

Watershed Data Assessment Framework

Methodology



*Presentation to the San Diego Copermitttee Monitoring
Workgroup*

January 27, 2009

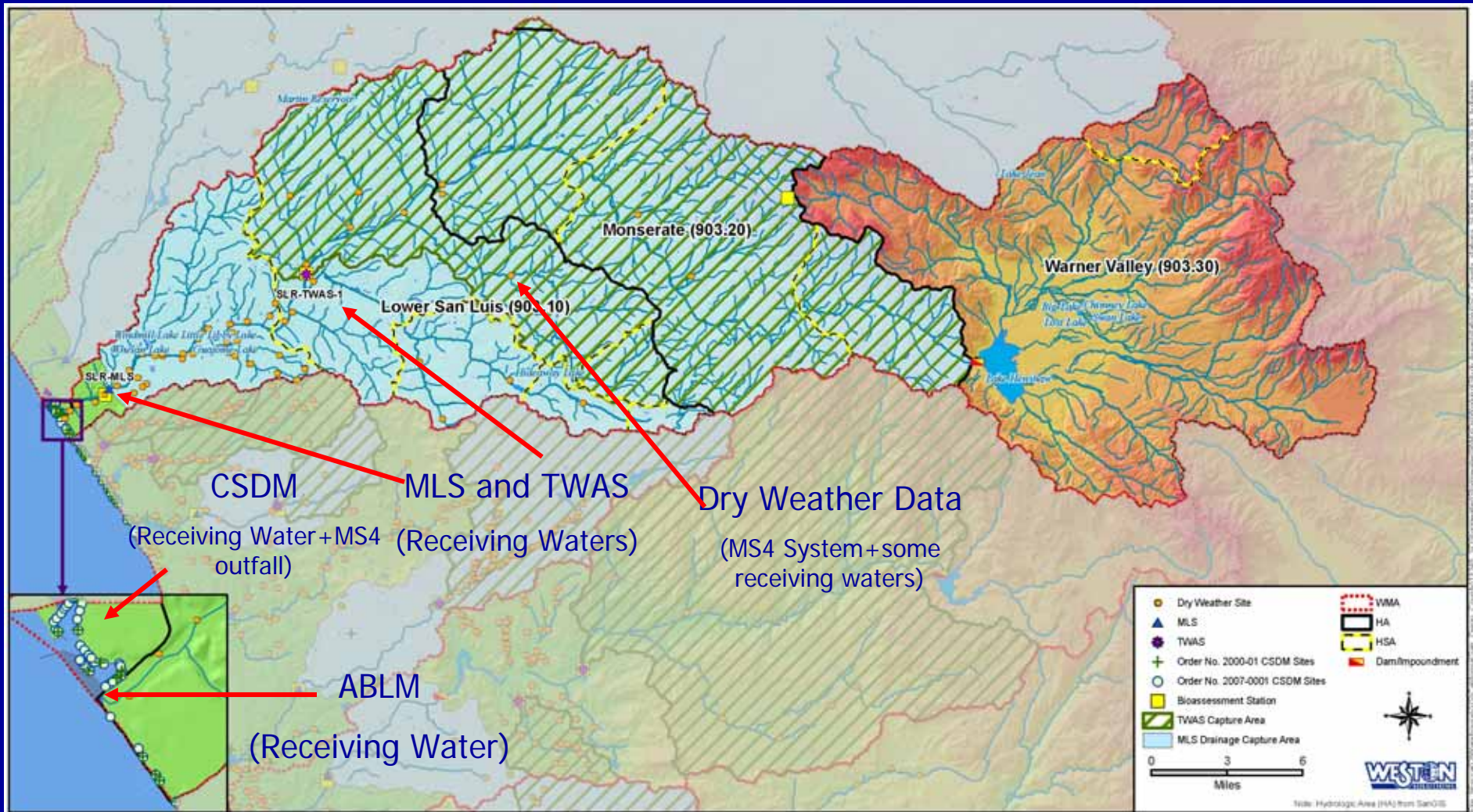
Dave Renfrew



History

- Under Order 2001-01, the Copermittees needed a framework for assessing data using multiple lines of evidence (Triad Approach).
- Data was accumulating from multiple programs.
- *Watershed Data Assessment Framework, Final Draft, Version 1, June 1, 2004*.
 - Developed in 2003 by MEC Analytical Systems, Inc. with the Copermittee Monitoring Workgroup.
- Issues with data quality objectives.
 - Were data comparable?
 - Could data be assessed in light of WQO?
 - How to compare third party data?

