

TABLE OF CONTENTS

| | | |
|------|---|------|
| 2.0 | 2008–2009 SCOPE OF WORK..... | 2-1 |
| 2.1 | Mass Loading Station Monitoring | 2-2 |
| 2.2 | Rapid Stream Bioassessment Monitoring and SMC Regional Bioassessment Program | 2-7 |
| 2.3 | Toxicity Identification Evaluations..... | 2-10 |
| 2.4 | Ambient Bay and Lagoon Monitoring..... | 2-11 |
| 2.5 | Bight '08 Regional Lagoon/Estuary Monitoring | 2-11 |
| 2.6 | Dry Weather Monitoring..... | 2-12 |
| 2.7 | Coastal Storm Drain Monitoring | 2-13 |
| 2.8 | Synthetic Pyrethroid Monitoring | 2-13 |
| 2.9 | MS4 Outfall Monitoring | 2-14 |
| 2.10 | Source Identification Monitoring..... | 2-15 |
| 2.11 | Annual Reporting..... | 2-16 |

LIST OF FIGURES

| | |
|--|-----|
| Figure 2-1. Regional Monitoring Stations during Permit Year 2008–2009 (Bight '08 Monitoring Year) | 2-3 |
|--|-----|

LIST OF TABLES

| | |
|--|-----|
| Table 2-1. List of Monitoring Stations' Latitudes and Longitudes | 2-4 |
| Table 2-2. Analytical Requirements for Mass Loading Stations | 2-6 |
| Table 2-3. 2009 Stormwater Monitoring Coalition Bioassessment Station Locations..... | 2-8 |
| Table 2-4. 2009 Stormwater Monitoring Coalition Bioassessment Analytes and Reporting Limits | 2-9 |

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2008–2009 Scope of Work

2.0 2008–2009 SCOPE OF WORK

This section presents a description of activities that were completed during the 2008–2009 monitoring year by the San Diego County Copermittees to comply with the Receiving Waters and Urban Runoff Monitoring and Reporting Program Number R9-2007-0001 (Order). Permit year two (October 1, 2008–September 30, 2009) of the Order was used as the basis for these activities. The 2008-2009 monitoring year occurred during the Bight '08 monitoring organized by the Southern California Coastal Water Research Project (SCCWRP). The Permit allowed the Copermittees the option to participate in the Bight '08 Monitoring Program with reduced compliance monitoring requirements.

Monitoring occurred at the historical mass loading stations (MLS) and in Chollas Creek as outlined in Table 1 of Section II.A.1(a) of the Order. The following monitoring activities were conducted by the Copermittees during the 2008–2009 Monitoring Season and are described in detail in each subsection:

- Mass loading station (MLS) monitoring occurred during one wet weather event.
- Participated in the SMC 2009 Regional Bioassessment and Water Quality Monitoring Survey.
- Toxicity identification evaluations (TIEs).
- Bight '08 Coastal Ecology Monitoring
- Coastal storm drain monitoring (CSDM).
- Synthetic pyrethroid monitoring.
- Municipal separate storm sewer system (MS4) outfall monitoring.
- Source identification monitoring.
- Annual reporting.

Each element of monitoring is designed to answer the five core management questions. The core management questions, as listed in the Permit, are presented as follows:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative urban runoff contribution to the receiving water problem(s)?
4. What are the sources of urban runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

2.1 Mass Loading Station Monitoring

Monitoring was conducted at 11 historical MLS. Activities include installing and maintaining equipment to perform flow monitoring and sampling during the monitoring year.

Chemical, bacteriological, and toxicity testing was performed during one wet weather storm event from the 11 MLS as outlined in Table 2 of the Order. Wet weather monitoring occurred during the first rainfall event meeting the criteria, on or after October 1, 2008. Trash assessments were conducted at each site in accordance with the Monitoring Work Plan for the Assessment of Trash in San Diego County (WESTON, 2007a). Additionally, the flow-weighted composite water sample collected from the MLS located at the base of the San Dieguito River Watershed was analyzed for PAHs, sulfate, and mercury as part of post fire storm monitoring efforts conducted during the 2007–2008 Monitoring Season. Figure 2-1 illustrates the MLS monitoring locations for the 2008–2009 Monitoring Season.

Temporary watershed assessment stations were not monitored during the 2008–2009 season due to participation in the Bight '08 Monitoring Program as indicated in Table 1 of the Order.

Season Mobilization and Demobilization of MLS Monitoring Sites

MLS were installed and maintained to perform flow monitoring and sampling during the monitoring year (approximately September 1–June 30). Flow monitoring data were collected throughout the monitoring season for the purposes of estimating annual watershed loads.

Stream Ratings

Stream ratings were performed using U.S. Geological Service (USGS) stream rating techniques. MLS channels were initially surveyed, and rating curves were developed using appropriate flow equations. During wet weather monitoring events, stream velocities were measured using an acoustic Doppler current profiler (ADCP) to calibrate the upper range of the rating curve for each site. Ratings curves may require periodic validation or re-calibration based on channel dimensions that may shift due to channel bed erosion or deposition throughout the year. Regular station maintenance activities include periodic stream ratings as needed.

