CITY OF STOCKTON
DEPARTMENT OF MUNICIPAL UTILITIES
2500 Navy Drive • Stockton, CA 95206-1191 • 209/937-8750 • Fax 209/937-8708
www.stocktongov.com

June 6, 2012

Ms. Pamela Creedon, Executive Officer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

CITY OF STOCKTON AND COUNTY OF SAN JOAQUIN NPDES MUNICIPAL STORMWATER PROGRAM REPORT OF WASTE DISCHARGE AND PROPOSED STORMWATER MANAGEMENT PLAN, ORDER NO. R5-2007-0173, NPDES NO. CAS083470

The City of Stockton and County of San Joaquin (Permittees) are pleased to submit the municipal stormwater program Report of Waste Discharge and Proposed Stormwater Management Plan. The Report of Waste Discharge (ROWD) has been integrated within the proposed Stormwater Management Plan (SWMP) so that the submittal is streamlined and the information obtained from the program effectiveness assessment forms the basis of the proposed program modifications for the next permit term.

Pursuant to Provision D.31, the ROWD portion of the document provides an assessment of the Stormwater Program activities conducted during the last permit term (2007-2012) and is being submitted as the application for re-issuance of the waste discharge requirements. Based on the ROWD assessment and several meetings with the Regional Water Quality Control Board staff, the Permittees are also submitting a proposed SWMP for the upcoming Permit term (2012-2017).

The proposed SWMP incorporates, among other things, a focus on pollutants of concern (POCs) to allow for prioritization of water quality issues and targeted implementation of control measures, performance standards, and best management practices (BMPs). The Permittees have assessed and identified the POCs that will drive the development and implementation of the SWMP over the next permit term.

Stockton
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If you have any questions, please contact me at (209) 937-8700 or Courtney Vasquez at (209) 937-8705.

C. MEL LYTLE, PH.D.
CITY OF STOCKTON
DIRECTOR OF MUNICIPAL UTILITIES

BRANDON NAKAGAWA, P.E.
COUNTY OF SAN JOAQUIN
SENIOR CIVIL ENGINEER

Attachments: Report of Waste Discharge and Proposed Stormwater Management Plan

cc: Courtney D. Vasquez, Stormwater Program Manager
Mack Walker, Larry Walker Associates
Karen Ashby, Larry Walker Associates

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CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

Executed on the 6th day of June 2012, at the City of Stockton.

C. Mel Lytle Ph.D.
Director of Municipal Utilities

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CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

Executed on the 4th day of June 2012, at the County of San Joaquin.

Brandon W. Nakagawa, P.E.
Interim Water Resources Coordinator

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: City of Stockton			
Address: 2500 Navy Drive			
City: Stockton	County: San Joaquin	State: CA	Zip Code: 95206
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729	

B. Facility Owner:

Name: City of Stockton			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☑ Governmental Agency 4. ☐ Partnership 5. ☐ Other:
Address: 2500 Navy Drive			
City: Stockton	State: CA	Zip Code: 95206	
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729	Federal Tax ID:

C. Facility Operator (The agency or business, not the person):

Name: City of Stockton			Operator Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☑ Governmental Agency 4. ☐ Partnership 5. ☐ Other:
Address: 2500 Navy Drive			
City: Stockton	State: CA	Zip Code: 95206	
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729	

D. Owner of the Land:

Name: City of Stockton			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation 3. ☑ Governmental Agency 4. ☐ Partnership 5. ☐ Other:
Address: 2500 Navy Drive			
City: Stockton	State: CA	Zip Code: 95206	
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729	

E. Address Where Legal Notice May Be Served:

Address: 2500 Navy Drive		
City: Stockton	State: CA	Zip Code: 95206
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729

F. Billing Address:

Address: 2500 Navy Drive		
City: Stockton	State: CA	Zip Code: 95206
Contact Person: C. Mel Lytle, Ph.D.		Telephone Number: 209-937-8729

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☐ **A. WASTE DISCHARGE TO LAND** ☑ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☐ Cooling Water
- ☐ Mining
- ☐ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Other, please describe: _____
- ☐ Animal Waste Solids
- ☐ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☐ Surface Impoundment
- ☐ Industrial Process Wastewater
- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☑ Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)	2. Latitude	3. Longitude
Facility: N/A	**Facility:** N/A	**Facility:** N/A
Discharge Point: Various	**Discharge Point:** Various	**Discharge Point:** Various

IV. REASON FOR FILING

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: N/A

Has a public agency determined that the proposed project is exempt from CEQA? ☐ **Yes** ☐ **No**

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ **Yes** ☐ **No**

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration**

Expected CEQA Completion Date: _____

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

See attached NPDES Report of Waste Discharge and Proposed Stormwater Management Plan.

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: C. Mel Lytle, Ph.D. **Title:** Director of Municipal Utilities

Signature: **Date:** 6/4/12

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Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: County of San Joaquin			
Address: 1810 East Hazelton Avenue			
City: Stockton	County: San Joaquin	State: CA	Zip Code: 95205
Contact Person: Brandon W. Nakagawa, P.E.		Telephone Number: 209-953-7460	

B. Facility Owner:

Name: County of San Joaquin			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address: 1810 East Hazelton Avenue			3. ☑ Governmental Agency 4. ☐ Partnership
City: Stockton	State: CA	Zip Code: 95205	5. ☐ Other:
Contact Person: Brandon W. Nakagawa, P.E.		Telephone Number: 209-953-7460	Federal Tax ID:

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
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Facility: N/A	**Facility:** N/A	**Facility:** N/A
Discharge Point: Various	**Discharge Point:** Various	**Discharge Point:** Various

IV. REASON FOR FILING

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: N/A

Has a public agency determined that the proposed project is exempt from CEQA? ☐ **Yes** ☐ **No**

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ **Yes** ☐ **No**

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration**

Expected CEQA Completion Date: _____

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

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Print Name: Brandon W. Nakagawa, P.E. **Title:** Interim Water Resources Coordinator

Signature: [signature] **Date:** 6/4/12

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Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

JUNE 2012

CITY OF STOCKTON & COUNTY OF SAN JOAQUIN

National Pollutant Discharge Elimination System Municipal Stormwater Program

Report of Waste Discharge & Proposed Stormwater Management Plan

prepared by

LARRY WALKER ASSOCIATES

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No appendices

List of Acronyms

ANOVA	Analysis of variance
BMP	Best management practice
BPA	Basin Plan Amendment
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City of Stockton
County	County of San Joaquin
CIP	Capital improvement project
CTR	California Toxics Rule
CWA	Clean Water Act
DFG	Department of Fish and Game
DNA	Deoxyribonucleic acid
DO	Dissolved oxygen
DRC	Development Review Committee
EC	Electrical conductivity
ECG	Enforcement Consistency Guide
EMC	Event mean concentration
FPPP	Facility Pollution Prevention Plan
GIS	Geographic Information System
HAZMAT	Hazardous Materials
HHW	Household Hazardous Waste
IBI	Index of Biological Integrity
IC	Illegal connection
ID	Illicit discharge
IGP	Industrial General Permit
IPM	Integrated Pest Management
IQR	Interquartile range
LA	Load Allocation
LID	Low impact development
MBAS	Methylene Blue Activated Substances

MCL	Maximum Contaminant Level
MDL	Method detection limit
MEP	Maximum Extent Practicable
MFST	Media Filter Stormwater Treatment
MOU	Memorandum of Understanding
MRP	Monitoring and Reporting Program
MS4	Municipal separate storm sewer system
MST	Microbial source tracking
MUD	Municipal Utilities Department
NAICS	North American Industry Classification System
NOI	Notice of Intent
NONA	Notice of Non-Applicability
NOT	Notice of Termination
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
OC	Organochlorine
ODS	Oxygen demanding substances *(Low DO Plan)*
ODS	Owner/developer/successor-in-interest *(Section 8)*
OEHS	Office of Environmental Health Services
OES	Office of Emergency Services
OP	Organophosphate
OWOW	Our Water Our World
PCR	Polymerase chain reaction
PCOs	Pest control operators
PEA	Program effectiveness assessment
POC	Pollutant of Concern
PRM	Pathogen related mortality
PSA	Public service announcement
QA/QC	Quality assurance/quality control
RL	Reporting limit
RMP	Regional Monitoring Program
ROS	Regression on order statistics

ROWD	Report of Waste Discharge
RWQE	Report of Water Quality Exceedance
SAWS	Stockton Area Water Suppliers
SFEI	San Francisco Estuary Institute
SIC	Standard Industrial Classification
SJAFCA	San Joaquin Area Flood Control Agency
SJR	San Joaquin River
SOP	Standard Operating Procedure
SSC	Suspended sediment concentrations
SSMP	Sewer System Management Plan
SSO	Sanitary sewer overflow
SSOERP	Sanitary Sewer Overflow Emergency Response Plan
SSORP	Sanitary Sewer Overflow Response Plan
SUA	Stockton Urbanized Area
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Stormwater Management Plan
SWQCPP	Stormwater Quality Control Criteria Plan
SWQCP	Stormwater Quality Control Plan
SWPPP	Stormwater Pollution Prevention Plan
TDS	Total dissolved solids
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl nitrogen
TMDL	Total maximum daily load
TOC	Total organic carbon
TSS	Total suspended solids
TU	Toxicity unit
UC	University of California
UCCE	University of California Cooperative Extension
U.S.	United States
U.S. EPA	United States Environmental Protection Agency
UWR	Universal Waste Rule
WDID	Waste Discharge Identification number

WLA	Waste Load Allocation
WQBP	Water Quality Based Plan
WQO	Water quality objective

Section 1

Program Management

OVERVIEW

This document, the Report of Waste Discharge (ROWD), provides a long-term assessment of the effectiveness of the stormwater management program and outlines the proposed Stormwater Management Plan (SWMP) for the Stockton Urbanized Area (SUA) during the next Permit term (the fourth permit term, 2012-2017). The SWMP, which includes existing and enhanced program control measures, represents the strategy for controlling the discharge of pollutants from the municipal storm drain system to the maximum extent practicable (MEP).

The purpose of the ROWD is, for each Program Element, to:

1. Present an overview of the SWMP implementation during the 2007-2012 Permit term;
2. Assess SWMP implementation during the 2007-2012 Permit term and/or over a longer timeframe; and
3. Identify the proposed program for the 2012-2017 Permit term.

The overall goals of the stormwater management program are to a) reduce the degradation of waters of the State and waters of the United States (U.S.) by urban runoff and protect their beneficial uses and b) develop and implement an effective SWMP that is well-understood and broadly supported by regional stakeholders. The core objectives of the SWMP are to:

1. Identify and control those pollutants in urban runoff that pose significant threats to the waters of the State and waters of the U.S. and their beneficial uses;
2. Comply with the federal regulations to eliminate or control, to the MEP, the discharge of pollutants from urban runoff associated with the stormwater drainage system;
3. Achieve compliance with water quality standards;
4. Develop a cost-effective program which focuses on pollution prevention of urban stormwater;
5. Seek cost-effective alternative solutions where prevention is not a practical solution for a significant problem; and
6. Coordinate the implementation of control measures with other agencies.

To address these objectives, the SWMP provides for a comprehensive and multidisciplinary effort by the City of Stockton (City) and County of San Joaquin (County)[1].

This section addresses the Program Management Program Element and is organized as follows:

- Regulatory Background
- SWMP Approach
- Program Effectiveness Assessment (PEA)
- SWMP Organization
- 2007-2012 Implementation
- 2012-2017 Proposed Program

[1] The City and the County are collectively referred to as "the Permittees."

REGULATORY BACKGROUND

The stormwater pollution control effort, of which this SWMP is a part, is the result of over 30 years of legislative effort, beginning with the 1972 Federal Water Pollution Control Act, subsequently known as the Clean Water Act (CWA). The CWA established the National Pollutant Discharge Elimination System (NPDES) program. The 1987 Federal CWA amendments created Section 402(p) of the CWA, mandating, among other things, permits for municipal stormwater dischargers. Section 402(p) required that the municipal NPDES permits include:

- A requirement to effectively prohibit non-stormwater discharges into the municipal separate storm sewer systems (MS4s); and
- Controls to reduce the discharge of pollutants in stormwater discharges to the MEP, including management practices; control techniques; system, design, and engineering methods; and such other provisions as the Administrator of the State determines appropriate for the control of such pollutants.

Subsequent regulations promulgated by the U.S. Environmental Protection Agency (U.S. EPA) on November 16, 1990 (40 Code of Federal Regulations [CFR] 122.26 (d)(2)(iv)) required municipal NPDES dischargers to develop and implement a management program to effectively address these requirements.

The City is defined as a large municipality (population greater than 250,000) as described within 40 CFR 122.26 (b)(4). As such, the City is required to obtain an NPDES municipal stormwater permit for the area under its jurisdiction. The County contains urbanized areas and areas of potential growth that are either enclosed within the City limits or surround the City. Due to the proximity of the County's urbanized areas to the City, their physical interconnection with the City's storm drain system, and the locations of their discharges relative to the City's system, the County is designated as a part of the large MS4 in accordance with 40 CFR 122.26 (b)(4)(iii). A map of the City's drainage areas and outfalls is provided as **Appendix A-1**, and a map of the County's drainage areas and outfalls is provided as **Appendix A-2**.

A table summarizing the history of the various NPDES municipal stormwater permits for the Permittees is provided in **Table 1-1**. The Permittees fall under the jurisdiction of the Central Valley Regional Water Quality Control Board (Regional Water Board) and must comply with the current municipal NPDES stormwater permit (Permit).

Table 1-1. History of NPDES Municipal Stormwater Permits for the Stockton Urbanized Area

Permit Term	Order No.	NPDES No.	Adoption Date	Effective Timeframe
First	Order No. 95-035	CA0082597	February 24, 1995	1995-2002
Second	Order No. R5-2002-0181	CAS083470	October 18, 2002	2002-2007
Third	Order No. R5-2007-0173	CAS083470	December 6, 2007	2007-2012[a]

a. Assuming that the fourth term permit is adopted by December 2012

The City and County developed Part I (May 1992) and Part II (May 1993) permit applications, respectively, which served as the genesis of the SWMP contained herein. In February 1995, the Permittees were named as co-permittees in their first term NPDES municipal stormwater permit (first

term permit[2]). The Regional Water Board adopted Order No. 95-035 (CA0083470). In October 2002, the first term permit was replaced with a second term permit[3], Order No. R5-2002-0181 (CAS083470).

In December 2002, U.S. EPA Region 9 and the Regional Water Board conducted a program audit of the Permittees' stormwater programs. The purpose of the audit was to determine the Permittees' compliance with the Permit and to review the overall effectiveness of the program. The audit identified program deficiencies as well as positive program attributes. The September 2003 (revised May 2004) update of the SWMP was developed in compliance with the second term permit requirements and incorporated performance standards to address the program deficiencies identified in the 2002 U.S. EPA program audit. Since the first term ROWD assessment indicated that many of the stormwater Program Elements were effective in reducing stormwater pollution, many of the established programs were continued during the second term permit. The revised SWMP included a wide range of continuing and enhanced Best Management Practices (BMPs) and control measures that were implemented over the period covered by the second term permit. The enhanced or new BMPs assisted the Permittees in improving the overall effectiveness of the stormwater program. Where possible, control measures and/or performance standards focused on specific pollutants of concern (POCs) or sources to enhance the pollution reduction efforts and provide an increased environmental benefit.

As required by the second term permit, the co-permittees developed an updated SWMP in April 2007 for the third term permit (Permit)[4], Order No. R5-2007-0173 (CAS083470). A final, 2009 SWMP was approved by the Regional Water Board on October 8, 2009.[5]

The Permit requires the Permittees to submit a ROWD 180 days prior to its expiration. Among other things, the ROWD requires the co-permittees to assess the effectiveness of their stormwater program and determine what additional efforts may be necessary. As part of the ROWD, the Permittees are proposing an updated SWMP for the fourth term permit.[6] The SWMP proposes a wide range of continuing, enhanced, and new BMPs and control measures that will be implemented during the fourth term permit period and includes a specific focus on POCs. It is the intent of this SWMP to meet the fourth term permit requirements through an iterative process. Each year, the Permittees will review the implementation and outcomes of their program and, if appropriate, modify and/or enhance the control measures and performance standards as needed to ensure that their program is effective.

Description of Permitted Area

The City is located within the Central Valley and is situated along the San Joaquin Delta waterway connecting the Sacramento and San Joaquin Rivers to the San Francisco Bay. Located in San Joaquin County, the City is approximately 83 miles east of San Francisco and 45 miles south of Sacramento.[7] It encompasses just over 60 square miles with an average elevation of 15 feet and is home to the largest, easternmost inland seaport in California. Although Stockton has historically been an agriculturally based economy, the City is now characterized by 680 miles of public streets; waterfront residential communities; more than 100,000 trees; a wide variety of recreational activities; and a large number of industrial and commercial centers. The City is the San Joaquin County Seat and is the thirteenth largest

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[2] 1995-2002

[3] 2002-2007

[4] 2007-2012

[5] Resolution No. R5-2009-0105

[6] 2012-2017, assuming adoption in December 2012

[7] http://www.ci.stockton.ca.us

city in California with a population of approximately 291,707, nearly 43 percent of the total population of the County. [8,9]

The County is located within the Central Valley and includes the San Joaquin Delta waterway connecting the Sacramento and San Joaquin Rivers to the San Francisco Bay. The County is located south of Sacramento, east of San Francisco, and is bordered by Sacramento County to the north, Amador and Calaveras Counties to the east, Stanislaus County to the south-east, and Contra Costa and Alameda Counties to the west. The County encompasses approximately 1,400 square miles with a density of approximately 493 people per square mile.[10] As of 2010, the County is home to 685,306 people; of these, 291,707 live within the City, and 144,897 live within the unincorporated area.[11,12] The County Phase I NPDES permit area consists of the urbanized unincorporated areas adjacent to or surrounded by the City and has a population of approximately 55,000 people. The County includes the Cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy.