Watershed Monitoring Data Elements



Data Assessment Methodology

- Step 1. Assemble data set
 - Wet Weather Receiving Water Monitoring (MLS Data)
 - Compare results to benchmarks
 - Compile number of exceedances per year
 - Determine frequency of exceedance.
 - Dry Weather Monitoring Data (Jurisdictions)
 - Compare to dry weather action levels
 - Compile number of exceedances per dry weather season
 - Results compared to ***“Interim Criteria for Evaluating Mass Loading and Dry Weather Station Data”***
 - *Constituent of Concern Frequency of Occurrence Assigned*
 - *Diamonds (high, medium, or low)*

| 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 | ◆◆◆ | 1 | |
| 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 | ◆ | 8 | |
| 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 | - | - | |
| Bacteric | | | | | | | | | | | | | | | | | | | |
| Total Coliform | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 22 | 3 | 23 | ◆ | 8 | |
| Fecal Coliform | 3 | 100 | 3 | 100 | 3 | 100 | 3 | 100 | 3 | 100 | 3 | 100 | 14 | 78 | 1 | 8 | ◆◆◆ | 2 | |
| Enterococci | 2 | 67 | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 28 | 3 | 23 | ◆ | 8 | |
| Pesticid | | | | | | | | | | | | | | | | | | | |
| Chlorpyrifos | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 11 | 0 | 0 | - | - | |
| Diazinon | 0 | 0 | 0 | 0 | 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 | - | - | |
| Toxicity | | | | | | | | | | | | | | | | | | EVIDENCE OF PERSISTENT TOXICITY? | |
| Ceriodaphnia dubia 7- day reproduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 1 | 6 | NA | NA | No | | |
| Bioassessment | IBI Rating | | | | | | | | | | | | | | EVIDENCE OF BENTHIC ALTERATION? | | | | |
| Los Penasquitos Creek, at Cobblestone Creek Rd. | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | NA | NA | Yes | | |
| Carroll Canyon Creek, at Highway 805 ** | Very Poor | Poor | Poor | Poor | Poor | Poor | Poor | Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | NA | NA | Yes | | |

Original method based on 3 wet events per year. Was heavily weighted on the cumulative wet weather results % exceedance.

* = 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 Penasquitos Creek at 805.



Los Penasquitos Creek

| Constituents With Any Wet Weather (MLS) WQO or Dry Weather Action Level Exceedance | MLS (Wet Weather) Results | | | | | | | | | | | | | | Dry Weather Results * | | Frequency of Occurrence | Criterion No. | |
|--|---------------------------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|----|-----------|-----|------------|----|-----------------------|-----|--|---------------|--|
| | 2001/2002 | | 2002/2003 | | 2003/2004 | | 2004/2005 | | 2005/2006 | | 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 | ◆◆◆ | 1 | |
| 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 | ◆ | 8 | |
| 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 | 1 | 2 | - | - | |
| Bacteriological | | | | | | | | | | | | | | | | | | | |
| Total Coliform | | | | | | | | | 3 | 0 | 0 | 0 | 4 | 22 | 3 | 23 | ◆ | 8 | |
| Fecal Coliform | | | | | | | | | 0 | 3 | 100 | 14 | 78 | 1 | 8 | ◆◆◆ | 2 | | |
| Enterococcus | | | | | | | | | 7 | 1 | 33 | 5 | 28 | 3 | 23 | ◆ | 8 | | |
| Pesticides | | | | | | | | | | | | | | | | | | | |
| Chlorpyrifos | | | | | | | | | 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 | - | - | |
| Toxicity | | | | | | | | | | | | | | | | | | | |
| Ceriodaphnia dubia 7- day reproduction | 0 | 0 | 0 | | | | | | | | | | | | NA | NA | EVIDENCE OF PERSISTENT TOXICITY? No | | |
| Bioassessment | | | | | | | | | | | | | | | | | | | |
| Los Penasquitos Creek, at Cobblestone Creek Rd. | Very Poor | | Very Poor | | Very Poor | | Very Poor | | Very Poor | | Very Poor | | Very Poor | | NA | | EVIDENCE OF BENTHIC ALTERATION? Yes | | |
| Carroll Canyon Creek, at Highway 805 ** | Very Poor | | Poor | | Poor | | Poor | | Very Poor | | Very Poor | | Very Poor | | NA | | | | |