Water Quality Monitoring at 11 Mass Loading Stations (MLS) During One Wet Weather Flow Event

Each MLS was monitored one time during the wet weather monitoring season (defined as October 1st through April 30th) per the Order during the 2008–2009 Monitoring Season. The MLS is to be monitored and sampled during the first viable rainfall event of the monitoring season. A viable storm event is considered a minimum of 0.1 inch of rainfall. Each storm of at least 0.1 inch of rainfall must be separated by a minimum of 72 hours of rainfall, and the forecasted storm volume must be within $\pm 50\%$ of the average storm volume and duration for the region. This monitoring will be performed in accordance with Table 1 of the Order. This task is to comply with monitoring year two of the permit cycle. Monitoring was performed at the 11 MLS sites shown on Figure 2-1.



Figure 2-1. Regional Monitoring Stations during Permit Year 2008–2009 (Bight '08 Monitoring Year)

2008–2009 Scope of Work

The Santa Margarita River MLS is monitored by U.S. Marine Corps Base Camp Pendleton. However, Camp Pendleton is not a co-permittee, therefore the co-permittees conducted monitoring in the unincorporated area of the County of San Diego upstream of the Camp Pendleton fenceline to ensure permit.

A total of 11 MLS sites were monitored (historical site locations were used with the exception of Santa Margarita):

- Santa Margarita River
- San Luis Rey River
- Agua Hedionda Creek
- Escondido Creek
- San Dieguito River
- Los Peñasquitos Creek
- Tecolote Creek
- San Diego River
- Chollas Creek
- Sweetwater River
- Tijuana River

A summary of the MLS and their respective latitude and longitudes is provided in Table 2-1.

Table 2-1. List of Monitoring Stations' Latitudes and Longitudes

| Watershed | Station Identifier | Latitude | Longitude |
|-----------------------|--------------------|------------|--------------|
| Santa Margarita River | SMR-MLS-2 | 33.3981420 | -117.2627300 |
| San Luis Rey River | SLR-MLS | 33.2206476 | -117.3582502 |
| Agua Hedionda | AHC-MLS | 33.1495195 | -117.2970815 |
| Escondido Creek | EC-MLS | 33.0482901 | -117.2260318 |
| San Dieguito River | SDC-MLS | 32.9990817 | -117.2056250 |
| Los Peñasquitos | LPC-MLS | 32.9045977 | -117.2226197 |
| Tecolote Creek | TC-MLS | 32.7729332 | -117.2030638 |
| San Diego River | SDR-MLS | 32.7652404 | -117.1686167 |
| *Chollas Creek | CC-SD8(1) | 32.7048179 | -117.1209628 |
| Sweetwater River | SR-MLS | 32.6507197 | -117.0635923 |
| Tijuana River | TJR-MLS | 32.5513062 | -117.0840495 |

*Monitoring is required during every year of the permit in Chollas Creek.

The sampling and analyses conducted for the MLS, summarized in Table 2-2 and described in further detail in the Sampling and Analysis Methods Section (Appendix B), is in accordance with applicable USEPA regulation and guidance. One flow-weighted composite was collected by autosampler, and field personnel collected one grab sample. Flow-weighted composite samples

were collected during representative flow conditions. Trash assessments were conducted during monitoring events at each MLS in accordance with the Monitoring Work Plan for the Assessment of Trash in San Diego County (WESTON, 2007a).

Flow-weighted composite samples were collected and analyzed for the following parameters:

- **Inorganic Chemicals**—Ammonia, total and dissolved organic carbon, total and dissolved phosphorus, nitrate, nitrite, total hardness, total kjeldahl nitrogen (TKN), total dissolved solids (TDS), total suspended solids (TSS), turbidity, methylene blue active substances (MBAS), and chemical oxygen demand (COD).
- **Metals (total metals and dissolved metals)**—Antimony, Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, and Zinc.
- **Organophosphate Pesticides**—Diazinon, Chlorpyrifos, and Malathion.
- **Synthetic Pyrethroids (storm events only)**—Allethrin, Bifenthrin, Cyfluthrin, Cypermethrin, Danitol, Deltamethrin, L-Cyhalothrin, Permethrin, and Prallethrin.
- **Toxicity Testing**—Using *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*.
- **Organics (Chollas Creek only)**—Polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and Chlordane (for Permit, Section II.A.1.h, compliance).
- **Post-Fire Storm Analyses**—Conducted at the San Dieguito MLS for PAHs, sulfate, and mercury.

Grab samples were analyzed for the following parameters:

- Field measurements of grab samples include temperature, pH, and specific conductance.
- Laboratory measurements were conducted on grab samples for biological oxygen demand (BOD), oil and grease (O&G), total coliform, fecal coliform, and enterococcus.

The MLS equipment installed and monitored for storm events remained in place during the course of the wet weather season. Continual flow data was downloaded remotely from each site on a monthly basis to provide a better understanding of flow estimates for pollutant loading information. Equipment was maintained throughout this period to ensure proper operation.