The Permittees experience approximately 184 sunny days per year, an average temperature of 74.6 degrees F, and an annual precipitation of approximately 14 inches. Dry, hot summers and relatively wet and cool winters are typical for the area.[13]

An overview map of the permitted area is provided in **Figure 1-1**.

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[8] http://www.visitstockton.org

[9] http://quickfacts.census.gov/qfd/states/06/06077.html

[10] http://quickfacts.census.gov/qfd/states/06/06077.html

[11] http://quickfacts.census.gov/qfd/states/06/06077.html

[12] http://www.sjgov.org

[13] http://www.visitstockton.org

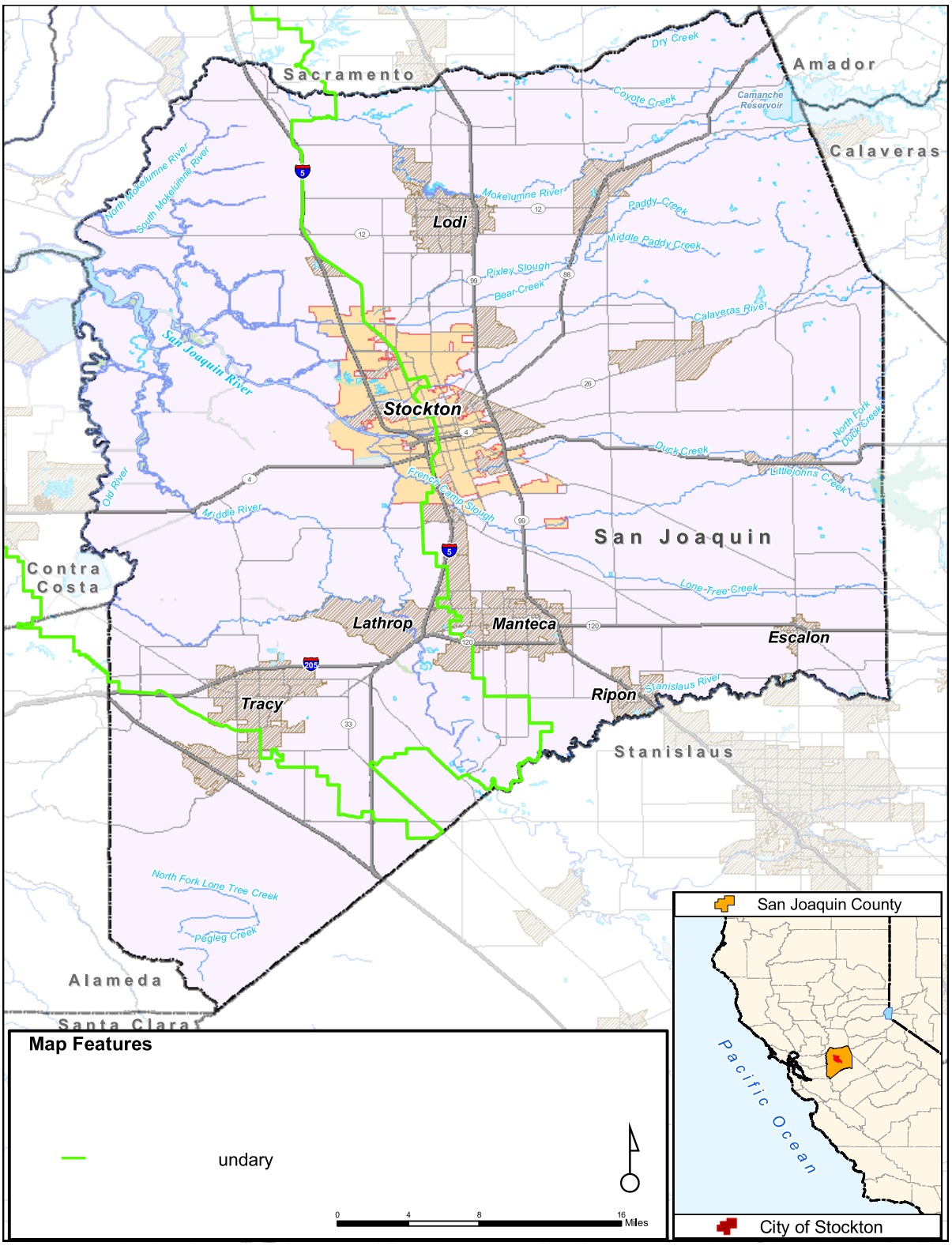

Figure 1-1. Stockton Urbanized Area Map

SWMP APPROACH

Over the last three permit terms, the Permittees have, pursuant to their stormwater permits and SWMPs, developed and implemented a comprehensive stormwater management program that includes similar control measures and performance standards as other municipalities throughout the state. The historical approach for stormwater programs has been to implement a comprehensive program, typically with increased prescriptive implementation measures, then conduct water quality monitoring for a suite of constituents to try to determine if the program is protecting receiving waters and beneficial uses. However, this type of approach has no overt strategy to link the performance standards and selected BMPs with the critical POCs. Rather, this type of approach has generally reflected a "do everything everywhere all at once" mindset. The result is that there has been little prioritization within a program to address the most severe water quality issues first or to target the performance standards and BMP implementation.

For the fourth term permit, the Permittees are proposing a slightly modified approach that would allow for a prioritization of water quality issues and POCs, as well as the ability to prioritize the stormwater program control measures and performance standards so that they may more specifically target the POCs, rather than focusing on other performance standards that do not have as direct an impact on the POCs. As described in additional detail in Section 2, the Permittees have assessed the following information and identified the POCs that will drive the development and implementation of the SWMP over the next permit term.

- **Total Maximum Daily Loads (TMDLs) and the 303(d) List** – Of increasing importance for stormwater programs throughout the state is the incorporation of TMDLs into the stormwater permits. As more and more TMDLs become effective and are incorporated into the stormwater permits, they become drivers for the program and elevate the need to address the POCs for which the stormwater agencies are assigned waste load allocations (WLAs) and/or have responsibilities pursuant to the implementation plans. In addition, it is important for the stormwater agencies to assess the 303(d) list to understand what TMDLs may be developed in the near future so that they can plan for them as needed.
- **Discharge Characterization and Receiving Water Quality** – The Permittees evaluated the water quality monitoring data to determine:
    - If their stormwater discharges had likely caused or contributed to an exceedance of applicable water quality objectives (WQOs); and
    - If the event-waterbody combinations exceeded the benchmark rate of 25% for cause or contribute exceedances. This benchmark provides a conservative guideline for the identification of POCs and allows for a prioritization of the stormwater program activities.

As a result of these analyses, the Permittees identified the POCs for the fourth term permit as:

- Pesticides (Chlorpyrifos, Pyrethroids)
- Pathogen Indicators (*E. coli*, Fecal Coliform)
- Mercury
- Dissolved Oxygen (DO)

The effectiveness assessment and remaining sections of the SWMP include management questions which directly relate to the POCs and performance standards that are most likely to have a direct and/or an indirect impact on the POC(s).

As shown in **Figure 1-2**, the Water Quality Monitoring Program (**Section 2**) identifies the POCs as the drivers for the stormwater program and identifies the approach for the continued water quality monitoring and data collection efforts. The Program Elements described in **Section 3** through **Section 8** each include baseline Performance Standards (those that should be a part of functioning stormwater program) as well

as those that specifically target the POCs. In addition, the implementation schedules at the end of each Program Element indicate which Performance Standards directly or indirectly address which POC(s).

The Water Quality Based Programs section (**Section 9**) recognizes that the Permittees will, on an annual basis and, as a part of the ROWD, group the water quality monitoring data and programmatic data together by POC to identify the effectiveness of the performance standards for that particular POC.

This POC-driven approach allows the Permittees to focus and prioritize their efforts and thereby create a more efficient and effective Stormwater Management Program.

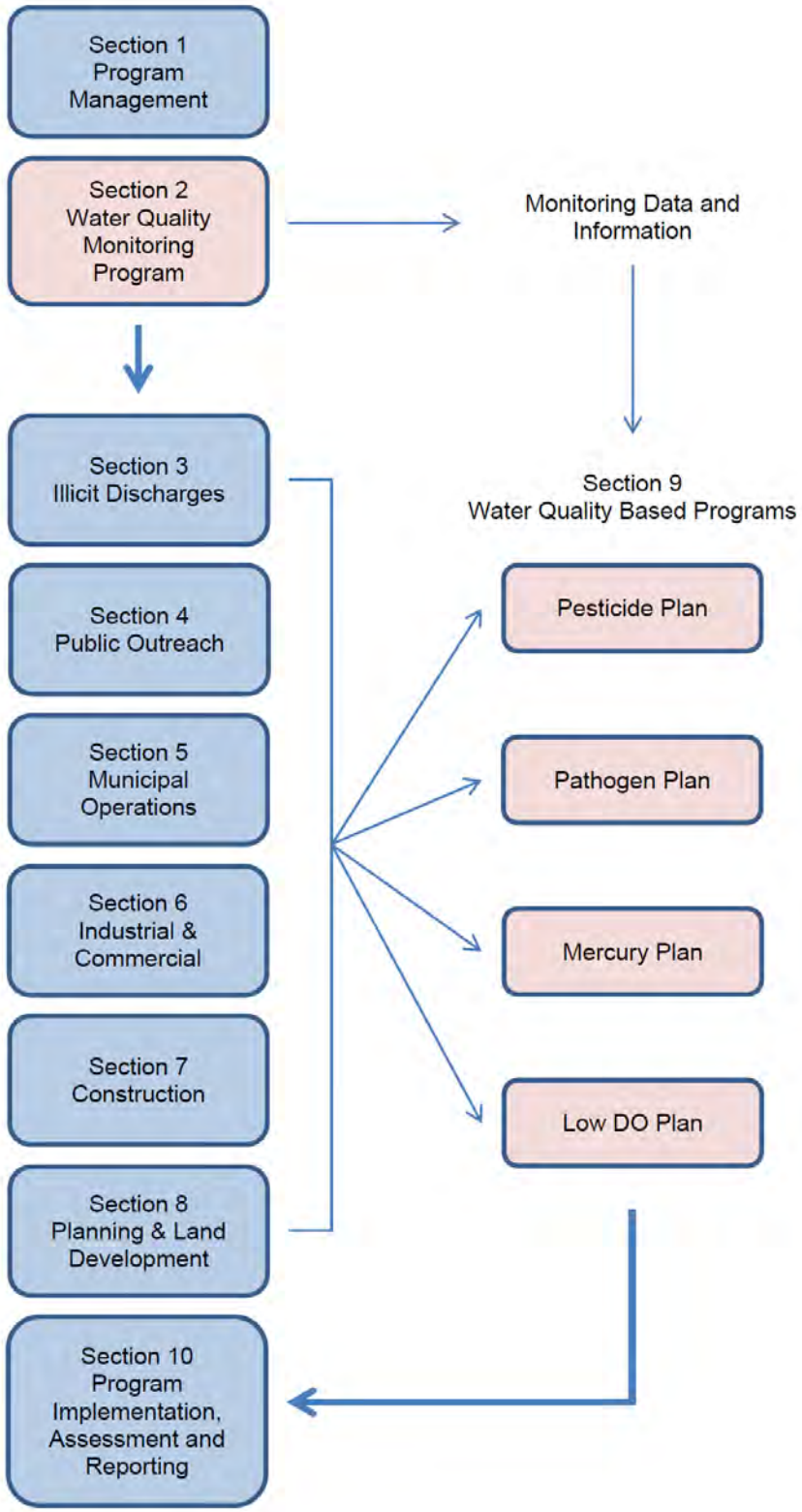

Figure 1-2. Stormwater Management Plan Approach

SWMP ORGANIZATION

The SWMP provides a comprehensive approach for addressing pollutants in stormwater discharges and is organized into ten sections. Supporting guidance and/or implementation tools for each Program Element are provided in corresponding appendices. An overview of each section is provided in **Table 1-2**. Successful implementation of the SWMP also requires training in order for the Permittees to ensure that their staff understand the Stormwater Program and conduct their activities in a manner that is protective of water quality. As a result, training is addressed within each Program Element, as needed.

Table 1-2. Overview of SWMP Sections

SWMP Section	Description
Section 1 Program Management	This section addresses the program overview, regulatory background, program coordination, fiscal analysis, and legal authority. In addition, the SWMP approach and methods that will be used to evaluate the overall program as part of the reporting process are identified.
Section 2 Water Quality Monitoring Program	This section describes the water quality monitoring program to assess the health of the local water bodies and characterize stormwater discharges.
Section 3 Illicit Discharges	This section describes the approach to detect, respond to, investigate and eliminate IDs and ICs.
Section 4 Public Outreach	This section describes the public education and outreach approach to promote change in behavior and increase the knowledge of target communities to reduce pollutants to the storm drain systems.
Section 5 Municipal Operations	This section describes the approach to address municipal operations so they are performed in a manner that is protective of water quality and minimizes the potential for pollutants to enter the storm drain system.
Section 6 Industrial and Commercial	This section describes the approach to inspect and provide outreach to industrial and commercial businesses.
Section 7 Construction	This section describes the approach to reduce pollutants from construction sites during all phases of construction.
Section 8 Planning and Land Development	This section describes the approach to address the reduction of pollutants in new development through site planning, design practices, and post-construction controls.
Section 9 Water Quality Based Programs	This section provides an overview of the various WQBPs that are being implemented, including the Pesticide Plan, Pathogen Plan, Mercury Plan, and Low DO Plan.
Section 10 Program Implementation, Assessment and Reporting	This section describes the implementation and reporting schedule. Annual reporting will incorporate the assessment methods identified in Section 1.

The SWMP is structured to identify the specific activities that must be implemented, as well as the party responsible for implementing the activities. Implementation schedules are also provided to assist the Permittees in the implementation of the SWMP. To address the core objectives and POCs, the SWMP incorporates a series of Control Measures and Performance Standards that provide for a long-term, comprehensive, and multidisciplinary effort by the Permittees to achieve water quality standards and protect beneficial uses. Some Control Measures and Performance Standards require a series of tasks to be undertaken in order to complete them; therefore, progressive implementation of the Performance Standards throughout the Permit term will be necessary in order to completely implement the Program Elements.

- Control Measures – Control Measures are programmatic actions required to meet Permit requirements and address program objectives. In developing the Control Measures, several key factors were considered:
    - Each Control Measure must address one or more of the program objectives.
    - Each Control Measure must clearly identify the corresponding performance standards.
    - The data and information from the previous permit term and/or reporting period must be analyzed to determine the effectiveness of each Control Measure, and the iterative process must be used to ensure that each Control Measure is effective and has a commensurate benefit for the resources expended.
    - Each Control Measure must actively identify enhancements/modifications that would improve the program element and overall effectiveness of the stormwater program.

  The Control Measures outlined within each Program Element were designed to adequately address all the applicable Permit provisions. For each Control Measure, there are accompanying Performance Standards which, once accomplished, constitute compliance with Permit requirements.

- Performance Standards – The Performance Standards included in each Control Measure establish the level of effort required (i.e., the specific tasks or activities which must be completed) to achieve the desired outcome.

- Implementation Schedules – Implementation schedules are included at the end of each Program Element to clearly identify what the performance standards are, when they need to be completed during the five-year permit term, and who has primary responsibility for completion of these performance standards to ensure accountability is built into the program. The tables also help identify whether the performance standards constitute a new activity for the Permittees (N), are building upon or are an enhancement of current activities (E), or are an activity that the Permittees are already implementing and will continue (C). The Implementation Schedules may evolve slightly as the program is developed, implemented, and assessed over the next five years.

PROGRAM EFFECTIVENESS ASSESSMENT

The Permittees' PEA strategy builds upon the results of the initial PEAs included as a part of the Annual Reports and addresses the stormwater program in terms of achieving both programmatic goals (i.e., raising awareness, changing behavior) and environmental goals (i.e., reducing pollutant discharges, improving environmental conditions).

In developing the PEA approach for the fourth term permit, the Permittees continued to refer to the approach promoted by the California Stormwater Quality Association™ (CASQA) to identify methods for assessing the effectiveness of the stormwater program. Since CASQA is updating their guidance document, the Permittees will review their approach after the update and determine if any modifications should be made.[14]

Outcome levels help to categorize and describe the desired results of the Program Elements and related Control Measures. Pursuant to the 2007 CASQA guidance, outcomes for stormwater programs have been generally categorized into six levels, including the following:

- Outcome Level 6 – Receiving Water Quality
- Outcome Level 5 – Runoff Quality
- Outcome Level 4 – Sources and Loads
- Outcome Level 3 – Behavior
- Outcome Level 2 – Awareness
- Outcome Level 1 – Implementation

The outcome levels represent ways in which the effectiveness of the program can be determined, even if it is intermediate.[15] Working backwards from Outcome Level 6 to Outcome Level 1, the Permittees can identify the key POCs, address the contribution from the MS4 outfalls, identify the potential sources and loads of those POCs, outreach to the target audiences who are involved at those sources, and then implement the program accordingly. **Figure 1-3** below identifies how this concept is integrated as a key component of the prioritized POC approach.

[14] CASQA, Municipal Stormwater Program Effectiveness Assessment Guidance, March 2007.

[15] CASQA, *Municipal Program Effectiveness Assessment Guidance*, May 2007.