Original method based on 3 wet events per year. Was heavily weighted on the cumulative wet weather results % exceedance.

Original method used dry weather results from the prior year of monitoring only (lower weighting).

* = 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 Penasquitos Creek at 805.



Los Penasquitos Creek

| Constituents With Any Wet Weather (MLS) WQO or Dry Weather Action Level Exceedance | MLS (Wet Weather) Results | | | | | | | | | | | | | | Dry Weather Results* | | Frequency of Occurrence | Criterion No. | |
|--|---------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|----|----------------------|---------------------------------|----------------------------------|---------------|--|
| | 2001/2002 | | 2002/2003 | | 2003/2004 | | 2004/2005 | | 2005/2006 | | 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 | ◆◆◆ | 1 | |
| 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 | ◆ | 8 | |
| 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 | 1 | 2 | - | - | |
| Bacteriological | | | | | | | | | | | | | | | | | | | |
| Total Coliform | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 4 | 22 | 3 | 23 | ◆ | 8 | | |
| Fecal Coliform | 0 | 0 | 3 | 100 | 14 | 78 | 1 | 8 | ◆◆◆ | 2 | | | | | | | | | |
| Enterococcus | 7 | 1 | 33 | 5 | 28 | 3 | 23 | ◆ | 8 | | | | | | | | | | |
| Pesticides | | | | | | | | | | | | | | | | | | | |
| Chlorpyrifos | | | | | | | | | | | | | | | | | | | |
| 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 | - | - | |
| Toxicity | | | | | | | | | | | | | | | | | | | |
| Ceriodaphnia dubia 7- day reproduction | 0 | 0 | 0 | | | | | | | | | | | | NA | NA | EVIDENCE OF PERSISTENT TOXICITY? | | |
| | | | | | | | | | | | | | | | | | No | | |
| Bioassessment | | | | | | | | | | | | | | | | | | | |
| Los Penasquitos 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 | NA | NA | EVIDENCE OF BENTHIC ALTERATION? | | | |
| Carroll Canyon Creek, at Highway 805 ** | Very Poor | Poor | Poor | Poor | Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | NA | NA | Yes | | | |

Original method based on 3 wet events per year. Was heavily weighted on the cumulative wet weather results % exceedance.

Original method used dry weather results from the prior year of monitoring only (lower weighting).

Frequency of Occurrence Diamonds and criterion based on defined formula (next page)

* = 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
 - = Constituent results are below the defined requirements for a Low Frequency of Occurrence
 ◆ = Low Frequency of Occurrence rating.
 ◆◆ = Medium Frequency of Occurrence rating.
 ◆◆◆ = High Frequency of Occurrence rating.
 ** Bioassessment station relocated during 2006-2007 to Los Penasquitos Creek at 805.



Data Assessment Methodology

| COC Frequency of Occurrence | Criterion No. | Definition |
|-----------------------------|---------------|--|
| High ◆◆◆ | 1 | Mass loading station tests results exceed WQO in greater or equal to 80% of samples. |
| | 2 | Six of the last consecutive storm samples at the MLS exceed WQO. |
| | 3 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> at least one DWS exceedance in the past year. |
| | 4 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> a significant increasing trend is found. |
| Medium ◆◆ | 5 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> no exceedances or data available for DWS in the past year. |
| | 6 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> one or more exceedances found in last 2 years of monitoring at the MLS (generally applies to historical datasets). |
| | 7 | Greater than 50% of the DWS samples have exceedances in the past year. |
| Low ◆ | 8 | DWS exceedances in 10 to 50% of the samples in the past year. |
| | 9 | MLS exceedances found in 25% to less than or equal to 50% of the samples <u>and</u> at least one exceedances found in last 2 years at the MLS (with or without DWS exceedances in the past year). |
| | 10 | Greater than 50% of the MLS samples have exceedances <u>and</u> no exceedances in the last 2 years at the MLS. |
| Coastal Program | 11 | Persistent exceedances (greater or equal to 80% of samples). Add one ◆ to bacteria determination (up to three ◆ maximum). |