Table 2-2. Analytical Requirements for Mass Loading Stations

| Constituent | Volume Required | Method | Target Reporting Limit | Units | Max Holding Time |
|---|-----------------|------------------|------------------------|-----------|------------------|
| General Physical and Inorganic Non-Metals | | | | | |
| TDS | 100 mL | SM 2540C | 20 | mg/L | 7D |
| TSS | 100 mL | SM2540D | 20 | mg/L | 7D |
| Turbidity | 100 mL | SM 2130A-B | 0.1 | NTU | 48H |
| Total hardness | 150 mL | SM 2340B | 10 | mg/L | 6M |
| pH (field) | In field | EPA 150.1 | 0.1 | S.U. | - |
| Specific conductance (field) | In field | SM 2510B | 1 | umhos/cm | - |
| Temperature (field) | In field | Meter | - | - | - |
| Dissolved phosphorus | 250 mL | SM 4500PE | 0.05 | mg/L | 48H |
| Total phosphorus | 250 mL | SM 4500PE | 0.05 | mg/L | 28D |
| Nitrate | 200 mL | SM4500NO3E | 0.1 | mg/L | 48H |
| Nitrite | 200 mL | SM4500NO2B | 0.05 | mg/L | 48H |
| TKN | 500 mL | SM4500C | 0.1 | mg/L | 28D |
| Ammonia | 250 mL | SM 4500NH3D | 0.1 | mg/L | 28D |
| BOD, five-day (grab only) | 1000 mL | SM5210B | 2 | mg/L | 48H |
| COD | 25 mL | EPA 410.4 | 25 | mg/L | 28D |
| Total organic carbon (TOC) | 125 mL | SM 5310 B | 1 | mg/L | 28D |
| Dissolved organic carbon (DOC) | 125 mL | SM 5310 B | 1 | mg/L | 28D |
| Organics | | | | | |
| O&G (grab only) | 500 mL | EPA 1664 | 5 | mg/L | 14D |
| Diazinon | 1 liter | EPA 625 | 0.05 | µg/L | 14D |
| Chlorpyrifos | 1 liter | EPA 625 | 0.05 | µg/L | 14D |
| Malathion | 1 liter | EPA 625 | 0.05 | µg/L | 14D |
| Synthetic pyrethroids (storm events only) | 1 liter | GC/MS NCI | 0.005 | µg/L | 7 D |
| MBAS | 250 mL | Mode SM 5540C | 1 | mg/L | 48H |
| Chollas Creek Only (additional methods) | | | | | |
| PCBs | 1 liter | EPA 625 | 0.020 | µg/L | 14D |
| Chlordane | 1 liter | EPA 625 | 0.005 | µg/L | 14D |
| PAHs | 1 liter | EPA 625 | 0.10 | µg/L | 14D |
| Metals – Total and Dissolved | | | | | |
| Antimony (Sb) | 75 mL | EPA 200.8 | 0.002 | mg/L | 6M |
| Arsenic (As) | 75 mL | EPA 200.8 | 0.001 | mg/L | 6M |
| Cadmium (Cd) | 75 mL | EPA 200.8 | 0.001 | mg/L | 6M |
| Chromium (Cr) | 75 mL | EPA 200.8 | 0.005 | mg/L | 6M |
| Copper (Cu) | 75 mL | EPA 200.8 | 0.001 | mg/L | 6M |
| Lead (Pb) | 75 mL | EPA 200.8 | 0.001 | mg/L | 6M |
| Nickel (Ni) | 75 mL | EPA 200.8 | 0.002 | mg/L | 6M |
| Selenium (Se) | 75 mL | EPA 200.8 | 0.002 | mg/L | 6M |
| Zinc (Zn) | 75 mL | EPA 200.8 | 0.02 | mg/L | 6M |
| Bacteriological | | | | | |
| Total coliform | 200 mL | SM 9221B | 20-1.6 mil. | MPN/100mL | 6H |
| Fecal coliform | 200 mL | SM9221E | 20-1.6 mil. | MPN/100mL | 6H |
| Enterococcus | 200 mL | SM 9230 | 20-1.6 mil. | MPN/100mL | 6H |
| Toxicity | 10 liters | - | - | - | 36H |
| 96-hr acute and seven-day chronic and reproductive test with the cladoceran <i>Ceriodaphnia dubia</i> | | | | | |
| Chronic test with the freshwater algae <i>Selenastrum capricornutum</i> | | | | | |
| 96-hr acute survival test with the amphipod <i>Hyaella azteca</i> . | | | | | |

The MLS monitoring answers core management questions 1, 2, 3, and 5. While some source information can be gained, this monitoring does not lend itself to interpreting direct relationship to the MS4 where most source tracking programs occur. However, the program is designed to provide needed information and works in tandem with the MS4 Monitoring Program, described in Subsection 2.8.

2.2 Rapid Stream Bioassessment Monitoring and SMC Regional Bioassessment Program

Rapid stream bioassessment monitoring was not conducted as part of the standard monitoring program due the Copermittees participation in the Bight '08 Monitoring Program. However, the Copermittees also contributed in-kind services to the recently implemented SMC Regional Bioassessment and Water Quality Monitoring Survey initiated during Spring 2009.

Program Description:

The SMC Regional Watershed Monitoring Program is a Southern California integrated monitoring program that was designed by the Bioassessment Working Group to answer the following questions:

1. What is the condition of streams in Southern California?
2. What are the major stressors to aquatic life?
3. Are conditions in locations of special interest getting better or worse?