Figure 1-3. Program Effectiveness Assessment Approach

Some important points to remember regarding these effectiveness assessments include the following:

- The ability of a stormwater program to assess an outcome level tends to become progressively more difficult as higher outcome levels (levels 4-6) are assessed. This is because the higher outcome levels assess the impact that the SWMP has on water quality, which requires a much more robust dataset over an extended period of time.
- Outcome levels 1-3 (and sometimes 4) are typically assessed using program management data, whereas outcome levels 4-6 are assessed using physical and/or water quality monitoring data.
- Each program element can be assessed at one or more outcome levels based on the data and information available.

Generally, program evaluations have been conducted by comparing how well the Permittees implemented Program Elements, the completion of which is likely to lead to stormwater quality improvement. If correlations can be established between the program efforts (e.g., conducting a survey, assessing BMP implementation) and water quality, it may allow predictions of water quality resulting from implementation of certain types of programs. Over time, correlating water quality improvement with programmatic results may help to identify the most expedient and cost-effective approaches to planning and assessing the program. As a part of the PEA, the Permittees will track the long-term progress of achieving improvements in receiving water quality.

The effectiveness assessment strategy that is proposed for the 2012-2017 Permit term is discussed below.

Program Management Questions and Goals

A comprehensive PEA strategy will provide the Permittees with the ability to determine if the stormwater programs are appropriately targeted and to determine whether intended results are being achieved efficiently and cost-effectively -- and ultimately to relate these results to conditions in urban runoff and receiving waters. The strategy that is proposed in this SWMP incorporates the use of management questions and goals to help determine the purpose of the data collection as well as to guide the implementation of the program.

By utilizing an iterative process and conducting effectiveness assessments, the Permittees can use the information gained to modify their programs and ensure that the resources expended are providing a commensurate benefit and are protective of water quality. Based on the program evaluation and experience in the implementation of the various Control Measures, the SWMP may need to be modified periodically in order to respond to changing conditions or to incorporate more effective approaches. In addition, the Permittees may also need to revise the SWMP in order to comply with regional- or watershed-specific requirements or WLAs that have been developed and approved pursuant to the TMDL process. Proposed revisions to the SWMP will be provided to the Regional Water Board as a part of the Annual Report submittal.

Preliminary Management Questions & Goals

Preliminary management questions and associated goals have been identified for the program as a whole (listed under General), as well as those that are proposed for POC-based implementation. The management questions and goals will be evaluated as part of the annual effectiveness assessment and will be re-evaluated as needed. The goals are established by the Permittees as a way to gauge the success of their efforts. However, the goals may be increased or decreased as needed by the Permittees and based on the implementation of the program. As part of the Annual Report process, the Permittees will evaluate and revise the management questions and goals as needed.

General

These questions provide valuable feedback for core components of the stormwater program. The Control Measure associated with each is identified within the brackets.

1. What are the annual expenditures for the stormwater program for each fiscal year? **[Pgm Mgmt]**
2. Do the field crews accurately identify and report illicit discharges (IDs) while conducting routine maintenance activities in the field? **[ID1]**
    a. The field crews accurately report and identify >95% of the IDs while conducting their routine maintenance activities.
3. Of the water pollution investigations that occur, what are the primary constituents of concern that are the focus of the investigations? **[ID3]**
4. What enforcement actions have been taken for IDs and illegal connections (ICs), and what were the results? **[ID4]**
5. For the stream cleanup events, how many volunteers assisted at how many sites? For those sites, how much trash/debris was collectively removed from the SUA? **[PO1]**
6. How much Household Hazardous Waste (HHW) was collected each fiscal year? **[PO1]**
7. Is the general public aware of the water pollution hotlines that have been established by the Permittees? **[P02]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the water pollution hotline numbers for the City.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the water pollution hotline numbers for the County.
8. How many catch basins are inspected and cleaned each year? How much total material is removed? **[MO5]**
9. How many pump stations are inspected and cleaned each year? How much total material is removed? **[MO5]**
10. How many curb miles are swept, and how much material is removed from the street sweeping, as well as from the green waste collection program? **[MO5]**
11. Are the industrial and commercial sites being managed so that they are in compliance with the local codes and ordinances and preventing pollutants from leaving the site? **[IC2]**
    a. Based on the results of the self-certifications, >90% of the sites are reporting that they are in compliance and are implementing and maintaining the necessary BMPs on site.
12. Are the construction sites being managed so that they are in compliance with the local codes and ordinances and preventing sediment and other pollutants from leaving the site? **[CO5]**
    a. Based on the results of the construction inspections, >95% of the construction sites are in compliance and are implementing and maintaining the necessary BMPs on site.
13. What is the total land area for each Permittee that has undergone new or redevelopment and how many/what types of BMPs have been implemented? **[LD3]**

POC-Based

These questions provide valuable feedback for the Water Quality Based Plans (WQBPs). The CASQA Outcome Level is identified within the brackets.

Pesticide Plan

1. Are the impacted waterways (receiving waters) meeting the TMDL targets for chlorpyrifos and diazinon as specified in the *Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL*? **[Environmental – OL6]**
2. Are the impacted waterways meeting the proposed criteria for pyrethroids (where they have been developed)? **[Environmental – OL6]**
3. Are the urban stormwater dischargers a significant source of chlorpyrifos and diazinon to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
4. Are the urban stormwater dischargers a significant source of pyrethroids to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
5. Are the Permittees meeting the load allocations (LAs) for urban discharge for diazinon and chlorpyrifos as specified in the *Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL*? **[Environmental – OL5]**
6. Are the Permittees effectively implementing BMPs that target pesticides? **[Programmatic – OL2-4]**
7. Is the general public aware of the need to reduce the use of pesticides and use more Integrated Pest Management (IPM) based approaches for the control of pests? **[PO1]**
    a. Based on the results of the Public Opinion Survey, <30% of the residents of the SUA report using pesticides within the past year.
8. Is the general public aware of the need to properly dispose of pesticide-containing products at the County HHW Facility, and are they doing so? **[P01]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of pesticide-containing products at the County HHW Facility.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of pesticide-containing products at the County HHW Facility.
        i. How much pesticide containing products are turned in on an annual basis to the HHW collection center? What is the breakdown of the items collected?
        ii. Identify the source(s) of information for the residents (public service announcements [PSAs], brochures, community events, "Our Water Our World" campaign [OWOW][16], etc.)
9. Is the general public improperly disposing of pesticide-related trash? **[PO1]**

[16] Bay Area Stormwater Management Agencies Association campaign with Orchard Supply Hardware (OSH) to encourage the use of less toxic products and proper disposal of pesticides

a. How much of the trash/debris that was collectively removed from the SUA as a part of the stream cleanup events was debris that contains pesticides?

10. Are the Permittees actively implementing the IPM program and actively managing their use of pesticides on their right-of-way and other landscaped areas? **[MO4]**

    a. How many acres is IPM used on, and what approaches are used?

    b. How much total active ingredient is used for the pesticides applications?

11. Are the industrial and commercial sites that use, store, or could generate pesticides aware of the BMPs that they should be implementing on site, and are they implemented and maintained? **[IC2]**

    c. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs and are doing so.

Pathogen Plan[17]

1. Are the impacted waterways meeting the TMDL targets for fecal coliform and E. Coli, as specified in the *Stockton Urban Waterways Pathogen TMDL*? **[Environmental – OL6]**

2. Are the urban stormwater dischargers a significant source of pathogens to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**

3. Are the Permittees meeting the LAs for fecal coliform and E. Coli, as specified in the *Stockton Urban Waterways Pathogen TMDL*?[18] **[Environmental – OL5]**

4. Are the Permittees effectively implementing BMPs that target pathogens? **[Programmatic – OL2-4]**

5. Is the general public aware of the need to properly dispose of pet waste, and are they doing so? **[P03]**

    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of pet waste.

    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of pet waste correctly.

        i. Identify the source(s) of information for the residents (pet waste signs, PSAs, brochures, community events, dog tag licensing, etc.)

6. Are the houseboat owners aware of the need to properly dispose of sump waste, and are they doing so? **[PO3]**

    a. Based on the results of the Public Opinion Survey, 80-100% of the houseboat owners are aware of the need to properly dispose of sump waste.

    b. Based on the results of the Public Opinion Survey, 80-100% of the houseboat owners are reporting that they are disposing of sump waste correctly.

7. Are the industrial and commercial sites that use, store, or could generate pathogens aware of the BMPs that they should be implementing on site, and are they implemented and maintained? **[IC2]**

    a. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs are doing so.

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[17] For the Pathogen TMDL the targets = WLA = LA = WQO

[18] Each waterbody has its own specific allocations; however, they must all meet the objectives.

8. Are the reported sanitary sewer overflows (SSOs) potentially impacting the storm drains and/or receiving waters? **[MO1]**
    a. Based on the SSOs, <25% of the SSOs are reaching the storm drains or receiving waters.
        i. Evaluate the estimated gallons and locations of impacts compared to monitoring data

Mercury Plan

1. Are the impacted waterways meeting the TMDL targets for methylmercury as specified in the *Sacramento-San Joaquin Delta Methylmercury TMDL*[19]? **[Environmental – OL6]**
2. Are the urban stormwater dischargers a significant source of total and/or methylmercury to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
3. Are the Permittees meeting the LAs for methylmercury as specified in the *Sacramento-San Joaquin Delta Methylmercury TMDL*? **[Environmental – OL5]**
4. Are the Permittees effectively implementing BMPs that target mercury and/or prevent the creation of methylmercury? **[Programmatic – OL2-4]**
5. Is the general public aware of the need to properly dispose of mercury-containing products at the County HHW Facility, and are they doing so? **[P01]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of mercury-containing products at the County HHW Facility.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of mercury-containing products at the County HHW Facility. Examples of such products include thermometers and other gauges, batteries, fluorescent and other lamps, switches, relays, sensors and thermostats.
        i. How much mercury containing products are turned in on an annual basis to the HHW collection center? What is the breakdown of the types of items collected at the centers?
        ii. Identify the source(s) of information for the residents (PSAs, brochures, community events, HHW, etc.)
6. Is the general public improperly disposing of mercury-related trash? **[P01]**
    a. How much of the trash/debris that was collectively removed from the SUA as a part of the stream cleanup events was debris that contains mercury (thermometers, fluorescent lights, oil-based paints, appliances with mercury switches)?
7. Are the industrial and commercial sites that use, store, or could generate mercury aware of the BMPs that they should be implementing on site – and are they implemented and maintained? **[IC2]**
    a. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs are doing so.

[19] The TMDL target is a fish-tissue based target for methylmercury

Low DO Plan

1. Are the waterways meeting the Basin Plan WQO for DO? **[Environmental – OL6]**
2. Are the urban stormwater dischargers a significant source of oxygen-demanding substances (ODS) to the receiving waters? **[Environmental – OL5]**
    a. Is re-suspended sediment a significant source of oxygen demand to the receiving waters?
3. Is receiving water quality improving with respect to prolonged periods of low DO? **[Environmental – OL5]**
4. Is the general public aware of the need to prevent pollution of the waterways by nutrients (e.g., soaps/detergents, fertilizers) and ODS (e.g., lawn waste, pet waste)? **[PO3]**
5. Has the Green Waste Collection Program been effective at decreasing the contribution of oxygen-demanding compounds from the storm drain system to the receiving waters? **[MO6]**

Proposed Assessment of Program Elements

The outcome levels that are anticipated to be evaluated by each program element are summarized in **Table 10-1**.

Table 10-1. Program Effectiveness Assessment Summary for the Overall Stormwater Program

Program Element	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
	Implement Program	Increase Awareness	Behavior Change	Pollutant Loads	Runoff Quality	Receiving Water Quality
Illicit Discharges	A	N	A	N	N/A	N/A
Public Outreach	A	A	A	A	N/A	N/A
Municipal Operations	A	A	A	A	N/A	N/A
Industrial and Commercial	A	A	A	N	N/A	N/A
Construction	A	A	A	N	N/A	N/A
Planning and Land Development	A	N	A	N	N/A	N/A

A – It is anticipated that an effectiveness assessment may be conducted during the 2012-2017 Permit term
N – An effectiveness assessment is not currently anticipated
N/A – This outcome level is not applicable

2007-2012 IMPLEMENTATION

An overview of the implementation of the Program Management portion of the Stormwater Program is provided on the following pages.

Program Coordination

Co-Permittees

The implementation of the stormwater management program requires a coordinated management effort by the Permittees. While named as co-permittees to one permit, the Permittees have separate programs and submit most documents and reports separately to the Regional Water Board. However, the programs are essentially identical, and the Permittees collaborate with each other to address common issues and to ensure consistency in program development and implementation.

In 1995, the City and County entered into a Memorandum of Understanding (MOU) for filing as co-permittees under one NPDES permit as well as the development of a receiving waters monitoring program. The MOU also provides a mechanism for the Permittees to continue to work cooperatively on the development and implementation of additional NPDES programs such as the Public Outreach program. To facilitate the ongoing communication and coordination between the two agencies, meetings are held on an on-going basis.

The Permittees have reviewed their existing MOU as needed since 1995 to ensure that it provides for a designation of joint responsibilities, decision making, information management of data and reports, and any other collaborative arrangements that are necessary in order to comply with the Permit.

Although the Permittees work together to coordinate the development and implementation of the program, each agency is responsible for implementing the stormwater program within their respective jurisdictions, and each has jurisdiction over and/or maintenance responsibilities for storm drains and/or watercourses in the City and surrounding urbanized areas of the County.

City of Stockton

The City's Municipal Utilities Department (MUD) Stormwater Management Division has primary responsibility for the development and implementation of the SWMP. Although administered and principally staffed by MUD, the implementation of the SWMP requires the assistance of and close coordination with several other City departments. An organizational chart for the City is provided as **Figure 1-3**.

County of San Joaquin

The County's Public Works – Water Resources Division has primary responsibility for the development and implementation of the SWMP. Although administered and principally staffed by Public Works, the implementation of the SWMP requires the assistance of and close coordination with several other County departments. An organizational chart for the County is provided as **Figure 1-4.**