Data Assessment Methodology

| COC Frequency of Occurrence | Criterion No. | Definition | |
|---------------------------------|---------------|--|--|
| High ◆◆◆ | 1 | Mass loading station tests results exceed WQO in greater or equal to 80% of samples. | |
| | 2 | Six of the last consecutive storm samples at the MLS exceed WQO. | |
| | 3 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> at least one DWS exceedance in the past year. | |
| | 4 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> a significant increasing trend is found. | |
| Medium ◆◆ | 5 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> no exceedances or data available for DWS in the past year. | |
| | 6 | Less than 80% and greater than or equal to 50% of the MLS samples exceed WQO <u>and</u> one or more exceedances found in last 2 years of monitoring at the MLS (generally applies to historical datasets). | |
| Uses different symbol than LTEA | | 7 | DWS samples have exceedances in the past year. |
| Low ◆ | 8 | DWS exceedances in 10 to 50% of the samples in the past year. | |
| | 9 | MLS exceedances found in 25% to less than or equal to 50% of the samples <u>and</u> at least one exceedances found in last 2 years at the MLS (with or without DWS exceedances in the past year). | |
| | 10 | Greater than 50% of the MLS samples have exceedances <u>and</u> no exceedances in the last 2 years at the MLS. | |
| Coastal Program | 11 | Persistent exceedances (greater or equal to 80% of samples). Add one ◆ to bacteria determination (up to three ◆ maximum). | |

Data Assessment Methodology

Triad Definitions

| Triad Component | Definition |
|---|---|
| Persistent Exceedance of Water Quality Objectives | A constituent of concern with a high frequency of occurrence based on wet and dry weather data exceedances compared to established list of benchmarks or trigger levels |
| Evidence of Persistent Toxicity | More than 50% of the toxicity tests for any given species have a NOEC of less than 100%. |
| Indication of Benthic Alteration | IBI score indicates a substantially degraded community (very poor) |

Data Assessment Methodology

Tabular Decision Matrix

| Chemistry | Toxicity | Benthic Alteration | Example Conclusions | Example Actions or Decisions |
|--|------------------------------------|------------------------------|--|--|
| 1. Persistent exceedance of water quality objectives (high frequency COC identified) | Evidence of persistent toxicity | Indications of alteration | Strong evidence of pollution-induced degradation | 1) Toxicity tests at higher dilutions to better quantify toxicity; Use TIE to identify contaminants of concern, based on TIE metric. 2) Evaluate/identify upstream source as a high priority. |
| 2. No persistent exceedances of water quality objectives | No evidence of persistent toxicity | No indications of alteration | No evidence of current pollution-induced degradation Potentially harmful pollutants not yet concentrated enough to cause visible impact | 1) No immediate action necessary. 2) Conduct periodic broad scans for new and/or potentially harmful pollutants. |
| 3. Persistent exceedance of water quality objectives (high frequency COC identified) | No evidence of persistent toxicity | No indications of alteration | Contaminants are not bioavailable Test organisms not sensitive to problem pollutants | 1) TIE would not provide useful information with no evidence of toxicity. 2) Continue monitoring for toxic and benthic impacts. Consider whether different or additional test organisms should be evaluated. 3) Initiate upstream source identification as a low priority. |
| 4. No persistent exceedances of water quality objectives | Evidence of persistent toxicity | No indications of alteration | Unmeasured contaminant(s) or conditions have the potential to cause degradation Pollutant causing toxicity at very low levels Synergistic effects of multiple chemicals at low levels causing toxicity | 1) Recheck chemical analyses and evaluate detection limits relative to reported toxic levels. 2) Verify toxicity test results; Consider additional advanced chemical analyses. 3) Toxicity tests at higher dilutions to better quantify |