The program intends to answer these questions through sampling and analysis of receiving waters in five major categories:

- Benthic macroinvertebrates.
- Benthic algae.
- Toxicity.
- Chemistry.
- Physical habitat analysis.

A probabilistic sample design is incorporated which selects monitoring sites randomly. The study area occurs in the coastal ranges watersheds from Santa Clara and Ventura in the north to San Diego in the south. Sampling will be conducted annually for a total of five years with sample collection efforts occurring in the period from late April through early July of each year. Participants include current NPDES permit holders, Regional Water Quality Control Board monitoring programs, Surface Water Ambient Monitoring Program (SWAMP), and the California Department of Fish and Game. The data collected will also be included in the statewide Perennial Stream Assessment (PSA) monitoring program. The current project workplan is available upon request (SCCWRP Technical Report 539, December, 2007).

2008–2009 Scope of Work

The San Diego Region was included in the sample design as four discreet regions described below with the watershed management areas listed:

- Northern San Diego (Santa Margarita River and San Luis Rey River WMAs).
- Central San Diego (Carlsbad and Los Peñasquitos River WMAs).
- Mission Bay and San Diego River (Mission Bay and La Jolla and San Diego River WMAs).
- Southern San Diego (San Diego Bay and Tijuana River WMAs).

The program has selected three strata for evaluation (i.e., Urban, Agriculture, and Open Space).

The San Diego Copermittees conducted bioassessment and water quality monitoring at 16 randomly selected stations throughout San Diego's watersheds in coordination with the SMC Program. Prior to the start of the field survey, site reconnaissance was performed to determine the final random site list. Many of the randomly selected sites were rejected due to a lack of water, access denial by private property owners, remoteness, or safety reasons. Final samples locations for the 2009 monitoring year are shown in Table 2-3.

Table 2-3. 2009 Stormwater Monitoring Coalition Bioassessment Station Locations

| Watershed Management Area | Stream Name | Latitude | Longitude | SMC Strata |
|---------------------------|--------------------|----------|------------|----------------------|
| San Luis Rey | Key's Creek | 33.31129 | -117.13885 | Northern Agriculture |
| San Luis Rey | Moosa Canyon | 33.23370 | -117.09392 | Northern Agriculture |
| San Luis Rey | San Luis Rey River | 33.34015 | -117.13233 | Northern Agriculture |
| San Luis Rey | San Luis Rey River | 33.22193 | -117.34612 | Northern Urban |
| Carlsbad | San Marcos Creek | 33.13525 | -117.17489 | Central Urban |
| San Dieguito River | San Dieguito | 33.03917 | -117.15803 | Central Urban |
| Los Peñasquitos | Los Peñasquitos | 32.93710 | -117.13851 | Central Urban |
| Los Peñasquitos | Soledad Canyon | 32.88934 | -117.20028 | Central Urban |
| Los Peñasquitos | McGonigle Cyn | 32.96281 | -117.16676 | Central Agriculture |
| Mission Bay and La Jolla | Tecolote | 32.79510 | -117.18495 | Mission Bay Urban |
| Mission Bay and La Jolla | Rose Creek | 32.84199 | -117.23481 | Mission Bay Urban |
| San Diego River | Murphy Canyon | 32.79654 | -117.11327 | Mission Bay Urban |
| San Diego River | Forester Creek | 32.83083 | -116.98486 | Mission Bay Urban |
| San Diego River | San Diego River | 32.83698 | -117.01875 | Mission Bay Urban |
| Sweetwater River | Sweetwater River | 32.64950 | -117.05887 | Southern Urban |
| Sweetwater River | Sweetwater River | 32.87181 | -116.61358 | Southern Open |

Prior to the start of the field survey, training sessions included the following:

- Site reconnaissance instruction to standardize site acceptance/rejection criteria (March 19, ½ day).
- Training in the California Rapid Assessment Method (CRAM) for riverine wetlands (April 7–9, 2009).

2008–2009 Scope of Work

- Field audit for physical habitat analysis (April 16, 2009).
- Training in the new benthic algae collection protocol (April 16, 2009).
- Information management seminar (April 23, 2009).

Field and Laboratory Activities:

The standard sampling and analytical methodologies include the SWAMP protocol for collection of benthic macroinvertebrates and physical habitat analysis, the SCCWRP benthic algae protocol for algae collection, the California Rapid Assessment Method (CRAM) protocol for wetland quality assessment, and SWAMP general methods for water sample collection. Sampling efforts were performed in accordance with the SMC Quality Assurance Project Plan.

Laboratory identifications of benthic macroinvertebrates followed the SAFIT level II guidelines. Maintenance of a project reference collection (representative specimens of each unique taxon identified) were required by each participating laboratory. Samples were collected for chemistry, benthic algae, and toxicity. The analytical constituents monitored are listed in Table 2-4.

Laboratories:

Laboratories conducting analyses for the SMC Regional Watershed Monitoring Program participated in successful completion of the SMC laboratory intercalibration exercise. The following laboratories were used in this project:

- CRG Marine Labs – Chemistry, Benthic Algae Chlorophyll-a, and AFDM.
- Weston Solutions, Inc. Toxicology Laboratory – Toxicity.
- Weston Solutions, Inc. Benthic Laboratory – Benthic sorting and taxonomy.
- California Department of Fish and Game Lab – Taxonomic QA.