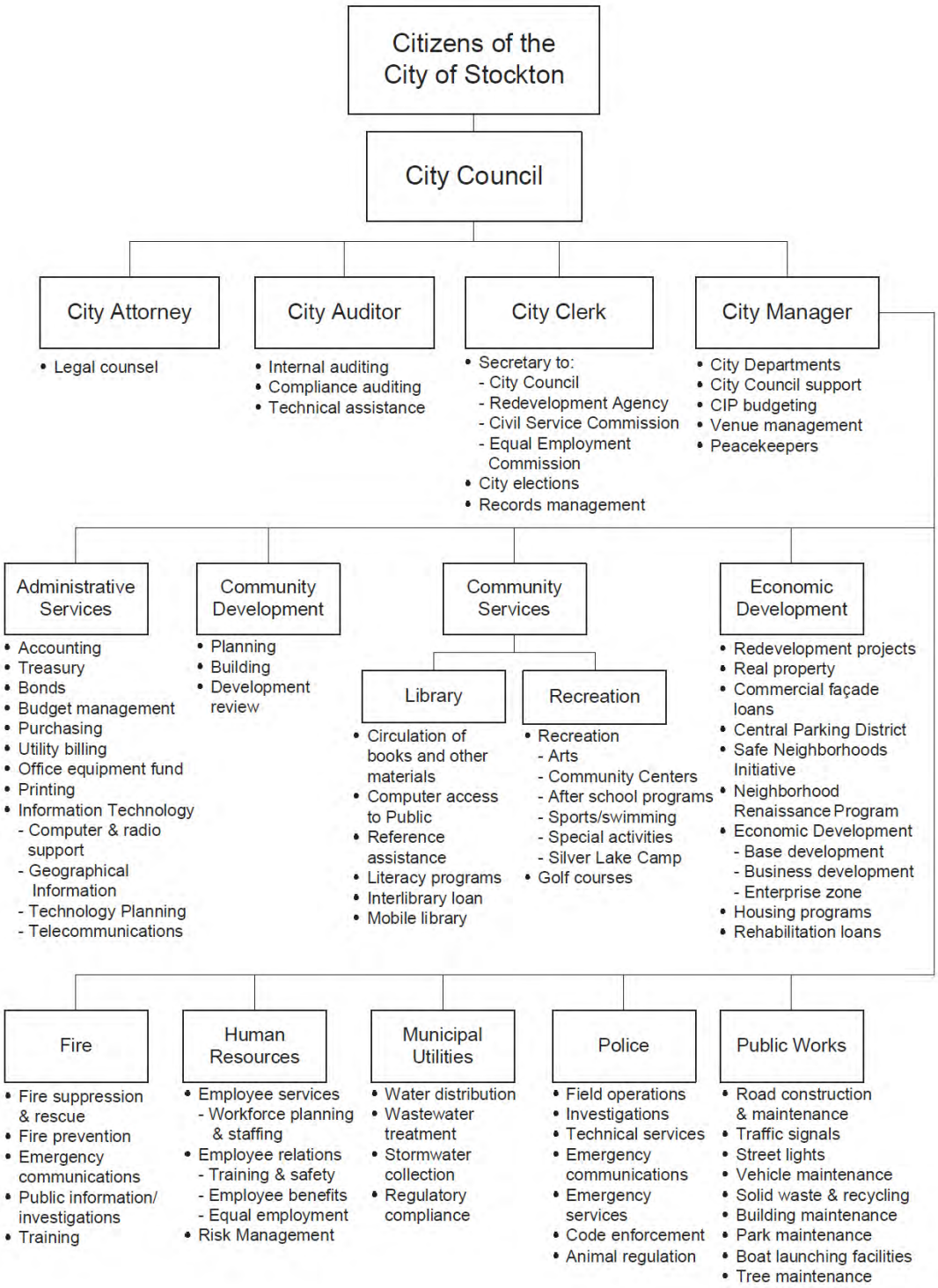


Figure 1-3. City of Stockton Organizational Chart

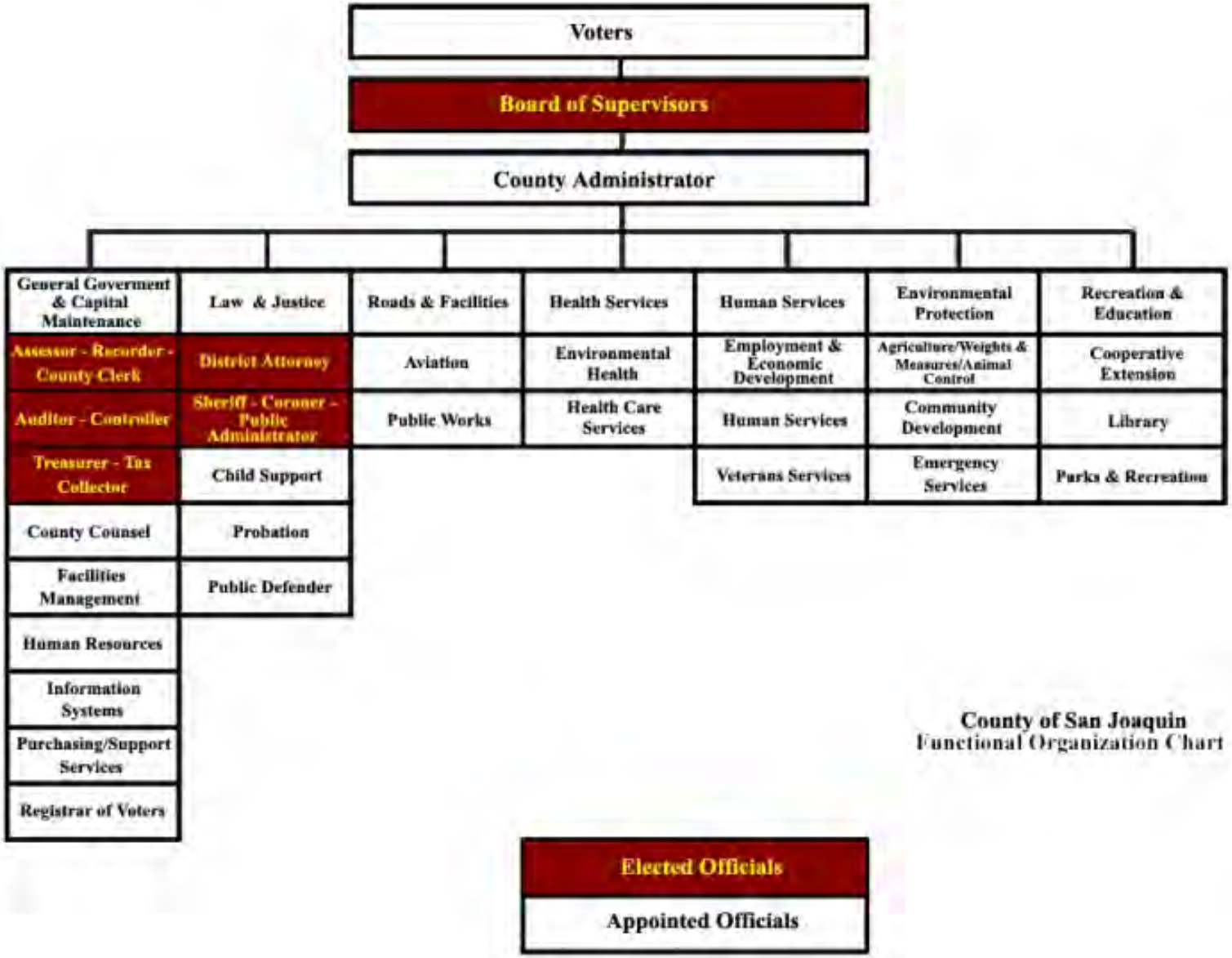


Figure 1-4. County of San Joaquin Stormwater Responsibilities Organizational Chart

Fiscal Analysis

Source of Funds

The City funds all of its stormwater related activities through a monthly stormwater user fee that was established in 1993 of $2.10/equivalent residential unit.

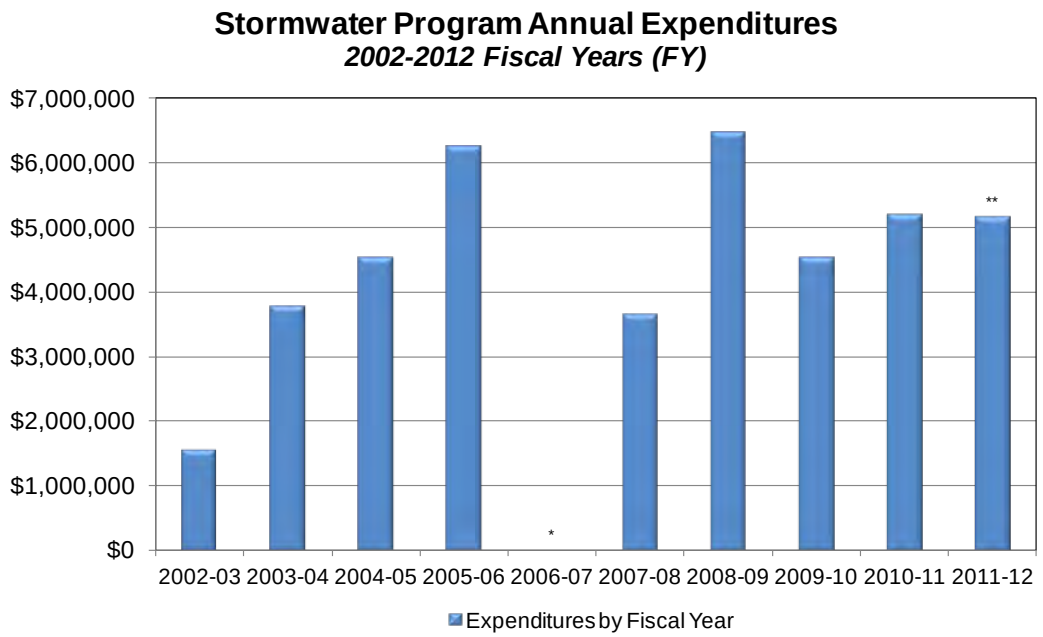
This stormwater user fee cannot be increased without a Proposition 218 vote. In June 2010, the City completed a Stormwater Rate Study to review the current rate structure and make recommendations to increase the monthly stormwater user fees in order to assist in funding the Program. The final Stormwater Rate Study was included as Appendix A-1 of the 2009-2010 Annual Report. A community vote on the proposed new Clean Water Fee occurred in the fall of 2010; however, the Clean Water Fee increase failed. The City is assessing the viability of proposing a new fee in 2012 or 2013 in order to supplement the stormwater funds.

The County funds its stormwater-related activities through the County Service Area No. 54 (CSA 54) Special District Fund, which was established in 1993. This special district includes all unincorporated county territory that is within the NPDES permitted area. A user charge ($35/parcel) is collected on the tax rolls for each of the 16,000 parcels within CSA 54, providing approximately 89% of the County's stormwater program funds. In addition, the County obtains approximately 4% of its stormwater program funding through inspection/plan check fees and another 7% through miscellaneous revenue/interest income.

Reporting

As a part of each Annual Report (Section 1), the Permittees have reported on the current NPDES expenditures as well as the projected expenditures for the next fiscal year. The budget summary includes the expenditures incurred to implement the SWMP. Pursuant to the second term Permit, the co-permittees reviewed and revised the fiscal analysis reporting format so that expenditures are consistently reported by SWMP Program Element from year to year.

The figure below depicts the City's Stormwater Program annual expenditures for each fiscal year from 2002 through 2011, as well as the projected expenditures for the 2011-2012 Fiscal Year.

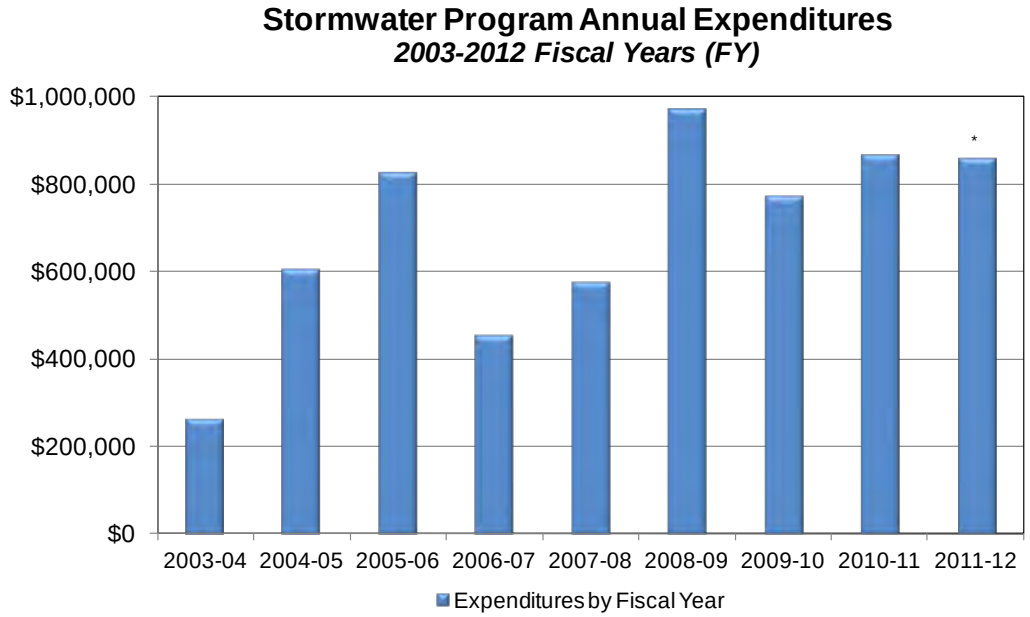


Note: Annual fluctuations in expenditures may be due to a number of factors, including, but not limited to: one-time development of program materials, permit requirements that differ from year to year, and phased program implementation.

* Data not available. This information was not reported in the City's 2006-2007 Annual Progress Report letter.

** Estimated Program Expenditures for 2011-2012 FY

The figure below depicts the County's Stormwater Program annual expenditures for each fiscal year from 2003 through 2011, as well as the projected expenditures for the 2011-2012 Fiscal Year.



Note: Annual fluctuations in expenditures may be due to a number of factors, including, but not limited to: one-time development of program materials, permit requirements that differ from year to year, and phased program implementation.

*Estimated Program Expenditures for 2011-2012 FY

Legal Authority

The Permit requires that the co-permittees implement a stormwater management program to reduce the pollutants in stormwater discharges to the MEP. Central to this program is the establishment and/or verification that the co-permittees have adequate legal authority to regulate the discharge of pollutants to the storm drain system.

The Permittees are legal entities with the authority to administer, implement, and enforce the stormwater management program within their separate jurisdictions. The co-permittees have broad legal authority from stormwater, wastewater, solid and hazardous materials (HAZMAT) regulations, and various public nuisance ordinances to address stormwater quality issues.

The City enacted a Stormwater Management and Discharge Control Ordinance No. 013-95 (Chapter 7, Part VIII, Section 7-800 to 7-858.2) to specifically control stormwater runoff quality. This ordinance both complements and supplements the existing ordinances and establishes uniform requirements for protecting and enhancing the water quality of the City's watercourses, water bodies, and wetlands in a manner consistent with the CWA.

The City Attorney provided the Regional Water Board with a certified statement of the City's existing legal authority on September 3, 2003. The certified statement recognizes that the City has adequate legal authority to implement and enforce each of the requirements contained in the Permit and 40 CFR 122.26 (d)(2)(i)(A-F). The City Attorney has reviewed the existing legal authority to ensure that the City has adequate legal authority to implement and enforce each of the requirements within Order No. R5-2007-0173.

County Counsel provided the Regional Water Board with a certified statement of the County's existing legal authority on September 29, 2003. The certified statement recognizes that the County has adequate legal authority to implement and enforce each of the requirements contained in the Permit and 40 CFR 122.26 (d)(2)(i)(A-F). County Counsel has reviewed the existing legal authority to ensure that the County has adequate legal authority to implement and enforce each of the requirements within Order No. R5-2007-0173.

The legal authorities will continue to be reviewed as needed. If it is determined that additional legal requirements are necessary, additional amendments or Ordinances will then be developed and adopted.

2012-2017 Proposed Program

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term. In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP.

No modifications were identified for the upcoming Permit term for this Control Measure.

OBJECTIVES

The objectives address the key components of the Program Management Program Element and identify that, in order to be effective, the program must:

- Ensure that all elements of the SWMP are implemented through effective program coordination;
- Ensure the program is sufficiently funded and conduct a fiscal analysis; and
- Ensure Permittees have the legal authority to implement the Stormwater Management Program.

These objectives will be met through implementation of specific performance standards, as detailed below. The Performance Standards establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit

The Permittees will review the proposed SWMP after the new 2012-2017 permit is adopted to ensure that it is consistent with the new permit requirements.

Permittees meet quarterly

The Permittees will continue to meet quarterly to facilitate ongoing communication and coordination between the two agencies.

Participate in quarterly internal Stormwater Program Meetings

The Permittees will each continue to meet quarterly to facilitate ongoing communication and coordination within their respective departments.

Participate in statewide stormwater-related meetings, conferences, and stakeholder groups, as needed

The Permittees will continue to participate in statewide stormwater-related meetings, conferences, and stakeholder groups, as needed.

Establish, review, and revise cooperative agreements, as needed

The Permittees will continue to establish, review, and revise any cooperative agreements, as needed. The Permittees have reviewed their existing MOU as needed since 1995 to ensure that it provides for a designation of joint responsibilities, decision making, information management of data and reports, and any other collaborative arrangements that are necessary in order to comply with the Permit.

Report the Fiscal Analysis within the Annual Report

The Permittees will continue to report their respective fiscal analyses within their Annual Reports.

Review/revise the legal authority as needed

The Permittees will continue to review and revise the legal authority as needed.

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
Program Coordination																			
Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit	N	X					X	X	X	X	X	X	X						
Track legislative and regulatory efforts related to the WQBPs	N						X	X	X	X	X							X	
Permittees meet quarterly	C																	X	
Participate in quarterly internal Stormwater Program Meetings	C												X	X					
Participate in statewide stormwater-related meetings, conferences, and groups, as needed	C																	X	
Establish, review, and revise cooperative agreements, as needed	C										X							X	
Fiscal Analysis																			
Report the Fiscal Analysis within the Annual Report	C																	X	
Legal Authority																			
Review/revise the legal authority as needed	C										X							X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
Program Coordination																			
Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit	N	X					X	X	X	X		X							X
Track legislative and regulatory efforts related to the WQBPs	N						X	X	X	X		X							X
Permittees meet quarterly	C																		X
Participate in quarterly internal Stormwater Program Meetings	C																		X
Participate in statewide stormwater-related meetings, conferences, and groups, as needed	C																		X
Establish, review, and revise cooperative agreements, as needed	C											X							X
Fiscal Analysis																			
Report the Fiscal Analysis within the Annual Report	C																		X
Legal Authority																			
Review/revise the legal authority as needed	C											X							X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 2

Water Quality Monitoring Program

2.1 OVERVIEW

The Permit requires the continued implementation of a water quality monitoring program. The specific requirements of the water quality monitoring program are detailed in the Monitoring and Reporting Program (MRP) and are summarized in the sections below. The monitoring elements were designed to characterize trends over long-term periods and to identify specific POCs. The results of the water quality monitoring analysis in this section and the identification of the POCs assist the Permittees in establishing the priorities for the Stormwater Program and to target future implementation measures to reduce pollutant loadings and protect and enhance the beneficial uses of local receiving waters. This is discussed further in the subsequent sections of the ROWD.

A review of the MRP efforts conducted from the beginning of the Permit term (July 1, 2007) to December 31, 2011[1] is presented in this section. Data collected during this time period are also compared to historic program data. This section presents the following information:

- **Permit MRP Requirements (Section 2.2)**: This section summarizes the MRP requirements for the Permit.
- **MRP Background (Section 2.3)**: This section provides an overview of the evolution of the MRP over the course of all the permit terms.
- **Baseline Monitoring (Section 2.4)**: This section discusses the urban discharge and receiving water monitoring program, the determination of the POCs, and compares the historic urban discharge and receiving water data to data from the current Permit term. This section also provides a review of the water column toxicity monitoring and dry weather field screening monitoring.
- **Supplemental Monitoring (Section 2.5)**: This section provides a review of the Sediment Plan and Sediment Toxicity Monitoring. It also compares the bioassessment monitoring and detention basin monitoring conducted during the Permit term to data from the second term permit. Finally, this section provides an overview of the BMP Effectiveness Studies.
- **Conclusions (Section 2.6)**: This section summarizes conclusions from the monitoring effort and provides an overall assessment of the waterbody health in the SUA.
- **Proposed 2012-2017 Program (Section 2.7)**: This section provides recommendations for the future Monitoring Program and proposes specific program elements for the fourth term permit.

[1] An end date of December 31, 2011 was selected since there was insufficient time to analyze and run a quality control check on any data generated after December 31 for the purposes of this ROWD. However, these data will be compiled and analyzed in future reports.

