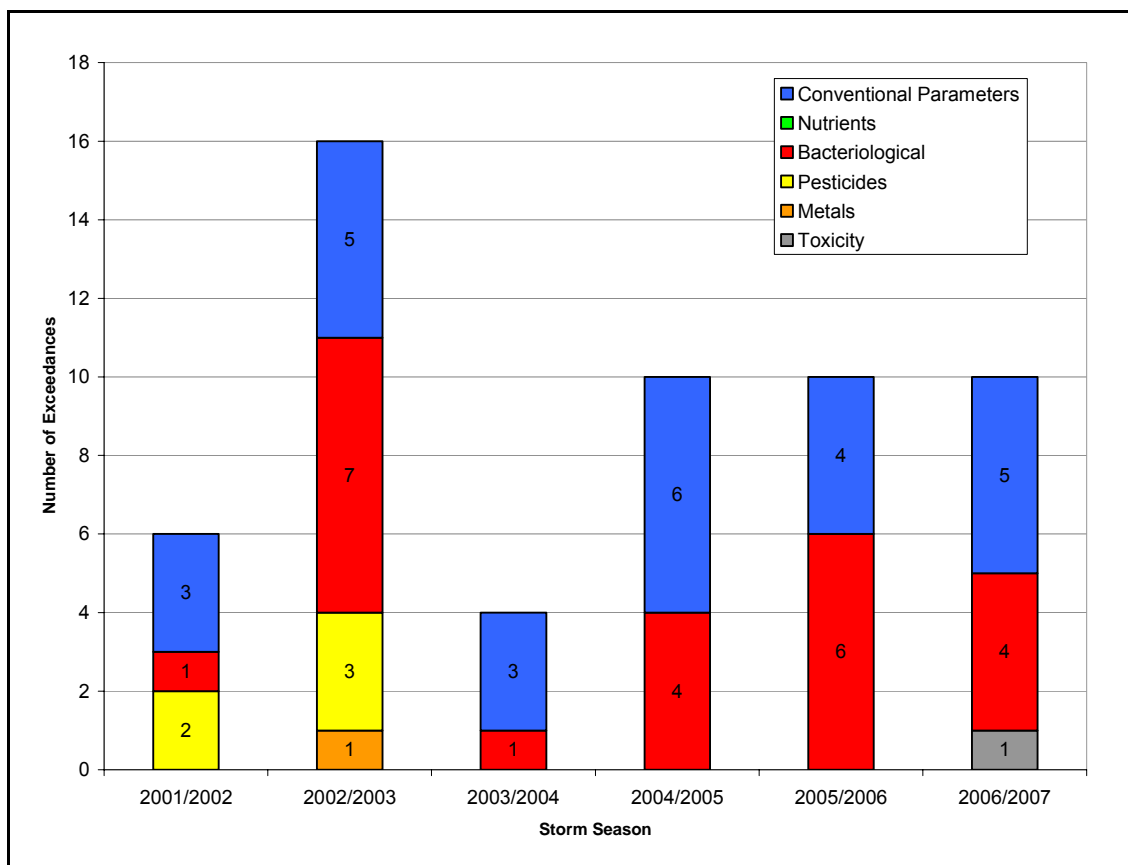


Figure 8-11. Stacked Bar Chart of the Number of Wet Weather Exceedances of Constituent Groups in Los Peñasquitos Creek.

Evaluation of the scatterplot presented in Section 8.2.2 and also in Appendix C indicated the presence of a statistically significant increasing trend for total nickel. Although total nickel was detected in storm water samples from each 2006-2007 storm event, concentrations were below the benchmark WQO. None of the constituents that had high, medium or low diamond ratings had statistically significant increasing or decreasing trends.

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 8-12 summarizes these results and lists possible conclusions and actions.

Table 8-12. Triad Decision Matrix Results for the Los Peñasquitos WMA.

Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Example Actions or Decisions
No persistent exceedances of benchmark WQOs	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 benchmark WQO (TDS and bacteria are not considered as toxic constituents based on the methods section), or persistent toxicity, but there was evidence of benthic alteration. Based on these findings, no action is eminently needed to address toxic chemicals; however, actions should be considered for implementation in the future to evaluate the role of physical habitat disturbance. 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 baseline water quality priority ratings presented in the 2005-2006 Urban Runoff Monitoring Report are also presented in this report in Table 8-13. 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.