Table 2-4. 2009 Stormwater Monitoring Coalition Bioassessment Analytes and Reporting Limits

| Target Analytes | Units | Reporting Limits |
|-----------------------------|---------------------------|------------------|
| Temperature | °C | -5 |
| Salinity | PPT | 0.5 |
| Conductivity | umhos/cm | 1 |
| Dissolved Oxygen | mg/L | 0.5 |
| pH | Units | 0.5 |
| Alkalinity (Weston Tox Lab) | mg/L | 1 |
| Conventionals | | |
| TSS | mg/L | 1 |
| Hardness | mg/L as CaCO ₃ | 5 |
| Major Ions | | |
| Chloride | mg/L | 1 |
| Sulfate | mg/L | 1 |
| Silica | mg/L | 1 |
| Nutrients | | |
| Nitrate | mg/L as N | 0.1 |
| Nitrite | mg/L as N | 0.1 |

**Table 2-4. 2009 Stormwater Monitoring Coalition Bioassessment
Analytes and Reporting Limits**

| Target Analytes | Units | Reporting Limits |
|---|--------------------|------------------|
| Ammonia | mg/L | 0.1 |
| Total N (TKN+NO ₂ +NO ₃) | mg/L | 0.2 |
| Total Phosphorus | mg/L | 0.05 |
| Orthophosphate | mg/L as P | 0.05 |
| Metals (Total + Dissolved) | | |
| Arsenic | µg/L | 1 |
| Cadmium | µg/L | 0.2 |
| Chromium | µg/L | 0.5 |
| Copper | µg/L | 0.5 |
| Lead | µg/L | 0.5 |
| Nickel | µg/L | 1 |
| Selenium | µg/L | 1 |
| Zinc | µg/L | 1 |
| Synthetic Pyrethroids | | |
| Cyfluthrin | µg/L | 0.01 |
| Cyhalothrin-lambda | µg/L | 0.01 |
| Cypermethrin | µg/L | 0.01 |
| Deltamethrin | µg/L | 0.01 |
| Esfenvalerate | µg/L | 0.01 |
| Fenvalerate | µg/L | 0.01 |
| Permethrin | µg/L | 0.01 |
| Benthic Algae Parameters | | |
| Chlorophyll-a | mg/M ³ | 2 |
| AFDM | g/M ² | 0.05 |
| Diatom Taxonomy | NA | |
| Soft Algae Taxonomy | NA | |
| Live Algae Taxonomy | NA | |
| Toxicity | | |
| Ceriodaphnia Acute Screening (100% strength only) | LC ₅₀ % | - |
| Ceriodaphnia Chronic Screening (100% strength only) | LC ₅₀ % | - |

2.3 Toxicity Identification Evaluations

Toxicity identification evaluations (TIEs) were planned to be performed using Phase I confirmatory TIEs if toxicity was observed at Agua Hedionda Creek during the first rainfall event. However, no toxicity was observed during the monitoring event and no TIE was conducted as part of the MLS monitoring.

TIEs were conducted as part of Bight '08 Monitoring for the species *Mytilus galloprovincialis* due to observed toxicity in sediment samples collected from Batiquitos Lagoon, San Diego River

2008–2009 Scope of Work

Estuary, and Tijuana River Estuary. The TIEs conducted during Bight '08 are described in more detail in the Bight '08 results sections where applicable.

TIEs provide information to answer core management questions 2 and 4. TIEs are used primarily to answer specific questions related to identifying the causes of toxicity.

2.4 Ambient Bay and Lagoon Monitoring

The Copermittees were not required to conduct the ABLM Program identified in the Order during the 2007–2008 Monitoring Season. The Regional Water Quality Control Board (RWQCB) provided a letter to the Copermittees dated June 12, 2008, detailing the tradeoff of resources from the ABLM requirement for the 2007–2008 monitoring period which would then be committed to the Bight '08 eutrophication study in San Diego Lagoons (RWQCB WPS Place Number 710562; Ibusse, 2008). The Copermittees agreed to contribute funds to the Bight '08 Eutrophication Study detailed in the Copermittees 2008–2009 Scope of Work. The ABLM Program was further developed during the 2008–2009 Monitoring Season following a review of the Bight '08 Monitoring Program results. The Copermittees developed the Ambient Bay and Lagoon Monitoring 2010-2012 Workplan through a collaborative process and submitted the details in the 2009-2010 Scope of Work.

2.5 Bight '08 Regional Lagoon/Estuary Monitoring

The Copermittees participated in the Southern California Bight 2008 Regional Monitoring Program (Bight 08) in lieu of conducting the complete regional stormwater monitoring requirements during the 2008-2009 Monitoring Season as allowed in the Order (and as stated above). In accordance with Table 1 of Section II. A.1.a of the permit, Temporary Watershed Assessment Station Monitoring, Bioassessment Monitoring, and Ambient Bay and Lagoon Monitoring are not required.