2.2 MRP BACKGROUND

The CWA of 1987 required NPDES permits for discharges from municipal storm drain systems serving populations of 100,000 or more. In accordance with the U.S. EPA stormwater regulations, the City submitted a Part 1 Application in 1992. Part 2 of the City's application for an NPDES permit was submitted to the Regional Water Board in May of 1993. In February 1995, the City and County were named as co-permittees and the Regional Water Board issued NPDES storm water permit number CA00083470. The County submitted its Part 1 Application in February 1995 and Part 2 Application in February 1996.

The City's Part 2 Application included an initial Characterization Study conducted during the 1992-1993 wet weather season, as well as a proposed monitoring program for representative data collection during the first term permit. Following review of the City's Part 2 Application, modifications were made to the proposed monitoring program and submitted to the Regional Water Board in May 1995. The NPDES monitoring program was then implemented during the 1995-1996 wet weather season. The Permittees' first term permit expired on February 1, 2000, however the second term permit was not issued until October 18, 2002.

The MRP has evolved over the course of the three permit terms. While special studies were conducted prior to the first permit term MRP and during the first permit term, a brief summary of the basic requirements of the MRP over the Stormwater Program's history is provided in **Table 2-1**.

Table 2-1. Evolution of the MRP over the Course of Three Permit Terms

MRP Element	First Term Permit (1995-2002)	Second Term Permit (2002-2007)	Third Term Permit (2007-2012)
		Baseline Monitoring	
Urban Discharge and Receiving Water Monitoring	• 5 urban discharge sites • 3 storm events per year	• 4 urban discharge sites • 4 urban receiving water sites • 2 storm events and 2 dry weather events per year	• 3 upstream receiving water sites • 4 urban discharge sites • 4 urban receiving water sites • 2 storm events and 2 dry weather events per year
Water Column Toxicity Monitoring	• 3 sites • 1 storm event per year	• Coordinated with urban discharge and receiving water program receiving water monitoring • 2 storm events and 2 dry weather events twice per permit term	• Coordinated with urban discharge and receiving water program receiving water monitoring • 2 storm events and 2 dry weather events per year
Dry Weather Field Screening		• 20% of outfalls screened per year	• 20% of outfalls screened per year
		Supplemental Monitoring	
Sediment Plan and Sediment Toxicity Monitoring			• Monitor 2-3 sites per permit year • Monitor 1 post-first flush and 1 dry weather
Bioassessment		• One study during permit term	• Final report on second term permit's study
Detention Basin Monitoring		• 3 detention basins • Influent and effluent monitoring during two storm events twice per permit term • Sediment sampling during dry season twice per permit term	• 1 detention basin • Influent and effluent monitoring during two storm events per year • Sediment chemistry monitoring during one dry weather event per year • Sediment toxicity monitoring during one storm event and one dry weather event per year
BMP Effectiveness Study		• 1 BMP	• 2 BMPs

2.3 PERMIT MRP REQUIREMENTS AND ASSOCIATED ELEMENTS

The Permit MRP was designed to meet the following objectives, as outlined in the MRP:

1. Assess compliance with the Permit
2. Measure and improve the effectiveness of the SWMP
3. Assess the chemical, physical, and biological impacts on receiving waters resulting from urban runoff
4. Characterize urban runoff
5. Identify sources of pollutants
6. Assess the overall health and evaluate long-term trends in receiving water quality

In order to meet these objectives, the MRP consisted of a variety of monitoring elements. A brief description of each of the monitoring elements is provided in **Table 2-2**. For the purposes of this section and consistent with the MRP, the monitoring elements prescribed in Sections II.C through II.F were grouped under the title of "baseline monitoring." Elements prescribed in Sections II.G, II.H, III.A, and III.B were grouped under the title of "supplemental monitoring", since each of these elements had its own work plan and monitoring sites. The Water Quality Based Programs prescribed in Section II.I are discussed further in Section 9 of this ROWD.

Table 2-2. MRP Sections and Associated Elements

MRP Section	General Description	General Information	Baseline Program	Supplemental Program	Water Quality Based Programs
I	Guidance for submission of work plans and reports including Annual Report	X			
II.A	Requirements for baseline monitoring, described as coordinating monitoring of urban discharge and receiving waters		X		
II.B	Sampling protocol		X		
II.C	Urban Discharge Monitoring		X		
II.D	Receiving Water Monitoring		X		
II.E	Water Column Toxicity Monitoring		X		
II.F	Dry Weather Field Screening		X		
II.G	Sediment Toxicity Monitoring			X	
II.H	Bioassessment Monitoring			X	
II.I	Water Quality Based Programs (see ROWD Section 9)				X
III.A	Detention Basin Monitoring			X	
III.B	BMP Effectiveness Study			X	

The specific aspects of each of the MRP elements is described in **Table 2-3** (for the baseline monitoring elements) and **Table 2-4** (for the supplemental monitoring elements) and summarized further in the following sections. The tables also indicate which MRP objectives are addressed within each monitoring element. All elements fulfill the first two objectives, to assess compliance with the Permit and measure and improve the effectiveness of the SWMP through the evaluation of each program in the following sections. Therefore, for the most part, these objectives are not listed in **Table 2-3** and **Table 2-4**.

Table 2-3. Permit Baseline Monitoring Requirements

BASELINE MONITORING		
Monitoring Activity	**Description**	**MRP Objective Addressed**
Urban Discharge Monitoring (Section 2.4.1 to 2.4.3)	• Monitor four sites • Two wet weather events per permit year, including an early season storm[a] • Two dry weather events per permit year[a] • All events coordinated with receiving water monitoring	• Assess impacts on receiving waters from urban runoff • Characterize urban runoff • Identify sources of pollutants
Receiving Water Monitoring (Section 2.4.1 to 2.4.3)	• Monitor three upstream receiving water sites • Monitor four urban receiving water sites • Upstream and downstream sites paired with urban discharge monitoring stations • Two wet weather events per permit year, including an early season storm[a] • Two dry weather events per permit year[a] • All events coordinated with urban discharge monitoring	• Assess impacts on receiving waters from urban runoff • Assess overall health and evaluate long-term trends in receiving water quality
Water Column Toxicity (Section 2.4.4)	• Monitor three upstream receiving water sites • Monitor four urban receiving water sites • Monitor during each permit year • Two wet weather events per permit year, including an early season storm[a] • Two dry weather events per permit year[a] • All events coordinated with urban discharge and receiving water monitoring	• Assess impacts on receiving waters from urban runoff • Assess overall health and evaluate long-term trends in receiving water quality
Dry Weather Field Screening (Section 2.4.5)	• Field screening of 20% of all City outfall locations during dry weather periods during each permit year[b] • Compare field data to “action levels” and follow-up with additional screening at locations of concern	• Identify sources of pollutants

Notes:

a. Only one wet weather event and one dry weather event were monitored during 2011-2012.

b. No dry weather field screening was conducted during 2011-2012.

Table 2-4. Permit Supplemental Monitoring Requirements

SUPPLEMENTAL MONITORING		
Monitoring Activity	**Description**	**MRP Objectives Addressed**
Sediment Plan and Sediment Toxicity Monitoring (Section 2.5.1)	• Monitor two to three sites per permit year • One post-first flush event and one dry weather event	• Assess the impacts on receiving waters from urban runoff
Bioassessment Monitoring (Section 2.5.2)	• Summarize previous permit term results • Coordinate with the Surface Water Ambient Monitoring Program in development of an Index of Biological Integrity for the region • Conduct bioassessment monitoring during one permit year[1]	• Assess the impacts on receiving waters from urban runoff • Assess overall health and evaluate long-term trends in receiving water quality
Detention Basin Monitoring (Section 2.5.3)	• Monitor one basin for two non-consecutive permit years • Two wet weather influent and effluent monitoring events • One wet weather and one dry weather sediment toxicity events • One dry weather sediment chemistry event	• Characterize urban runoff • Measure and improve effectiveness of SWMP
BMP Effectiveness Studies (Section 2.5.4)	• 1 study of Legion Park • 1 study of Low Impact Development BMP	• Measure and improve effectiveness of SWMP

Note:
1. A monitoring program was not required for bioassessment

Long-term trends in receiving water quality based on multiple baseline and supplemental programs are also addressed in Section 2.6.

2.4 BASELINE MONITORING

2.4.1 Urban Discharge and Receiving Water Monitoring

Description

Four waterbodies have been historically monitored as part of the urban discharge and receiving water monitoring program, with the intent of assessing the long-term trends and potential impacts of urban runoff on receiving waters as well as the health of the SUA waterbodies. This information has also been used to identify POCs in order to prioritize the implementation actions within stormwater program.

The watersheds included in the monitoring program are:

- Mosher Slough (MS)
- Calaveras River (CR)
- Duck Creek (DC)
- Smith Canal (SC)

Each watershed included three monitoring locations, all of which are monitored on the same day:

- An upstream receiving water site[2]: these sites are located at the upstream border of the SUA to assess the water quality as it enters the SUA
- An urban discharge site: these sites are located at the point of discharge to the receiving water
- An urban receiving water site: these sites are located downstream of the urban discharge locations

The urban discharge monitoring locations are representative of urban discharges from the various land uses within the SUA, as shown in **Table 2-5**. The selected monitoring stations are located at sites that are representative of commercial, industrial, residential, and mixed land uses, in order to characterize different types of urban discharges. The period during which the site has been monitored is also provided for reference. **Figure 2-1** shows the location of the monitoring sites. Except for the Duck Creek site, DC-65, each urban discharge monitoring site is located at a pump station discharging directly to receiving water.

2 There is no upstream receiving water site on Smith Canal because the waterbody does not extend upstream of the SUA.

Table 2-5. Urban Discharge and Receiving Water Monitoring Sites

Monitoring Program	Station ID	Monitoring Site Location	Predominant Land Use	Watershed Area (acres)	Years Monitored[a]
Upstream Receiving Water Sites	MS-14RUS	Mosher Slough at North Cole Drive	Residential / Agricultural	N/A	2007-2011
	CR-46RUS[b]	Calaveras River at Solari Ranch Road	Agricultural	N/A	2007-2011
	CR-1[b]	Calaveras River at South Main Street Bridge	Agricultural / Open space	N/A	2007-2011
	DC-65RUS	Duck Creek at Stagecoach Road	Industrial / Agricultural	N/A	2007-2011
Urban Discharge Sites	MS-14	9211 Kelly Drive	Residential / Commercial	533	1992-2011
	CR-46	4250 North West Lane	Commercial / Residential	169	1992-2011
	DC-65[c]	555 Zephyr Drive	Industrial	343	1992-2010
	DC-66[c]	2916 South Airport Way	Mixed Use	399	2011[d]
	SC-1	840 Baker Place	Mixed Use	1,866	2002-2011
Urban Receiving Water Sites	MS-14R	Mosher Slough at Mariners Drive Bridge	Residential / Agricultural	N/A	2002-2011
	CR-46R	Calaveras River at east side of the bridge for El Dorado St.	Residential / Commercial	N/A	2002-2011
	DC-65R[e]	Duck Creek at Odell Ave. over-crossing	Residential / Industrial	N/A	2002-2010
	DC-66R[e]	Duck Creek on west side of the South Airport Way Bridge	Mixed Use	N/A	2011[d]
	SC-1R	Smith Canal at east side of the bridge for Pershing Avenue	Residential / Mixed Use	N/A	2002-2011

Notes:

a. During 2011-2012, only one storm event and one dry weather event were monitored. Both were conducted during 2011, so years monitored reflect monitoring through 2011 instead of the end of the Permit term

b. The upstream Calaveras River site was moved to the Diverting Canal (CR1) from a site on the Old Calaveras River (CR46RUS) in 2010-2011. This was because CR46RUS tended to have insufficient flow for sampling and the best alternative site was CR1 where there is generally continuous flow.

c. During 2011-2012, the Duck Creek sampling location was moved from DC-65 to DC-66 for dry weather sampling only because the discharge from DC65 is diverted to the sanitary sewer during most of the dry weather season.

d. Only one event (dry weather) was monitored at DC-66 and DC-66R, because a new monitoring location had not been identified until part way through the Permit term

e. Because the dry weather Duck Creek sampling location was moved upstream to DC-66, a closer urban receiving water location was established in 2011-2012: DC-66R. DC-66R is immediately downstream of DC-66 and thus more representative of the urban discharge impact from DC-66.

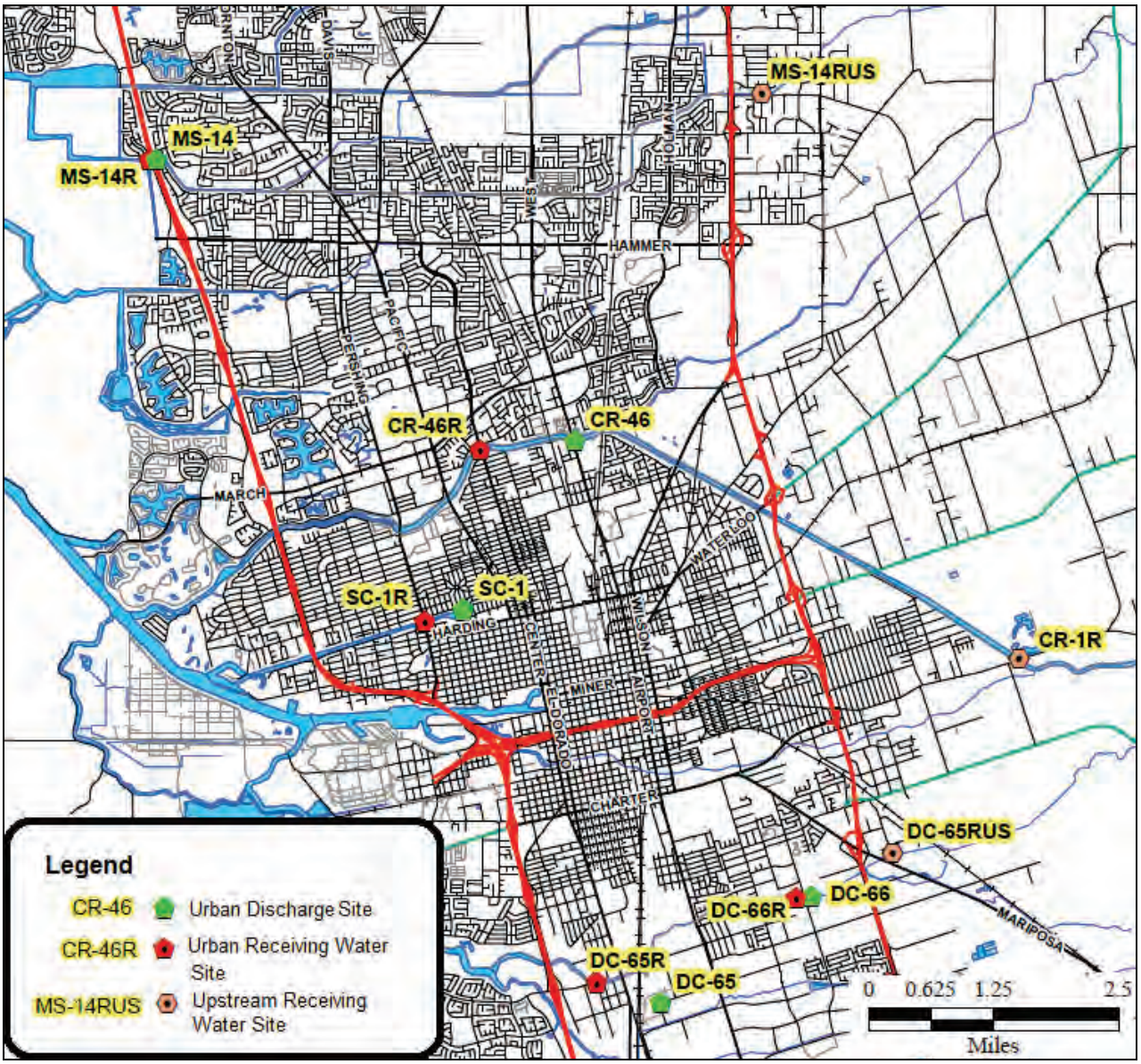


Figure 2-1. 2007-2011 Baseline Monitoring Locations in the Stockton Urbanized Area

From July 1, 2007 to June 30, 2011, the urban discharge and receiving water monitoring sites were monitored during one first flush storm, one other wet weather event and two dry weather events.[3] The first flush storm was monitored to characterize the wash-off of constituents built up on surfaces during the dry season. Other events captured wet weather wash-off versus dry weather urban discharge.

The monitoring events are summarized in **Table 2-6** (wet weather) and **Table 2-7** (dry weather). All monitoring data collected as part of the urban discharge and receiving water monitoring program are provided in **Appendix B-1** except for quality assurance/quality control (QA/QC) samples (e.g., field duplicates, field blanks). QA/QC data are provided with complete lab reports in **Appendix B-2**. In

[3] Upstream sites were not always monitored due to insufficient flow.

Appendix B-3, summary statistics (median, standard deviation and coefficient of variation) for conventionals and metals data collected from 2007-2012 are provided. The wet weather and dry weather statistics for individual urban discharge sites, as well as the combined data for all urban discharge sites, are presented in tables in **Appendix B-3**.