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 (2000-2007)
- 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 (2000-2007)

- Triad Assessment – Toxicity Testing of Storm water (2000-2007)
- 303(d) Listing (2003)

Table 8-13. 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	D	A	A	C
Miramar Reservoir HA (906.10)	55%	C	A	D	D	A	D	C	C	C	A	A	C
Poway HA (906.20)	45%	D	A	D	D	C	D	D	D	D	B	B	C
2006-07 High ¹ Frequency of Occurrence Ratings			◆◆◆								◆◆◆		
Constituents of Concern			TDS								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

303(d) listing update has occurred and should be updated

It should be noted that the 303(d) listing for the bacteria has been removed from the new 2006 303(d) list. Because the LTEA ratings are primarily driven by 303(d) listings, the “A” priority given to Bacteria/Pathogens within the Los Peñasquitos Creek WMA may no longer be accurate since the table was not regenerated to reflect the delisting of bacteria in the Miramar Reservoir HA.

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. 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 benchmark 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 benchmark 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.

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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 and fecal coliform for the Los Peñasquitos Creek 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 nutrients and bacteria category in the Los Peñasquitos Creek Watershed that are based on the threat to water quality inventory ratings tables can be found in the BLTEA report (WESTON, MOE, & LWA, 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 (26.7%), vacant/undeveloped (15.0%), and parks and recreation (29.7%). The major land uses within the contributing runoff area are parks (28.6%), residential (30.7%), and undeveloped (21.4%).

Within the Los Peñasquitos Creek WMA, TDS and fecal coliform were the only high frequency of occurrence constituents of concern (COC) followed by turbidity, total coliform and enterococci which were all low frequency of occurrence COC. There was no evidence of persistent toxicity in Los Peñasquitos Creek WMA; however, the benthic community appeared to be limited by unknown factors. A statistically significant increasing trend was noted only for total nickel. However, total nickel concentrations are well below, and have never exceeded the WQO benchmark.

Measured storm event loads were compared to loading 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 storms events sampled.

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 benchmark WQO included turbidity, pH, sulfate, Diazinon, methyl parathion and toxicity. Results from the other two stations within the Los Peñasquitos Watershed were similar to those found near the MLS site. Sulfate, manganese and toxicity were above the benchmark WQO at all sites. Turbidity and Diazinon concentrations were above the benchmark WQO sporadically. It should be noted that Diazinon has not been detected at the MLS since the 2003-2004 season.

Bioassessment monitoring in the Los Peñasquitos WMA was conducted at two sites. The upstream site was in Los Peñasquitos Creek in Poway, and the downstream site was in Los Peñasquitos Creek adjacent to the MLS. Both of the sites had Index of Biotic Integrity ratings that were in the Very Poor category for both surveys, and had O/E ratios that also indicated degraded biotic conditions. Since the beginning of the program, the upstream Los Peñasquitos Creek site has had a mean IBI score of 9.6 and a mean O/E ratio of 0.67. The O/E rated the site above the impairment threshold for the October 2001 and October 2005 surveys. The downstream Los Peñasquitos watershed site has had a mean IBI score of 11.7 and a

mean O/E ratio of 0.58. The O/E rated the site slightly above the impairment threshold for the October 2002 and October 2004 surveys.

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. However, the bacteria finding is based on the 2002 303(d) list which has since been delisted. 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 assessments 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 may allow for long-term BMP effectiveness assessment. Incorporation of additional usable data from other third party monitoring programs may help to increase the confidence of the water quality priority ratings and overall WMA assessments.

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 changes to the water quality priority ratings may occur based on the changes noted in the 2006 303(d) list.

The new permit monitoring order (R9-2007-0001) calls for two temporary watershed assessment stations (TWAS) for this watershed. One is located in the Carroll Creek drainage area and one is located upstream of the historical MLS. These new stations will provide additional data to evaluate the spatial distribution of constituents within the watershed during both wet and dry (ambient) conditions. These data will allow for the estimation of annual loading within the watershed. Data will also be gathered to comply with the lagoon Investigative Order No. R9-2006-076 during the 2007-2008 monitoring period that will provide valuable information related to sedimentation characteristics at various stations within Los Peñasquitos Lagoon.