The Copermittees contributed in-kind services and funds for three separate Bight '08 studies (Sediment Quality, Coastal Wetland Eutrophication, and Coastal Microbiology). The San Diego County Municipal Copermittees developed a San Diego Regional Bight 2008 Coastal Estuary Workplan. The Copermittees also supported the coastal wetland study in lieu of 2007–2008 Ambient Bay and lagoon Monitoring as permitted by the June 12, 2008 letter to the County of San Diego from Mr. John Robertus of the San Diego eQCB. The Coastal Microbiology Workplan was still under development during the 2008–2009 Monitoring Season. For the purposes of this report, the Copermittees are reporting on Sediment Quality from the regions lagoons/estuaries.

The Copermittees selected eight lagoons/estuaries in the San Diego Region for inclusion in the Bight '08 program and are presented as follows:

- Santa Margarita Lagoon.
- Agua Hedionda Lagoon.
- Batiquitos Lagoon.

2008–2009 Scope of Work

- San Elijo Lagoon.
- Los Peñasquitos Lagoon.
- San Diego River Estuary.
- Sweetwater River Estuary.
- Tijuana River Estuary.

The Copermittees Bight 2008 Workplan was designed to provide data needed to answer questions related to the Southern California Bight, the San Diego Region, and the individual lagoons of study. San Diego Copermittees utilized a longitudinal-transect study to investigate changes in sediment conditions with greater distances from freshwater-input areas of lagoons. Lagoons were partitioned into five segments and sampling stations were located using a tessellated random sampling design consistent with Bight protocols. Sediment samples were collected and analyzed for chemistry, toxicity, and benthic community assemblages. Data were assessed using the recently developed sediment quality objectives. Surface water quality monitoring of bacteria and TSS during sediment sampling events also provide an assessment of ambient water quality in the lagoons during the summer months. The lagoon sediment sampling commenced in July 2008 and continued through September 2008 for consistency with the SCCWRP Bight '08 Program.

The Bight '08 Monitoring Program (Lagoon/Estuary Program) answers core management questions 1, 2, 3, and 5. While some source information can be gained, this monitoring does not lend itself to interpreting direct relationship to the MS4 where most source tracking programs occur. However, the program is designed to provide needed information and works in tandem with the receiving water monitoring conducted at the MLS and TWAS.

2.6 Dry Weather Monitoring

Each jurisdiction conducts a separate Dry Weather Monitoring Program described in each Jurisdictional Urban Runoff Management Program Annual Report. Dry weather samples are collected from the jurisdictions' MS4 to detect and eliminate illicit discharges and illegal connections. Samples are collected from May 1–September 30 each permit year. The results from each of the individual dry weather monitoring programs are compiled into a regional data-sharing format at the conclusion of the dry weather monitoring season. These results are then included in the data assessment framework presented in each watershed assessment section. The results of the 2008 Dry Weather Monitoring Program were included in this report's data assessment and provide a comparison of urban runoff in the MS4 to the ambient and storm event receiving water condition.

The Dry Weather Monitoring Program primarily answers core management questions 3 and 4 which address urban runoff discharges in the MS4. The Dry Weather Monitoring Program data partially answers core management questions 1, 2, and 5 and is primarily limited to the MS4 system.

2008–2009 Scope of Work

2.7 Coastal Storm Drain Monitoring

Each coastal jurisdiction participates in the Coastal Storm Drain Monitoring (CSDM) Program. The purpose of the CSDM Program is to detect and eliminate illicit discharges and illegal connections resulting in coastal beach closures for bacteria. Samples are collected from outfalls and receiving waters and are analyzed for fecal indicator bacteria (total coliform, fecal coliform, and enterococcus) in accordance with the CSDM Program Work Plan (SDCRC, 2008a).

The results from the CSDM Program are provided annually as a separate report (Appendix J). The reporting period of the CSDM Program occurs from October 1 through September 30 of each monitoring year. For the purposes of assessing the data in the data assessment framework and for comparing with other relevant monitoring programs, the CSDM data from May 1, 2008 through April 30, 2009, were assessed. Data from May 1 through September 30 provide an assessment of dry weather urban runoff conditions. Data from September 30 through April 30 provide an assessment of wet weather urban runoff conditions.

The CSDM Program primarily answers the core management questions 3 and 4 which address urban runoff discharges and the relation to receiving water impairments. Because samples are also collected in the receiving water, questions 1, 2, and 5 can also be answered. The use of this data to answer core management questions 1, 2, and 5 is limited to the areas where paired samples are collected and only applies to bacterial data.

2.8 Synthetic Pyrethroid Monitoring

Synthetic pyrethroids are pesticides currently used to control termites, ants, and for other insects such as mosquitoes, roaches, and spiders. These pesticides are currently available commercially as well as over the counter and have replaced the use of the organophosphate pesticides Chlorpyrifos and Diazinon which were banned in 2004 and 2005, respectively, from retail sale and commercial uses.

In order to measure and assess the presence of synthetic pyrethroids in receiving waters, the Copermittees developed the Monitoring Work Plan for the Assessment of Synthetic Pyrethroids in San Diego County (WESTON, 2007b). The work plan was developed in response to the permit requirements outlined in Section II.A.7 of the Order. The work plan specified that water samples would be collected and analyzed as part of the standard analytical list for storm water sampling events. Because pyrethroids are associated with sediments typically related to high-velocity flows (e.g., during storm events), dry weather ambient flows were not analyzed for pyrethroids; however, post-storm sediment samples were collected after the first major storm event of the season to assess the presence of synthetic pyrethroids in receiving waters.