Table 2-6. Summary of Wet Weather Monitoring 2007-2012[1]

		Upstream Receiving Water			Urban Discharge				Urban Receiving Water			
Date	**Event Code**	MS-14RUS	CR-46RUS/ CR-1	DC-65RUS	MS-14	CR-46	DC-65	SC-1	MS-14R	CR-46R	DC-65R	SC-1R
1/4/2008	SE46	N/A	N/A	N/A	C	C	F	C	G	G	F	G
11/1/2008	SE47	G	I	I	G	G	G	C	G	G	G	G
2/5/2009	SE48	I	I	G	G*	G*	G*	G	G	G	G	G
10/13/2009	SE49	G	G	E	G	C	G	C	G	G	G	G
4/11/2010	SE50	G	I	G	C	C	C	C	G	G	G	G
11/19/2010	SE51	I	I	I	C	C	C	C	G	G	G	G
10/5/2011	SE52[a]	G	G	I	C	C	C	C	G	G	G	G

Notes:

C = Composite

F = Composite sampler failed and samples were not analyzed. The failure was not identified until the end of storm making grab sampling not possible.

N/A = Not applicable - site not established

G = Grab sample

I = Insufficient flow for monitoring

E = Sample not taken. Water was flowing east (away from SUA) and was not representative of upstream sources.

* Grab samples were substituted from composite samples because composite samplers were not operational

a. During the 2011-2012 Permit year, only one wet weather event was monitored

Incoming storm events were tracked and assessed against storm selection criteria (e.g., amount of precipitation, days since last rain event, duration of event) and the forecasted reliability that the storm would occur. Wet weather monitoring is particularly challenging in the SUA, since rainfall forecasts are often unreliable due to the convective nature of incoming storms. In addition, because storms normally intersect Stockton traveling from the west to the east, it is not unusual for northern Stockton to receive significant rainfall, while southern Stockton remains dry, or vice versa. With this in mind, wet weather events were timed to capture urban runoff impacts with the highest possible representation of the targeted storm event (e.g., high percent capture). In the case of 2010-2011, only one storm was captured due to difficulty in meeting storm selection criteria.

Data regarding total storm event rainfall, total runoff volume, percent storm event capture, duration of storm events, antecedent dry weather conditions, total runoff volume, and receiving water discharge conditions were recorded and reported with each annual report. During wet weather, all urban discharge samples were collected as flow-weighted composites[4] with the exception of a few parameters (volatile and semi-volatile organic compounds, oil and grease, and pathogen indicators) that were collected as grab samples.

[4] With the exception of a few composite-sampler malfunctions as described in **Table 2-5**.

Table 2-7. Summary of Dry Weather Monitoring 2007-2012

		Upstream Receiving Water			Urban Discharge				Urban Receiving Water			
Date	**Event Code**	MS-14RUS	CR-46RUS/ CR-1	DC-65RUS	MS-14	CR-46	DC-65/ DC-66	SC-1	MS-14R	CR-46R	DC-65R/ DC-66	SC-1R
9/10/2007	DW09	N/A	N/A	N/A	G	G	G	G	G	G	G	G
6/18/2008	DW10	N/A	N/A	N/A	G	G	G	G	G	G	G	G
2/4/2009	DW11	I	I	G	G	G	G*	G	G	G	G	G
5/22/2009	DW12	G	G	G	G	G	G	G	G	G	G	G
2/17/2010	DW13	I	I	G	G	G	G*	G	G	G	G	G
6/8/2010	DW14	G	G	G	G	G	G	G	G	G	G	G
4/4/2011	DW15	I	G	G	G	G	G*	G	G	G	G	G
5/25/2011	DW16	G	G	G	G	G	N	G	G	G	G	G
8/30/2011	DW17[a]	G	G	G	G	G	G**	G	G	G	G**	G

Notes:

G = Grab sample

N/A = Not applicable - site not established

I = Insufficient flow for monitoring

N = Site not monitored due to changes in monitoring plan for Duck Creek

*These events sampled at DC-65 are believed to be representative of urban discharge because they were not collected during the period of dry weather diversion

** Final dry weather Duck Creek samples were collected at DC-66 and DC-66R

a. Only one dry weather event was monitored in 2011-2012

During dry weather all urban discharge samples were collected as grab samples, and all receiving water samples (dry and wet) were collected as grab samples. In 2010-2011, the Permittees realized that the majority of dry weather events sampled at DC-65 were not representative of urban discharge. Since the 1990s, from April 15 to September 15, flow has been diverted from DC-65 to the sanitary sewer. Therefore only the noted events in **Table 2-6** evaluated urban discharge impacts at DC-65R. The final dry weather event, DW17, was conducted in 2011-2012 when the Permittees had selected a new set of sites on Duck Creek.

Pollutants of Concern

The Permittees utilize the process described below to prioritize the constituents that warrant special attention due to their potential impact on the local waterbodies (i.e., POCs). The following subsections describe:

- Event by Event Methodology for Reports or Water Quality Exceedances: This section explains how a single cause and contribute exceedance is determined
- Methodology for Identification of POCs: This section explains how cause and contribute exceedances are tallied to determine POCs

Event by Event Methodology for Reports of Water Quality Exceedances

The Permittees are required to provide a summary of the monitoring data, including the identification of water quality improvements or degradation and recommendations for improvements to the SWMP. To support this effort, all receiving water monitoring data were compared with applicable WQOs [5] contained in:

- The Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan)
- The California Toxics Rule (CTR)
- California Title 22 regulations[6]

In addition, Provision C.3 of the Permit required the Permittees to develop Reports of Water Quality Exceedances (RWQEs) on an event by event basis when the Permittees determined that their stormwater discharges had likely caused or contributed to an exceedance of applicable WQOs. **Figure 2-2** shows the steps used to determine if a RWQE is needed and what information is included.

[5] The term "water quality objectives" is used interchangeably with "water quality criteria."

[6] There is some question as to the applicability of these water quality objectives and criteria to stormwater discharges. It is not clear that a proper Water Code section 13241 analysis was performed on the state water quality objectives used herein. In addition, the State Water Resources Control Board (State Board) has determined that the federal water quality criteria, such as are contained in the CTR, do "not apply to regulation of storm water discharges." *See* State Board Policy for Implementation of Toxics Standards for the Inland Surface Waters, Enclosed Bays, and Estuaries of California at pg. 1, fn 1; *see also* CTR Preamble, 65 Fed. Reg. 31682 (5/18/00), which does not identify municipal stormwater as a potentially affected entity. Moreover, there is no indication that these objectives and criteria were ever intended to be applied to stormwater discharges at the end of pipe. Nevertheless, these objectives and criteria are used herein for a conservative evaluation of exceedances.

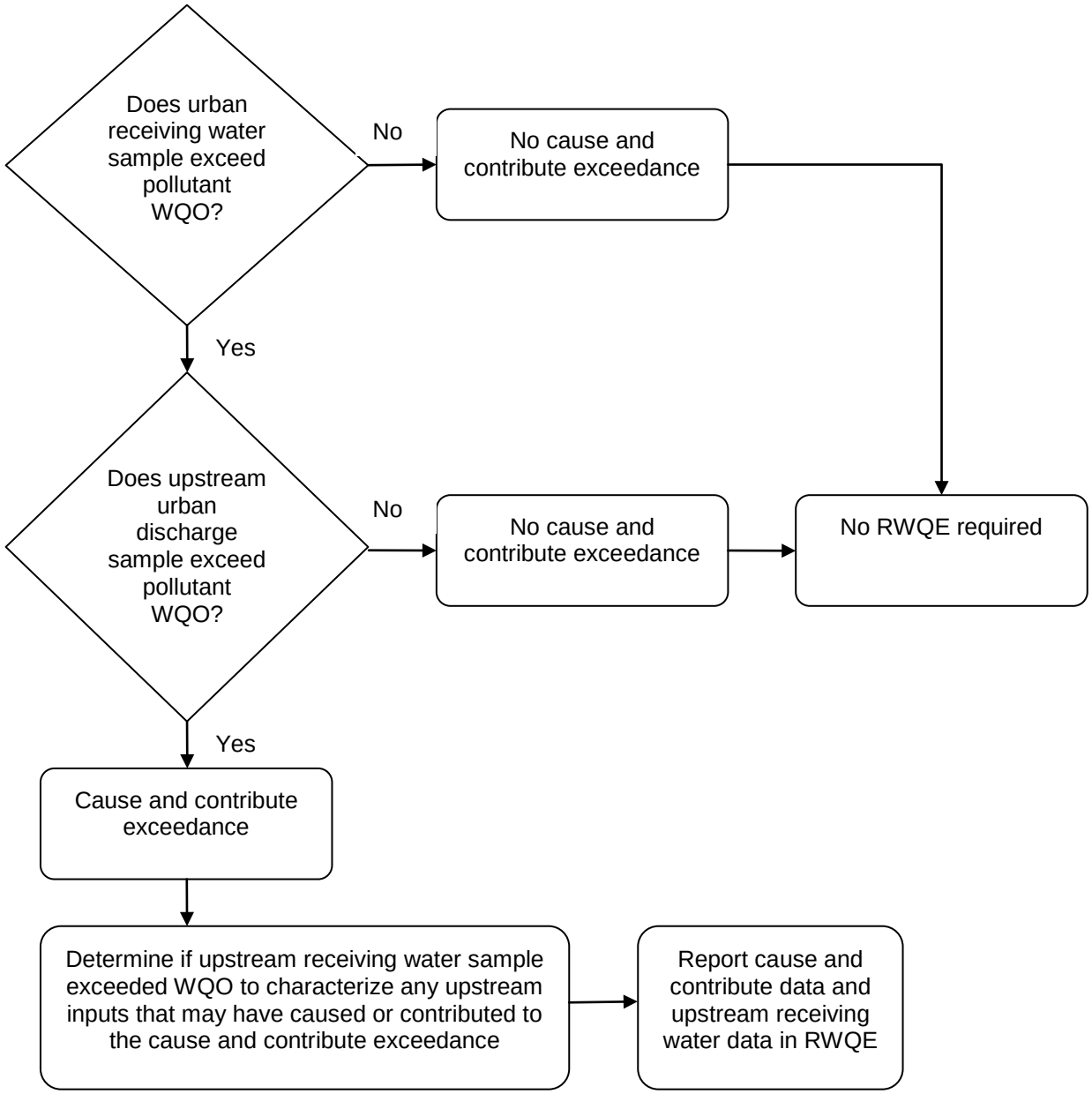


Figure 2-2. Cause and Contribute Exceedance Determination and Requirement for Report of Water Quality Exceedance

Although the Permittees have derived a methodology to determine when the RWQEs are necessary, the following conservative assumptions associated with this methodology should be noted:

- Simple comparisons of receiving water constituent concentrations to the WQOs do not consider the *duration* of exceedances. For example, toxicity-based aquatic life WQOs, which are reflective of either acute (1-hour) or chronic (4-day) exposures, are intrinsically based on both duration *and* frequency. As such, it should be noted that chronic WQOs may be compared to the environmental

sample, but because urban runoff influence is short term and episodic (often much less than 4-days), the environmental impact may be minimal or non-existent. For this reason, wet weather samples were compared to acute criteria, while dry weather samples were compared to chronic criteria to use a more conservative approach.

- Human health WQOs generally refer to a consistent exposure period over a lifetime (e.g., three liters of water consumed per day for seventy years). The duration of storm event exposure depends on the hydrology of the waterbody, which can be very dynamic, and thus it is most likely that an acute (instantaneous) exposure to a contaminant would occur, as opposed to an exposure on chronic or human health (longer term) timescales. In fact, when applicable, secondary Title 22 Maximum Contaminant Levels (MCLs) are used, which represent taste and odor criteria, instead of primary MCLs, which represent actual human health risk due to drinking of water. In addition, Title 22 drinking water objectives are applicable to potable water coming from the tap after the source water had undergone appropriate treatment. Thus, the comparison to Title 22 drinking water objectives (secondary MCLs or CTR human health objectives) is considered highly conservative.

The WQOs used for comparison for each constituent are presented in **Appendix B-1**. Many constituents monitored did not have corresponding WQOs in the CTR, Basin Plan, and Title 22 Regulations (e.g., pyrethroids). Therefore, they could not be evaluated using this process.

For those constituents that were compared to WQOs, the RWQEs were summarized in each annual report along with Program control measures (e.g., street sweeping) that specifically target these constituents and have the potential to reduce these exceedances. Because relatively few data points were available for analysis in individual annual reports, the approach used in annual reports should be viewed as a *planning-level* effort to urban discharge impacts. The following section of the ROWD takes a more long-term view of exceedances to determine the POCs using data from the entire permit term.

Methodology for Identification of Pollutants of Concern

As a part of the development of the annual reports and the ROWD, a summary of the RWQEs is developed to assist in identifying the POCs. Once the summary is developed, the following approach is used to identify the urban discharge and receiving water monitoring-based POCs:

- First, event-waterbody combinations are tallied. The number of event-waterbody combinations is defined as the number of sampling events multiplied by the number of waterbodies sampled[7]. During the Permit term, there were 58 event-waterbody combinations.
- The event-waterbody combinations are then assessed to determine how many samples exceeded the benchmark rate of 25% for cause or contribute exceedances for a given constituent. This benchmark was established by the Permittees in order to provide a conservative guideline for the identification of POCs and allow for a prioritization of the stormwater program activities. In addition, this approach is consistent with the methodology used for the POC identification in the 2007 ROWD.

A depiction of this process is shown in the flow chart in **Figure 2-3**.

[7] Six waterbody-events were not tallied. Five dry weather waterbody-events were not tallied on Duck Creek because DC-65 was not representative of urban discharge during these events. One wet weather waterbody-event was not completed at Duck Creek. See **Table 2-5** and **Table 2-6** for further explanation.

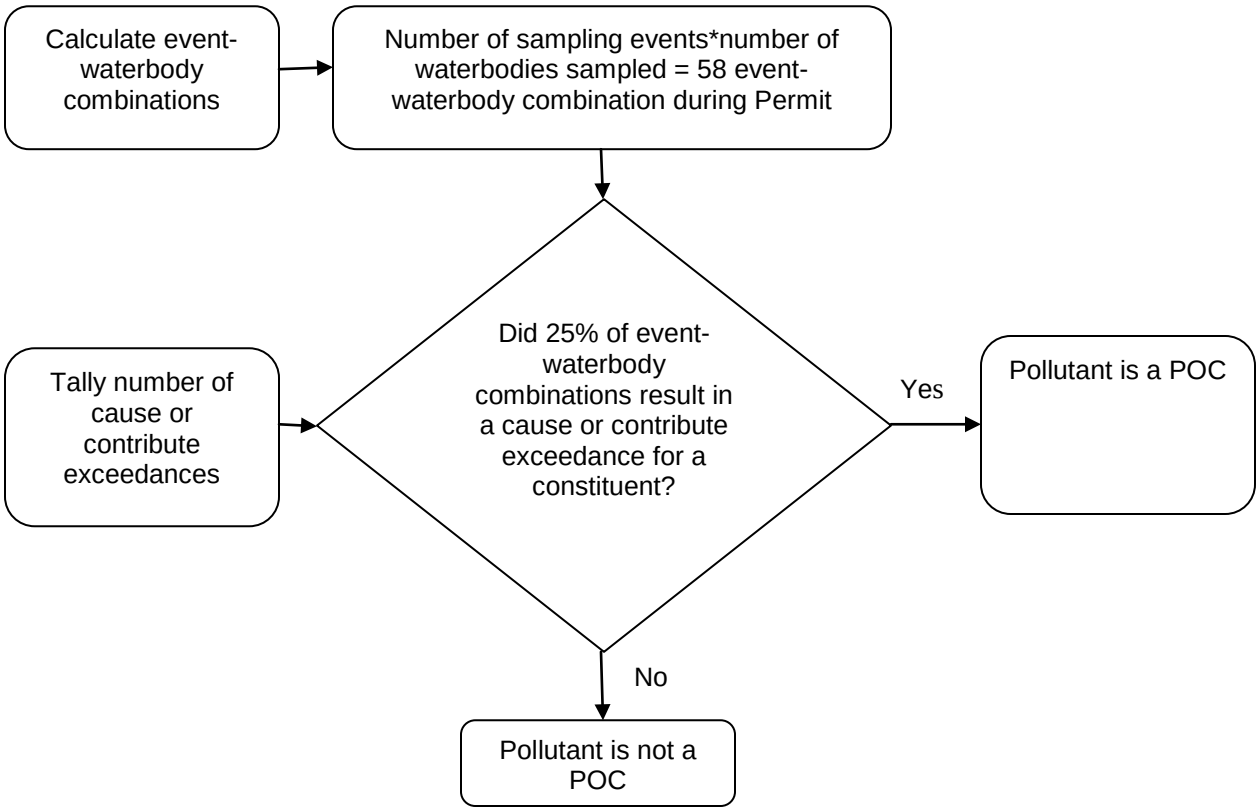


Figure 2-3. Process for Determination of POCs during a Permit Term

All of the RWQEs[8] and pollutants that exceeded the benchmark and were identified as POCs are summarized in **Table 2-8**. In addition, the Permit POCs are also compared to the second term permit POCs to show the long-term trends. These trends are discussed in further detail in the following section.

[8] Some RWQEs were submitted for Duck Creek dry weather events that are not included in this tally. This is because the urban discharge was determined not to be representative of urban discharge after the RWQE had already been submitted.