Order 2007-0001 Assessment Process

- Permit requires WURMPS annually assess receiving waters (Section E.c of Order R9-2007-0001).
 - *“Assessment shall identify the WMA’s water quality problems that are partially or fully attributable to MS4 discharges”*
- Differences in new permit
 - Persistent exceedance shall mean exceedances of WQO, benchmarks, or action levels by a pollutant known to cause toxicity for two wet and/or two dry samples in a given year.
 - no such thing as a diamond system
 - Evidence of Benthic Alteration includes **Poor** and Very Poor IBI scores.
 - Persistent toxicity based on 50% at a given location in a given monitoring year.

Issues

- New monitoring design
 - More than one receiving water site per watershed
 - Ambient receiving water data
 - Different conditions assessed
 - Different benchmarks (wet and dry)
 - Lack of data (rotating monitoring design)
 - New data (no history)


Process

- Compared to benchmarks and action levels.
- Applied WMA assessment framework.
- Compared ambient conditions and wet conditions separately.

| COC Frequency of Occurrence | Criterion No. | Definition |
|-----------------------------|---------------|--|
| High ◆◆◆ | 1 | Mass loading station MLS or temporary watershed assessment station (TWAS) tests results exceed benchmark WQO in greater or equal to 80% of samples. |
| | 2 | The last six consecutive sample events at the MLS or TWAS exceed water quality benchmark. |
| | 3 | Less than 80% and greater than or equal to 50% of the MLS or TWAS samples exceed the water quality benchmark <u>and</u> at least one DWS exceedance in the past year. |
| | 4 | Less than 80% and greater than or equal to 50% of the MLS or TWAS samples exceed the water quality benchmark <u>and</u> a significant increasing trend is found. |
| Medium ◆◆ | 5 | Less than 80% and greater than or equal to 50% of the MLS or TWAS samples exceed the water quality benchmark <u>and</u> no exceedances or data available for DWS in the past year. |
| | 6 | Less than 80% and greater than or equal to 50% of the MLS samples exceed the water quality benchmark <u>and</u> one or more exceedances found in last 2 years of monitoring at the MLS or TWAS (generally applies to historical datasets). |
| | 7 | Greater than 50% of the DWS samples have exceedances in the past year. |
| Low ◆ | 8 | DWS exceedances in 10 to 50% of the samples in the past year. |
| | 9 | MLS or TWAS exceedances found in 25% to less than or equal to 50% of the samples <u>and</u> at least one exceedance found in last 2 years at the MLS or TWAS (with or without DWS exceedances in the past year). |
| | 10 | Greater than 50% of the MLS or TWAS samples have exceedances <u>and</u> no exceedances in the last 2 years at the MLS or TWAS. |
| Coastal Storm Drain Program | 11 | Persistent exceedances (greater or equal to 80% of samples). Add one ◆ to bacteria determination (up to three ◆ maximum for ambient conditions only). |

Note: Best professional judgment applies when unique situations arise (fewer samples at a site; sewage spills) and for toxicity once it is linked to a specific COC.

1. Definitions were updated to incorporate ambient data and TWAS data and associated new programs detailed in RWQCB Order No. R9-2007-0001.