Sediment samples were collected within two weeks following the first monitored storm of the season from the base of the major watersheds in San Diego County (11 MLS and 4 TWAS). (total of 15 sites). These samples were analyzed for synthetic pyrethroids, TOC, and grain size distribution. Samples were collected in accordance with the Monitoring Work Plan for the

Assessment of Synthetic Pyrethroids in San Diego County (WESTON, 2007b). Post-storm sediment sampling will occur over the five-year permit cycle.

Synthetic pyrethroid monitoring answers the core management questions 1, 2, 3, and 5 which address beneficial use impacts in relation to urban runoff. Synthetic pyrethroid monitoring also answers core management question 4 which addresses sources of urban runoff that are contributing to receiving water problems.

2.9 MS4 Outfall Monitoring

During the 2007–2008 Monitoring Season, the Copermittees collaboratively developed the MS4 Outfalls Monitoring Program in San Diego County Watershed Management Areas (SDCRC, 2008b). The purpose of this program is to characterize pollutant discharges from MS4 outfalls in each watershed during wet and dry weather as required by Section II.B.1 of the Order. The program uses a stratified random sample approach for a regional evaluation of the MS4 outfalls and a targeted approach at the watershed level. The Regional Monitoring Program conducted the random sampling element. Jurisdictions collected the targeted samples and sent them for analysis by an analytical laboratory.

The regional stratified random approach evaluated outfalls 36" (inches) in diameter and larger. Samples collection goals are set to six random sites per watershed management area (WMA) from nine WMAs over the course of a monitoring season. Samples were collected during dry events (target of 54 total per year) and wet weather events (target of 54 total per year). During a sampling event, one grab sample was collected from one random location per WMA for a total of nine samples per monitoring event. A total of six dry monitoring events and six wet weather monitoring events are needed to provide a sample size of 54 per seasonal type (dry or wet). Over a 5-year period a total of 30 samples per WMA will be collected, which may be used for assessment of the MS4s of a watershed.

The random MS4 Outfall Monitoring Program was conducted by the Regional Monitoring Program. Random sampling was conducted to address the following subquestions:

1. What are the characteristics of the discharges from MS4 outfalls in regard to high-priority pollutants?
2. Are constituent loadings changing over time?

The probability-based design in which stations are located randomly provides the ability to draw statistically valid inferences regarding the region as a whole, rather than just the station itself. In the design the region is divided into nine strata that are each defined by a WMA. The six samples are selected randomly within each strata or WMA for each year of monitoring.

The targeted MS4 Outfall Monitoring Program was conducted by each jurisdiction during Summer 2009. Targeted sampling was conducted to address the following subquestions:

1. Which of the targeted MS4 outfalls have the greatest pollutant loading?
2. Are the pollutant loadings decreasing from these MS4 outfalls?

Targeted sampling is conducted to assess the relative contribution of a particular constituent discharged from MS4 outfalls to the high-priority problems of the receiving waters. The site-specific station design of the targeted program will generate information to support source prioritization in each WMA and will assess constituent trends over time. Through a consensus-building workshop process, the Regional Monitoring Workgroup proposed to collect 200 discharge samples from targeted MS4 outfalls in the region. The choice of 200 was based on the realistic number of MS4 outfalls that have water during dry weather and are most likely to contribute to receiving waters problems in the region. To fairly distribute the 200 samples across the region, a formula based on population and land area within a WMA was used.

MS4 outfall monitoring primarily answers the core management questions 3 and 4, which address urban runoff discharges and the relation to receiving water impairments.

2.10 Source Identification Monitoring

During the 2007–2008 Monitoring Season, the Copermittees collaboratively developed the Source Identification Program as a framework document. This program was implemented during the 2008–2009 Monitoring Season. The goal of this monitoring program is to identify and assess the sources of discharges of constituents related to urban runoff causing high priority water quality problems in the receiving water(s) within each WMA.

For the 2008–2009 Monitoring Season, the Copermittees developed and implemented the 2008–2009 Source Identification Monitoring, Residential Area Runoff Assessment. The study was conducted in the City of La Mesa and the City of Del Mar. Both study areas focus on predominantly single-family residential neighborhoods. The La Mesa study will include a small area of commercial and industrial development that will be analyzed separately and provide additional insight on dry weather flows from mixed use areas.

Key study questions for these investigations include:

1. When are the dry weather or nuisance flows detected from single-family residences (during what part of the day/week)?
2. What is the water quality and load of constituents of dry weather or nuisance flows from single-family residences?
3. What are the potential sources of dry weather flows from single-family residences?

The data will provide information on the sources of dry weather/nuisance flows from single family residences. These data can then be used by Copermittees to develop effective BMP strategies for residential areas, which is one of the most common land uses in the San Diego region.