Table 2-8. 2007-2011 Summary of Cause and Contribute Exceedances and Identification of Pollutants of Concern[a,b]

Constituents	Units	Lowest WQO	WQO Source[c]	Mosher Slough (MS-14/ MS-14R)		Calaveras River (CR-46/CR-46R)		Duck Creek (DC-65/DC-65R & DC-66/DC66-R)		Smith Canal (SC-1/ SC-1R)		All		POC in 2002 - 2006	POC in 2007 - 2011
				Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet		
Aluminum (total)	µg/L	200	2nd MCL	1	3		5	2	6	2	5	5	19	Yes	Yes
Aluminum (dissolved)	µg/L	200	EPA Ambient WQ				1		1				2	No	No
Copper (total)	µg/L	H	CTR	1	2	1	4	2	1	1	1	5	8	Yes	No
Iron (total)	µg/L	300	2nd MCL	1	2	4	4	1	5	2	5	8	16	Yes	Yes
Lead (total)	µg/L	H	CTR					1				1		Yes	No
Zinc (total)	µg/L	H	CTR				2		1				3	No	No
E. coli	MPN/ 100mL	235	Basin Plan		5	2	6		5		3	2	19	Yes	Yes
Fecal coliform	MPN/ 100mL	400	Basin Plan	1	5	2	6		4	3	4	6	19	Yes	Yes
Electrical Conductivity	µmhos/ cm	1,000	Basin Plan							1		1		No	No
DO	mg/L	>5-6[d]	Basin Plan	1					1	1		2	1	No	No

Notes:

a. There were a total of 58 event-waterbody combinations in 2007-2012

b. Highlighted cells indicate POCs

b. WQO = Water Quality Objective; 2nd MCL = secondary MCL; EPA Ambient WQ = EPA Ambient Water Quality; CTR = California Toxics Rule

c. WQO for DO is >5 mg/L from December 1 to August 31 and >6 mg/L from September 1 to November 30

Historic Urban Discharge and Receiving Water Data Analysis

As previously discussed, the City began monitoring the water quality in the SUA in 1992 as part of its application for an NPDES permit. In order to assess all of the water quality monitoring that has been conducted to date and to analyze periods of the same duration, this section looks at five year periods beginning with 1992. However, the analysis for the POCs is based on POCs identified in the second term permit and the third term Permit (which are slightly different time frames than the other analyses).

During the second term permit, seven POCs were identified (based on the comparison with the appropriate water quality objective):

- Total copper (chronic CTR – aquatic life)
- Total lead (chronic CTR– aquatic life)
- Total aluminum (secondary MCL – drinking water taste and odor)
- Total iron (secondary MCL – drinking water taste and odor)
- Fecal coliform (Basin Plan – water contact human health)
- *E. coli* (proposed Basin Plan amendment – water contact human health)
- Oil and grease (Basin Plan narrative – environmental aesthetics)

During the second term permit, during both wet and dry weather events, metals were compared to the chronic CTR criteria. In 2007-2012, dry weather events were compared to the chronic CTR criteria and wet weather events were compared to the acute CTR criteria as discussed in the previous section. Other than this exception, POCs were determined in the same manner during the second term permit as the third term Permit.

During the third term Permit there were only 4 POCs identified (based on the comparison with the appropriate water quality objective):

- Total aluminum (secondary MCL – drinking water taste and odor)
- Total iron (secondary MCL – drinking water taste and odor)
- Fecal coliform (Basin Plan – water contact human health)
- *E. coli* (proposed Basin Plan amendment – water contact human health)

While the Permittees did not conduct analyses to determine POCs until the second term permit and the current Permit, they did monitor for some of the POCs listed above during earlier permit terms. For the purposes of showing long-term trends, the following analysis considers data by five-year periods and includes some data that were not required as part of an MRP. The data that were collected during these five year periods is summarized in **Table 2-9**. Long-term trends for Permit POCs are analyzed on a site by site basis in the following section. The combined list of POCs from the second term permit and the Permit are analyzed using the combined datasets from all sites in the section thereafter.

Table 2-9. POC Monitoring Comparison for Five Year Periods (1992 to 2012)

	1992-1997	1997-2002	2002-2007	2007-2012
Sites Monitored				
Upstream Receiving Water Sites				x
MS-14RUS				x
CR-46RUS/CR-1				x
DC-65RUS				x
Urban Discharge Sites				x
MS-14	x	x	x	x
CR-46	x	x	x	x
DC-65	x	x	x	x
SC-1			x	x
Urban Receiving Water Sites			x	x
MS-14R			x	x
CR-46R			x	x
DC-65R			x	x
SC-1R			x	x
Number of Events Monitored				
Wet Weather	12	17	15	7
Dry Weather	0	0	8	9
Pollutants of Concern Monitored				
Total aluminum			x	x
Total copper	x	x	x	x
Total iron			x	x
Total lead	x	x	x	x
E. coli			x	x
Fecal coliform	x	x	x	x
Oil and grease	x	x	x	x

A review of **Table 2-9** shows that initially only urban discharge sites were monitored. Later, urban receiving water sites were added. In the Permit, upstream receiving water sites were added. The number of events monitored (both wet and dry) and the POCs that were monitored also changed over these five year periods.

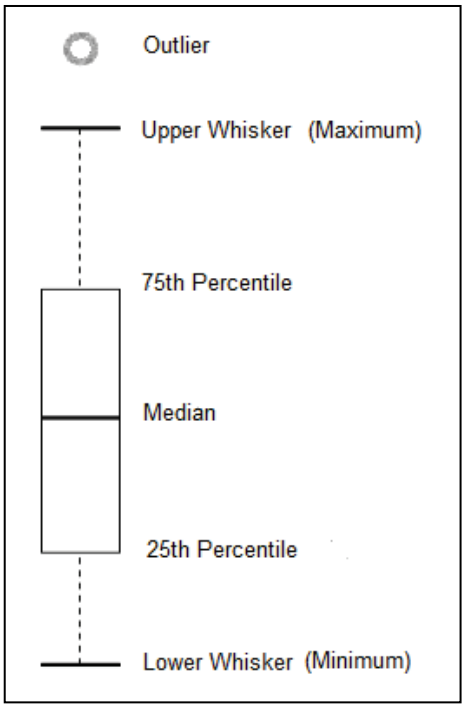


Figure 2-4. Definition of a Box Plot

Box plots of all of the urban discharge data for the POCs from 1992-2012 are provided below. In **Figure 2-4**, to the left, a visual representation of the definition of a box plot is shown. The following should be noted:

- The box plots display statistical information about a given dataset along the y-axis.
- The 25th percentile and 75th percentile of the dataset are represented by the upper and lower edges of the rectangle, and the median is represented by a thick horizontal line within the box.
- The "whiskers" of the box extend to the minimum and maximum values of the dataset, or to approximately 1.6 times the difference between the 75th percentile and 25th percentile, called the interquartile range (IQR), divided by the square root of the number of data points in the set[9]. In the latter case, values beyond the extent of the whiskers are presented as empty circles to designate their status as outliers.
- The total metals wet weather boxes represent event mean concentrations (EMCs) determined from flow weighted composites.[10]
- All dry weather boxes and all, fecal coliform, and oil and grease figure boxes represent grab samples.
- Dry weather data are presented as yellow boxes to the left and wet weather event data are presented as light blue boxes to the right.
- The WQO for each associated constituent is presented as a dashed horizontal blue line.

Because most dry weather Duck Creek events were excluded, the sample size for analysis was too small to create box plots.

Site Specific Data Analysis for Identified POCs

Box and whisker plots for each urban discharge site are provided in **Figure 2-5** through **Figure 2-8**. Statistics for 2002-2007 and historical data with an analysis of any statistically significant change between permit terms are presented in the following **Table 2-10** through **Table 2-17**. Site-specific conclusions drawn from these figures follow.

[9] http://stat.ethz.ch/R-manual/R-patched/library/grDevices/html/boxplot.stats.html

[10] Wet weather samples have occasionally been grab samples as noted in **Table 2-6**.

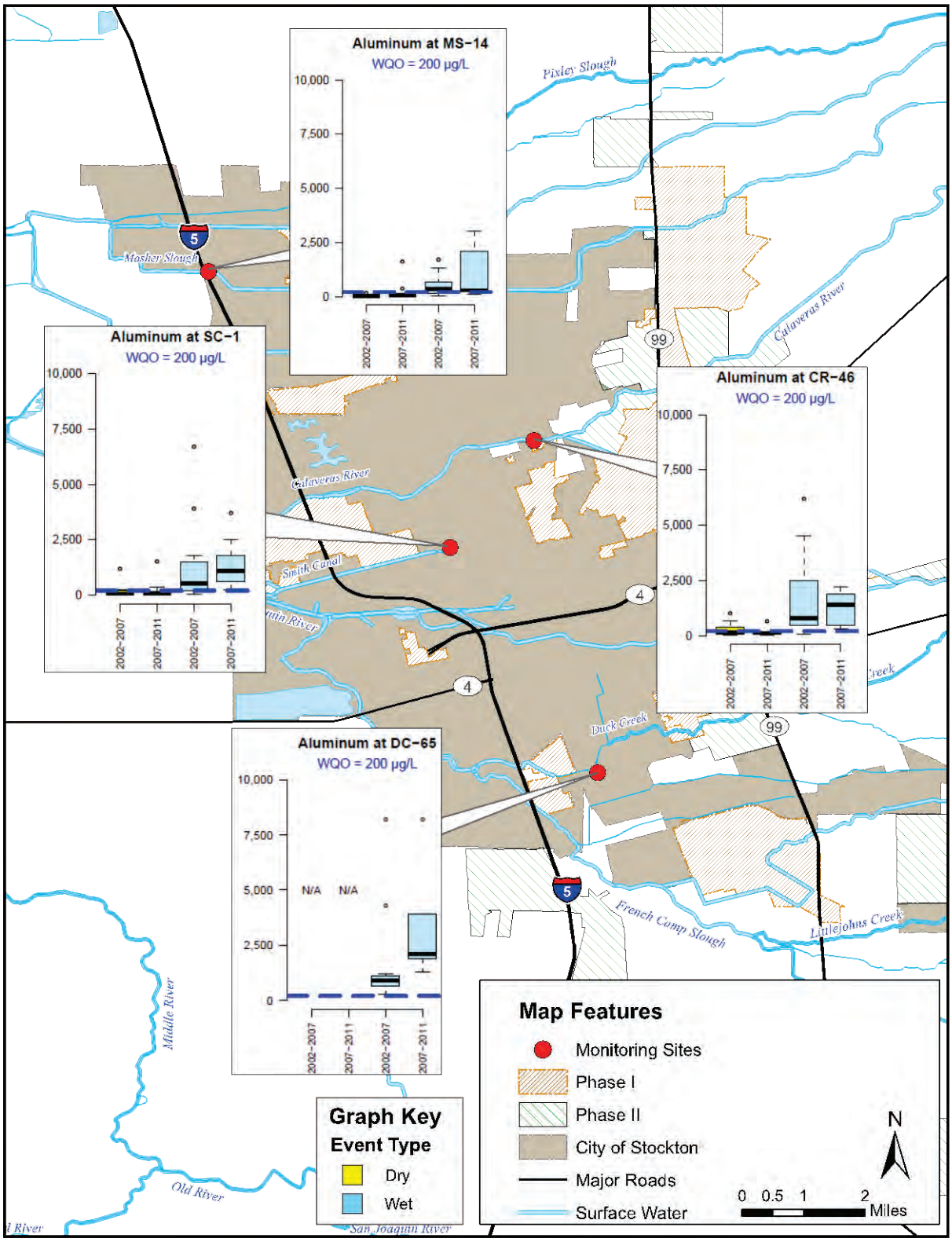
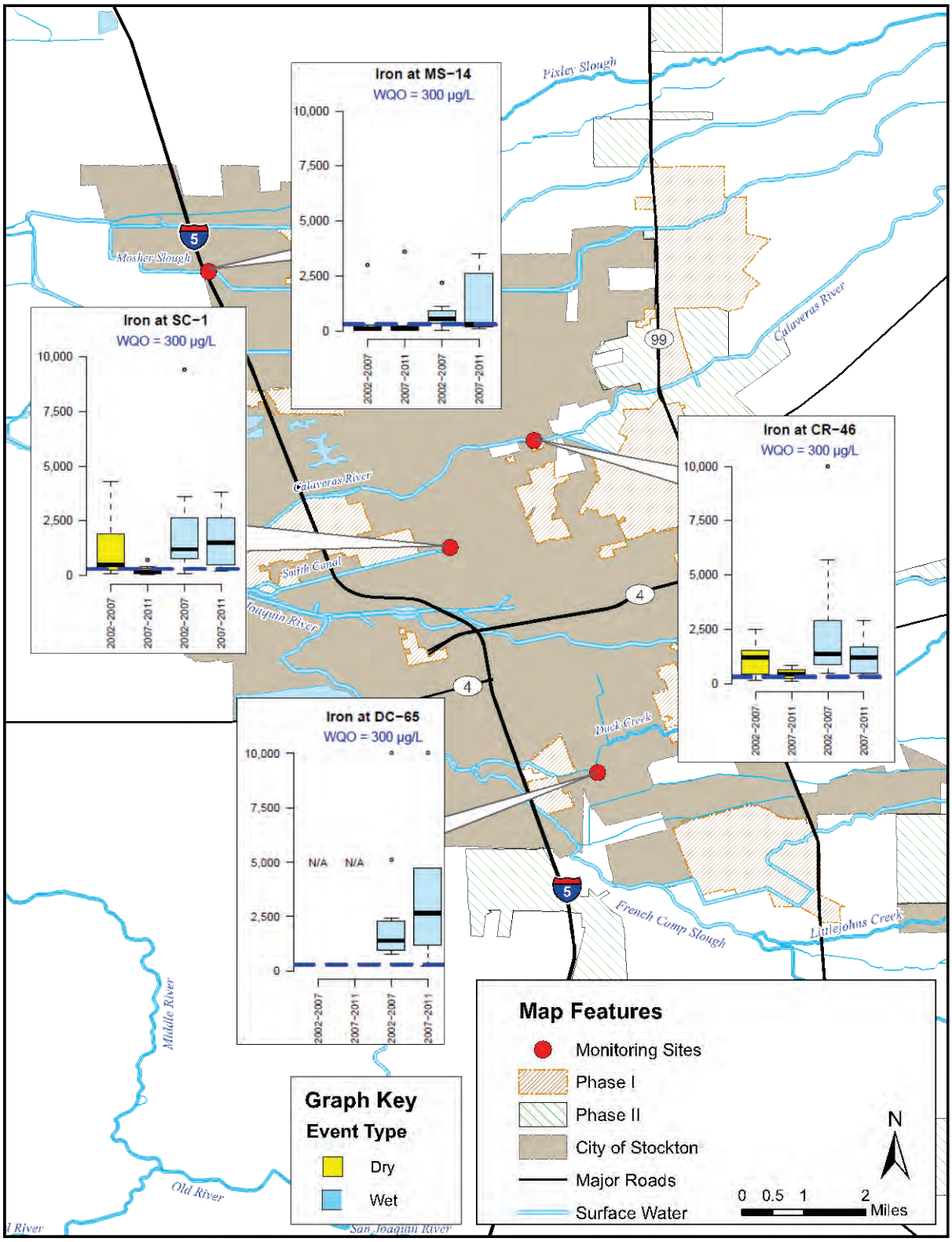


Figure 2-5. Total Aluminum Concentrations Summarized for Dry Weather and Wet Weather Events during 2002-2011



FFigure 2-6. Total Iron Concentrations Summarized for Dry Weather and Wet Weather Events during 2002-2011

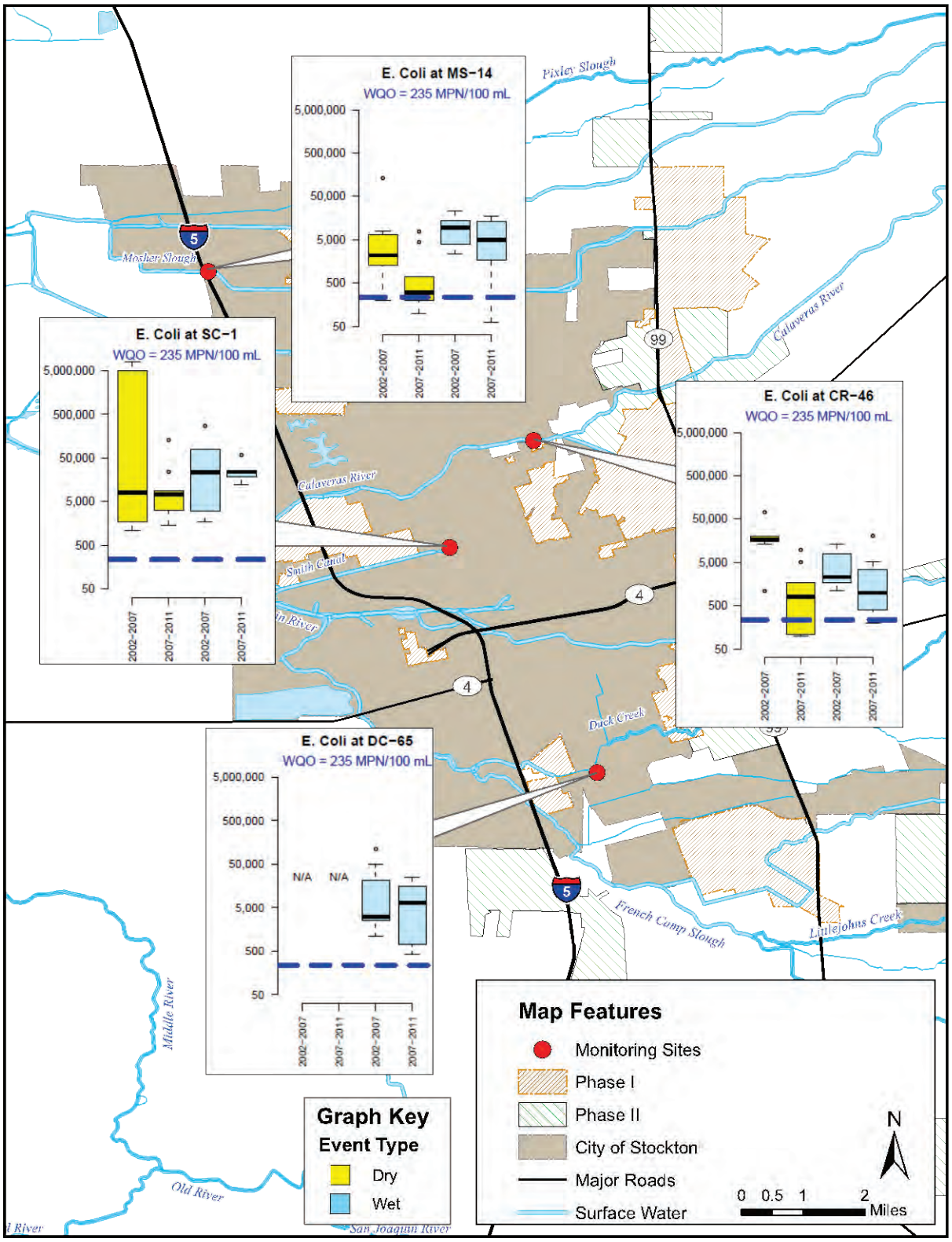


Figure 2-7. *E. coli* Concentrations Summarized for Dry Weather and Wet Weather Events during 2002-2011