| Los Peñasquitos WMA | | | | | | | | |
|--|---|-----|------------|--|---|------------------|---|---------------|
| Constituents With Any Ambient Receiving Water Benchmark or Dry Weather Action Level Exceedance |  Ambient Receiving Water Results at MLS and/or TWAS ² | | | | Urban Runoff Program Results ¹ | | Frequency of Occurrence | Criterion No. |
| | 2007/2008 | | CUMULATIVE | | 2007* | | | |
| | #/6 | % | #/6 | % | # | % | | |
| Conventional Parameters | | | | | | | | |
| Ammonia | 0 | 0 | 0 | 0 | 1 | 4 | - | - |
| Total dissolved solids | 6 | 100 | 6 | 100 | NA | NA | ◆◆◆ | 1 |
| Total suspended solids | 0 | 0 | 0 | 0 | NA | NA | - | - |
| Turbidity | 0 | 0 | 0 | 0 | 3 | 12 | ◆ | 8 |
| Nutrients | | | | | | | | |
| Orthophosphate | 0 | 0 | 0 | 0 | 1 | 4 | - | - |
| Bacteriological | | | | | | | | |
| Total coliform | 0 | 0 | 0 | 0 | 3 | 20 | ◆ | 8 |
| Fecal coliform | 0 | 0 | 0 | 0 | 2 | 13 | ◆ | 8 |
| Enterococci | 6 | 100 | 6 | 100 | 4 | 27 | ◆◆◆ | 1 |
| Pesticides | | | | | | | | |
| Diazinon | 0 | 0 | 0 | 0 | 0 | 0 | - | - |
| Toxicity | | | | | | | EVIDENCE OF PERSISTENT TOXICITY? | |
| <i>Ceriodaphnia</i> 7-day reproduction | 5 | 83 | 5 | 83 | NA | NA | Yes ³ | |
| <i>Selenastrum</i> 96-hour | 1 | 17 | 1 | 17 | NA | NA | No | |
| Bioassessment | IBI Rating | | | EVIDENCE OF BENTHIC ALTERATION? | | | | |
| Los Peñasquitos Creek, at Highway 805 ** | Very Poor | | Very Poor | | NA | Yes ³ | | |
| Los Peñasquitos Creek, at Springbrook Drive (LPC-TWAS-2) | Very Poor | | Very Poor | | NA | | | |
| Carroll Canyon Creek, at Sorrento Valley Road (LPC-TWAS-1) | Very Poor | | Very Poor | | NA | | | |

RW

DW

DW

DW

RW+DW

TIEs not warranted

¹ Urban Runoff Program results from Jurisdictional Dry Weather Program, Dry-Coastal Storm Drain Monitoring Program, Dry MS4 Outfall, and Dry Source ID Monitoring Programs.

² The TWAS located in Carroll Canyon drains to Los Peñasquitos Lagoon below the MLS.

* = Total number of observations varied among constituents.

NA = Not assessed, Not Applicable, or Not Analyzed.

- = 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.

³ Based on two of two toxic results at LPC-TWAS-1 and the MLS and one toxic result at LPC-TWAS-2.