2008–2009 Scope of Work

The Copermittees intended to leverage the results of the Proposition 50 Nonpoint Source Pollution Control Program Grant entitled “Evaluating Best Management Practices (BMPs) Effectiveness to Reduce Volumes of Runoff and Improve the Quality of Runoff from Urban Environments” that is being conducted by Dr. Darren Haver of the University of California, Davis. Dr. Haver is coordinating the collection of wet and dry samples from four residential communities in Sacramento and four residential communities in Orange County. The Copermittees collected water quality data within the City of La Mesa and City of Del Mar to verify that the University of California Study results apply to the San Diego Region. This U.C. Davis source identification study will potentially apply to all watersheds in the San Diego Region. It should be noted that during the course of the 2008-2009 Monitoring Season, the State of California suspended all funding for non-essential grant programs, which included Dr. Haver’s study.

2.11 Annual Reporting

The results of the monitoring activities conducted during the 2008–2009 Monitoring Season are provided in this annual monitoring report and outline the following:

- Mass loading station wet weather monitoring.
- Rapid stream bioassessment monitoring surveys including the SMC Regional Monitoring Survey.
- Toxicity identification evaluations.
- Bight ’08 Lagoon/Estuary Monitoring.
- Dry Weather Field Screening and Analytical Monitoring Program.
- Coastal storm drain monitoring.
- Pyrethroid monitoring.
- MS4 outfall monitoring.
- Source Identification Program monitoring.
- Available third-party data from the 2008–2009 Monitoring Season.

This report includes data and results summaries, explanations, and discussions of data. Data comparisons, recommendations for future monitoring—based on the Watershed Data Assessment Framework (MEC, 2004)—comparison of current storm water monitoring results to previous years monitoring results, watershed management area assessments, and identification of trends are included in the report. This report builds on the database developed during the previous seasons for long-term trend analysis and provides:

1. Watershed-based analysis of findings for each monitoring program component, including:
 - Identification and prioritization of water quality problems.
 - Watershed water quality characterization and potential source analysis.

2008–2009 Scope of Work

- Load/concentration analyses at MLS.
 - Statistical evaluation of loads/concentrations at MLS to land use, population, and sources.
 - Source activity linkage to water quality impacts.
 - Identification of recommended future monitoring to identify and address sources of water quality problems.
 - Results and discussion of TIEs, along with actions to reduce pollutant discharge and abate sources causing toxicity. Identification of areas that may require TIEs based on analysis of chemical and toxicity data at MLS, as required in Order No. 2001-01 Attachment B, Section II.B, and at RSB monitoring stations, as required by Order No. 2001-01 Attachment B, Section II.A.2.
2. A detailed description of monitoring conducted under Investigation Order No. R9-2004-0277 for Chollas Creek, as well as information required by Investigation Order No. R9-2004-0277.
 3. A discussion for each watershed and how monitoring answers each of the management questions listed in Section I.B of the Order.
 4. Identification of how goals listed in section I.A of the Order are addressed by monitoring, including:
 - Compliance with the Order No. R9-2007-0001.
 - Measure and improve effectiveness of monitoring programs.
 - Assess chemical, physical, and biological impacts based on a “weight of evidence approach” in evaluating storm water effects. This includes creek health as measured by biological community diversity (bioassessment monitoring), as well as storm water quality measured at the mass loading station for chemical, physical and bacteriological contaminant levels (chemistry and microbiology tests) and toxic effects to organisms (toxicity testing).
 - Characterize urban runoff discharges by calculating wet and dry weather pollutant loading estimates based on almost year round flow data.
 - Prioritize drainage and sub-drainage areas that need management actions by identification of potential areas of concern based upon exceedances of water quality objectives, toxic effects, or community degradation in hydrologic units.
 - Detect and eliminate illicit discharges and illicit connections to the MS4 through use of information collected in the Dry Weather Field Screening and Analytical Monitoring Program.
 - Assess the overall health of receiving waters using information from all components of the Receiving Water Monitoring Program, including MLS, ABLM, and Bioassessment monitoring data.
 - Use of third-party data to assist in the assessment of watersheds as applicable and available.

- Incorporation of the Baseline Long-Term Effectiveness Assessment (BLTEA) rating tables presented in the 2005-06 Annual Report. This is limited to reporting the assessment tables based on the previous five-year data set.
- 5. Identification and analyses of long-term trends in storm water and receiving water quality using appropriate non-parametric methods.
- 6. Calculation of annual pollutant loads (wet and dry weather) due to urban runoff in watersheds identified in Table 4 of Order No. R9-2007-0001.
- 7. An assessment for monitoring program components listed above (both receiving water and urban runoff) for compliance with relevant water quality benchmarks or action levels, as applicable.
- 8. Describe monitoring station locations, including latitude and longitude, frequency of sampling, quality assurance/quality control procedures, and sampling analyses and protocols.
- 9. A standard format including a stand-alone, comprehensive executive summary addressing each section of the monitoring report, comprehensive interpretations and conclusions, and recommendations for future actions.

Following the development and review of the draft Annual Monitoring Report, comments received from the Copermittees are addressed and summarized, and responses are provided. Copermittees then collaborate to resolve comments, and the response-to-comments letter is incorporated as an appendix to this report. The necessary revisions are made, and a final report is provided to meet the RWQCB January 31, 2010, deadline.