Los Peñasquitos WMA



Wet Weather Receiving Water Results at MLS and/or TWAS²

| Constituents With Any Wet Weather Benchmark or Dry Weather Action Level Exceedance | Wet Weather Receiving Water Results at MLS and/or TWAS ² | | | | | | | | | | | | | | | | Urban Runoff Program Results ¹ | | Frequency of Occurrence | Criterion No. | | |
|--|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|---|----|-------------------------|---------------|--|--|
| | 2001/2002 | | 2002/2003 | | 2003/2004 | | 2004/2005 | | 2005/2006 | | 2006/2007 | | 2007/2008 | | CUMULATIVE | | 2007* | | | | | |
| | #/3 | % | #/3 | % | #/3 | % | #/3 | % | #/3 | % | #/3 | % | #/6 | % | #/24 | % | # | % | | | | |
| Conventional Parameters | | | | | | | | | | | | | | | | | | | | | | |
| COD | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | NA | NA | - | - | | |
| Ammonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | - | - | | |
| Total dissolved solids | 3 | 100 | 3 | 100 | 3 | 100 | 3 | 100 | 2 | 67 | 3 | 100 | 3 | 50 | 20 | 83 | NA | NA | ◆◆◆ | 1 | | |
| Total suspended solids | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 1 | 33 | 1 | 33 | 4 | 67 | 7 | 29 | NA | NA | ◆ | 9 | | |
| Turbidity | 0 | 0 | 2 | 67 | 0 | 0 | 1 | 33 | 1 | 33 | 1 | 33 | 5 | 83 | 10 | 42 | 3 | 12 | ◆ | 9 | | |
| Nutrients | | | | | | | | | | | | | | | | | | | | | | |
| Orthophosphate | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 1 | 4 | - | - | | |
| Bacteriological | | | | | | | | | | | | | | | | | | | | | | |
| Total coliform | 0 | 0 | 2 | 67 | 0 | 0 | 1 | 33 | 1 | 33 | 0 | 0 | 2 | 33 | 6 | 25 | 3 | 20 | ◆ | 9 | | |
| Fecal coliform | 1 | 33 | 3 | 100 | 1 | 33 | 3 | 100 | 3 | 100 | 3 | 100 | 5 | 83 | 19 | 79 | 2 | 13 | ◆◆◆ | 3 | | |
| Enterococci | 0 | 0 | 2 | 67 | 0 | 0 | 0 | 0 | 2 | 67 | 1 | 33 | 3 | 50 | 8 | 33 | 4 | 27 | ◆ | 9 | | |
| Pesticides | | | | | | | | | | | | | | | | | | | | | | |
| Chlorpyrifos | 0 | 0 | 2 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 0 | 0 | - | - | | |
| Diazinon | 2 | 67 | 1 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 13 | 0 | 0 | - | - | | |
| Toxicity | | | | | | | | | | | | | | | | | | | | | | |
| EVIDENCE OF PERSISTENT TOXICITY? | | | | | | | | | | | | | | | | | | | | | | |
| <i>Ceriodaphnia</i> 7-day reproduction | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 0 | 0 | 1 | 4 | NA | NA | No | | | |
| <i>Hyalella</i> 96-hour acute | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 75 | 3 | 14 | NA | NA | Yes ³ | | | |
| <i>Selenastrum</i> 96-hour | 2 | 67 | 0 | 0 | 1 | 33 | 0 | 0 | 2 | 67 | 1 | 33 | 0 | 0 | 5 | 21 | NA | NA | No | | | |
| Bioassessment | IBI Rating | | | | | | | | | | | | | | | | EVIDENCE OF BENTHIC ALTERATION? | | | | | |
| Los Peñasquitos Creek, at Highway 805 ** | Very Poor | Poor | Poor | 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 | | | | | |
| Los Peñasquitos Creek, at Springbrook Drive (LPC-TWAS-2) | 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 | Very Poor | NA | | | Yes | | |
| Carroll Canyon Creek, at Sorrento Valley Road (LPC-TWAS-1) | Very Poor | Poor | Poor | 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 | | | | | |

RW, MLS and TWAS-1 only
RW
RW+DW
RW+DW
RW
RW+DW

¹ Urban Runoff Program results from Jurisdictional Dry Weather Program, Wet MS4 Outfall, and Wet Source ID Monitoring Programs.

² The TWAS located in Carroll Canyon drains to Los Peñasquitos Lagoon below the MLS.

* = Total number of observations varied among constituents.

NA = Not assessed.

- = Constituent results are below the defined requirements for a Low Frequency of Occurrence rating.



◆ = Low Frequency of Occurrence rating.

◆◆ = Medium Frequency of Occurrence rating.

◆◆◆ = High Frequency of Occurrence rating.

³ Persistent toxicity triggered by two of two *Hyalella azteca* toxicity hits at LPC-TWAS-2 with no historical data to suggest otherwise. Synthetic pyrethroids were detected in levels sufficient to induce a toxic response to this organism based on published LC₅₀ values. This is common issue on a region wide and statewide basis in urban areas.

Los Peñasquitos WMA Integrated Watershed Management Area Assessment

| Assessment Category | Program | Frequency of Occurrence Assessment Findings | Persistent Toxicity Observed | Evidence of Benthic Impairment | Integrated WMA Assessment Summary |
|--|---------------------------------------|---|---|---|---|
|  Ambient | Ambient Receiving Water | MLS, TWAS, and Bioassessment Monitoring | ◆◆◆-TDS, enterococci | Yes (<i>C. dubia</i> reproductive endpoint at LPC-TWAS-1) | <p>TDS is identified as a high frequency of occurrence COC during both ambient and wet weather conditions. TDS is a known issue related to importation of drinking water, over-irrigation, and potential recycled water uses. Enterococci were identified as a high frequency of occurrence COC during ambient conditions. Both TWAS sites and MLS sites were above the benchmark during both monitoring events. Indicator bacteria may be related to dry weather runoff due to jurisdictional dry weather data exceedances. Bacterial re-growth in the receiving waters may occur during low velocity conditions.</p> <p>Low frequency of occurrence COCs were primarily related to dry weather monitoring data collected in the MS4 for turbidity, total coliform, and fecal coliform.</p> <p>Persistent toxicity was observed to the <i>Ceriodaphnia dubia</i> reproductive endpoint during both ambient events at the MLS and LPC-TWAS-1 sites. Toxicity was not observed at a level sufficient to warrant a toxicity identification evaluation (Survival was > 50% in the 100% sample) at either site during the Spring 2008 ambient event.</p> |
| | Ambient Urban Runoff Areas | Jurisdictional Dry Weather Monitoring, Coastal Storm Drain Monitoring, MS4 Program Data, Source Identification Monitoring | ◆-Turbidity, total coliform, fecal coliform | NA | |
|  Wet Weather | Wet Weather Receiving Water | MLS, TWAS, and Bioassessment Monitoring | ◆◆◆-TDS, fecal coliform ◆-Turbidity, total coliform, enterococci | Yes (<i>Hyalella azteca</i> at LPC-TWAS-2) | |
| | Wet Weather Urban Runoff Areas | MS4 Program Data and Source Identification Monitoring | (No data from the programs to date) | NA | |

* Note: MS4 Outfall Monitoring and Source Identification Monitoring Program data were not included in this assessment and will be incorporated in future data assessments.

Triad results

| Condition | Chemistry | Toxicity | Bioassessment* | Action |
|-----------------|---|---|----------------------------|--|
| Wet Weather | Persistent exceedance of water quality objectives (high frequency constituent of concern identified). Pyrethroids at LPC-TWAS-2 | Evidence of persistent toxicity. <i>Hyaella</i> at LPC-TWAS-2 | Indications of alteration. | Conduct TIE to identify contaminants of concern, based on TIE metric. (However, Pyrethroids are the likely source of toxicity based on chemistry results). Address upstream sources as a high priority. |
| Ambient Weather | No persistent exceedances of water quality objectives. | Evidence of persistent toxicity. (<i>C. dubia</i> reproductive endpoint at LPC-TWAS-1 | Indications of alteration. | Conduct TIE to identify contaminants of concern, based on TIE metric. (Not warranted at this time due to low levels of toxicity) Address upstream sources as a high priority. Address potential role of urban runoff causing physical habitat disturbance. |

| Watersheds/ Subwatersheds | Percentage of Total Area | Priority Ratings* | | | | | | | | | | | |
|---|-----------------------------|--------------------|-----------------------|----------|-------------------|-----------|------------|-----------|---------------------|--------------------------|------------------------|---|--|
| | | Constituent Groups | | | | | | | | | | Stressor Groups | |
| | | Heavy Metals | Dissolved Minerals | Organics | Oil and Grease | Sediments | Pesticides | Nutrients | Gross Pollutants | Bacteria/ Pathogens | Benthic Alterations | Toxicity | |
| Los Peñasquitos WMA | 100% | D | A | D | D | A | D | D | D | A | A | C | |
| Miramar Reservoir HA (906.10) | 55% | C | A | D | D | A | D | C | C | A | A | C | |
| Poway HA (906.20) | 45% | D | A | D | D | C | D | D | D | B | B | C | |
| 2006–2008 High Frequency of Occurrence COCs (from WMA Integrated Assessment) | | | | | | | | | | | | | |
| 2006–2007 High ¹ Frequency of Occurrence Ratings | | | ◆◆◆ TDS | | | | | | | | | | |
| 2007–2008 High ¹ Frequency of Occurrence Ratings | Wet Weather | | ◆◆◆ TDS | | | | | | | ◆◆◆ Fecal coliform | Very Poor IBI | Persistent Toxicity to <i>H. azteca</i> (TWAS- 2) | |
| | Ambient | | ◆◆◆ TDS | | | | | | | ◆◆◆ Enterococci | Very Poor IBI | Persistent Toxicity to <i>C. dubia</i> reproduc- tion (TWAS- 1) | |

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 subwatershed areas.

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

High-Priority Level Based on Data

2006 SWRCB Section 303d listing