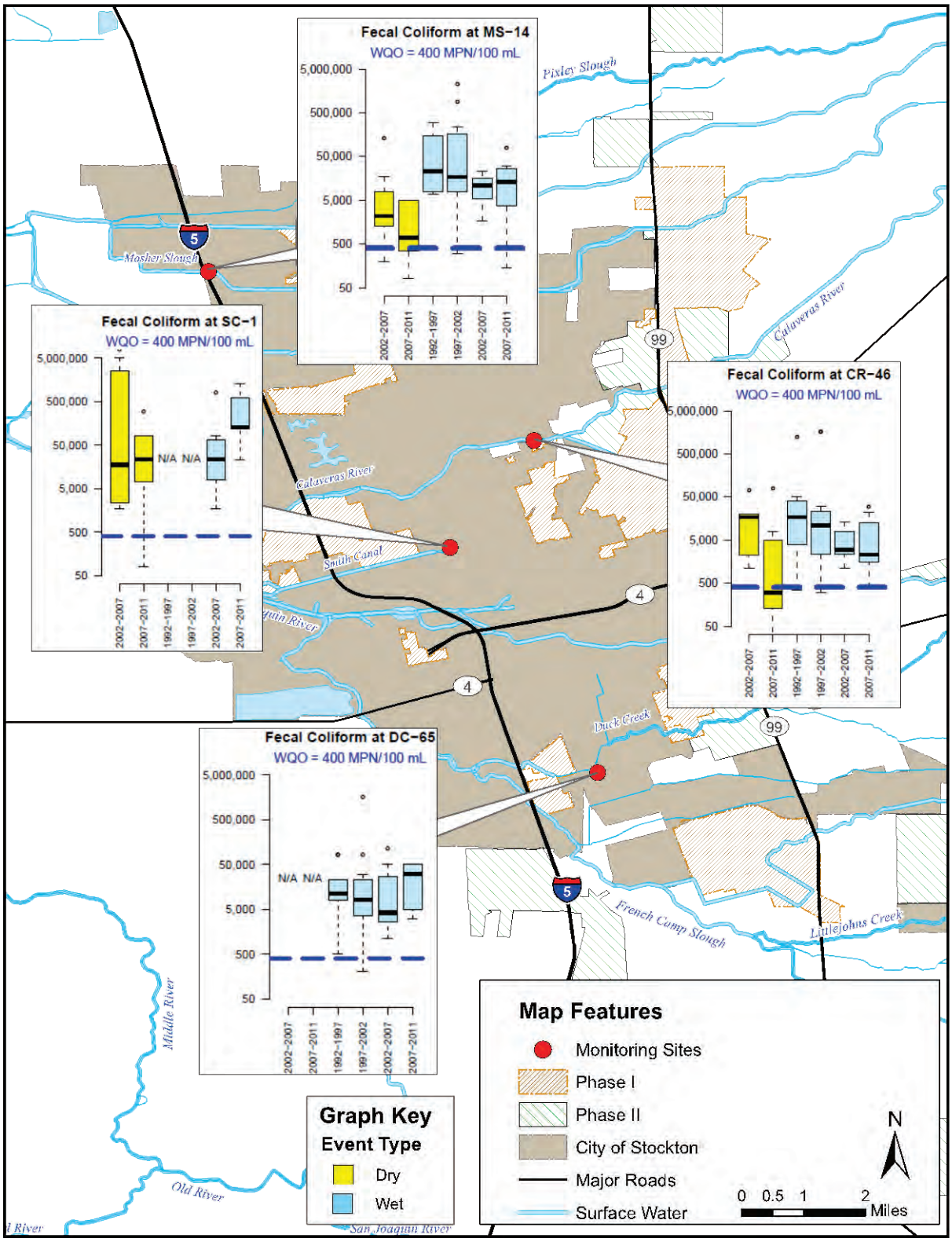


Figure 2-8. Fecal Coliform Concentrations Summarized for Dry Weather and Wet Weather Events during 1992-2011

In **Table 2-10** through **Table 2-17**, all sampling data were grouped by site, event type (dry or wet weather), POC, and permit term. The number of samples in each data group and median or geometric mean of each group is presented. While medians are shown for all constituents in the box plots, geometric means are shown for pathogen indicators in the tables. Geometric means are more appropriate for pathogen indicators because individual concentrations of pathogen indicators can range so widely.

In the final column of each table, groups from different permit terms were compared to each other to examine if there were statistically significant differences between the groups. 2002-2007 data were compared to 2007-2012 data for all POCs. Where older data were available, 2007-2012 data were also compared to the entire dataset from 1992-2007. Statistical differences indicate trends over time. These comparisons were performed using analysis of variance (ANOVA) methods that compare the variance across permit terms to the variance within the 2007-2012 dataset. [11]

Table 2-10. Comparison of Site Specific Dry Weather Total Aluminum Medians from 2002-2007 to 2007-2011

		2002-2007		2007-2011		Statistically Significant Trend between 2002-2007 and 2007-2011?
Site	Units	N	Median	N	Median	
MS-14	µg/L	9	26	9	50	None
CR-46	µg/L	9	150	9	120	None
SC-1	µg/L	8	69.5	9	77	None

Table 2-11. Comparison of Site Specific Wet Weather Total Aluminum Medians from 2002-2007 to 2007-2011

		2002-2007		2007-2011		Statistically Significant Trend between 2002-2007 and 2007-2011?
Site	Units	N	Median	N	Median	
MS-14	µg/L	12	340	7	280	None
CR-46	µg/L	10	785	7	1400	None
DC-65	µg/L	11	910	6	2100	None
SC-1	µg/L	12	525	7	1100	None

Table 2-12. Comparison of Site Specific Dry Weather Total Iron Medians from 2002-2007 to 2007-2011

		2002-2007		2007-2011		Statistically Significant Trend between 2002-2007 and 2007-2011?
Site	Units	N	Median	N	Median	
MS-14	µg/L	9	94	8	98.5	None
CR-46	µg/L	9	1200	8	425	Decrease
SC-1	µg/L	8	485	8	165	Decrease

[11] ANOVA analysis is a well-established and universally-accepted statistical method that tests the assumption that an individual dataset's mean is the same as other datasets to which it is being compared. If the probability of this hypothesis is found to be outside of a 95% confidence interval, it is rejected and the datasets are considered to be different to a statistically significant degree. For more information, please refer to the statistical textbooks regarding F tests.

Table 2-13. Comparison of Site Specific Wet Weather Total Iron Medians from 2002-2007 to 2007-2011

Site	Units	2002-2007 N	2002-2007 Median	2007-2011 N	2007-2011 Median	Statistically Significant Trend between 2002-2007 and 2007-2011?
MS-14	µg/L	12	560	7	310	None
CR-46	µg/L	10	1350	7	1200	None
DC-65	µg/L	11	1400	6	2650	None
SC-1	µg/L	12	1200	7	1500	None

Table 2-14. Comparison of Site Specific Dry Weather *E. coli* Geometric means from 2002-2007 to 2007-2011

Site	Units	2002-2007 N	2002-2007 Geometric mean	2007-2012 N	2007-2012 Geometric mean	Statistically Significant Trend between 2002-2007 and 2007-2011?
MS-14	MPN/100mL	7	3,155	9	497	None
CR-46	MPN/100mL	7	14,188	9	578	Decrease
SC-1	MPN/100mL	6	37,800	9	7,531	None

Table 2-15. Comparison of Site Specific Wet Weather *E. coli* Geometric means from 2002-2007 to 2007-2011

Site	Units	2002-2007 N	2002-2007 Geometric mean	2007-2012 N	2007-2012 Geometric mean	Statistically Significant Trend between 2002-2007 and 2007-2011?
MS-14	MPN/100mL	10	7,984	7	2,492	None
CR-46	MPN/100mL	9	3,152	7	1,278	None
DC-65	MPN/100mL	11	7,077	6	3,956	None
SC-1	MPN/100mL	10	19,001	7	22,860	None

Table 2-16. Comparison of Site Specific Dry Weather Fecal Coliform Geometric means from 2002-2007 to 2007-2011

Site	Units	2002-2007 N	2002-2007 Geometric mean	2007-2011 N	2007-2011 Geometric mean	Statistically Significant Trend between 2002-2007 and 2007-2011?
MS-14	MPN/100mL	9	3,397	9	946	None
CR-46	MPN/100mL	9	8,844	9	750	Decrease
SC-1	MPN/100mL	8	39,521	9	14,045	None

Table 2-17. Comparison of Site Specific Wet Weather Fecal Coliform Geometric means from Five Year Periods from 1992 to 2012 (Units = MPN/100mL)

	1992-1997		1997-2002		2002-2007		2007-2011		Statistically Significant Trend between Permit Terms?
Site	N	Geometric mean	N	Geometric mean	N	Geometric mean	N	Geometric mean	
MS-14	11	50,091	15	30,604	11	8,106	7	7,347	None
CR-46	12	25,506	15	9,533	10	3,999	7	3,189	None
DC-65	9	10,763	15	10,883	12	7,349	6	16,560	None
SC-1		N/A*		N/A*	11	21,341	7	188,828	Increase

Notes:
* Smith Canal was not sampled during these five year periods

A review of **Table 2-10**, **Table 2-12**, **Table 2-14**, and **Table 2-16** for dry weather conditions leads to the following observations:

- Sufficient data for analysis of dry weather trends were not available at DC-65.
- Total aluminum concentrations generally were similar during both 2002-2007 and 2007-2012 for all sites.
- Total iron concentrations showed a statically significant decrease at CR-46 and SC-1. Total iron concentrations at MS-14 for the two permit terms were similar and below the WQO.
- *E. coli* and fecal coliform dry weather trends seem to be similar at individual sites:
    - At MS-14, the range of concentrations in both *E. coli* and fecal coliform was slightly lower from 2002-2007 to 2007-2012. From 2002-2007 to 2007-2012, geometric means decreased, but the decrease was not statistically significant.
    - At CR-46, the ranges of concentrations for both *E. coli* and fecal coliform datasets are larger in 2002-2007 than in 2007-2012, but CR-46 had lower *E. coli* and fecal coliform geometric means in 2007-2012. The differences between the datasets for these two permit terms at CR-46 for both *E. coli* and fecal coliform are statistically different and showed a downward trend.
    - At SC-1, the ranges of concentrations in both *E. coli* and fecal coliform datasets are larger in 2002-2007 than in 2007-2012, and geometric means decreased, but not at a statistically significant level.

A review of **Table 2-11**, **Table 2-13**, **Table 2-15**, and **Table 2-17** for wet weather conditions leads to the following observations:

- At MS-14, total aluminum and total iron concentrations showed a greater range in 2007-2012 than in 2002-2007, but the medians remained similar between the two permit terms. Overall, MS-14 medians were closer to the WQOs than other sites.
- At CR-46, the median total aluminum concentration increased from 2002-2007 to 2007-2012 but the median iron concentration decreased. Neither difference was statistically significant.
- At SC-1, aluminum concentration medians from 2002-2007 to 2007-2012 were similar but showed an increase although not statistically significant. Likewise the total iron concentration range and median increased although the increase was not statistically significant.

- At DC-65, the range of concentrations of both total aluminum and total iron was greater in 2007-2012 than in 2002-2007, but the medians did not show a statistically significant difference. Overall, concentrations of total aluminum and total iron at DC-65 were above the WQOs more often than the other sites.
- *E. coli* concentration ranges and geometric means tracked downward but not statistically significant between 2002-2007 and 2007-2012.
- Long-term (1992-2012) wet weather trends in fecal coliform did not show statistically significant trends, with the exception of SC-1. At SC-1, between 2002-2007 and 2007-2012 there was a statistically significant increase in fecal coliform concentrations. Long-term trends over more than two permit terms could not be analyzed because SC-1 was not monitored prior to 2002-2007.

Data Analysis for Identified POCs for All Sites (Combined Data)

The combined analysis for data at all sites assesses a list of POCs expanded to include both POCs from the Permit, as well as the second permit term. Summary box plots are presented for each Permit POC in **Figure 2-9** and each additional second term permit POC in **Figure 2-10**. Therefore, **Figure 2-9** shows the additional POCs of total copper, total lead, and oil and grease. Summary statistics for all sites are also presented for the POCs from 2002-2007 and 2007-2012 in **Table 2-18** (dry weather) and **Table 2-19** (wet weather). Hardness-based WQOs for total copper and total lead were calculated based on median dry weather and wet weather hardness values, respectively from 2002-2012. The same ANOVA analysis of statistically significant trends used in the previous section is used for these tables.

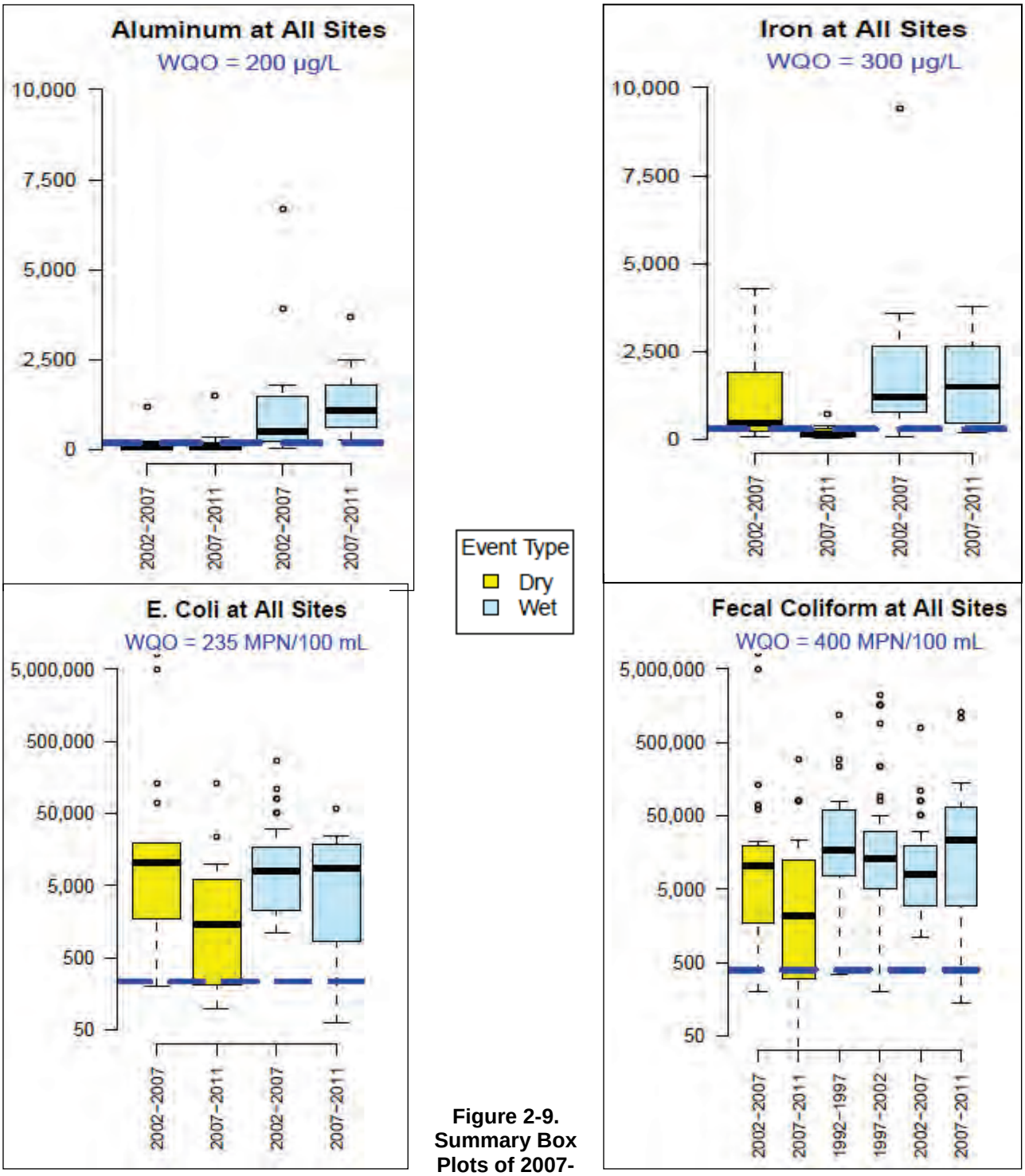
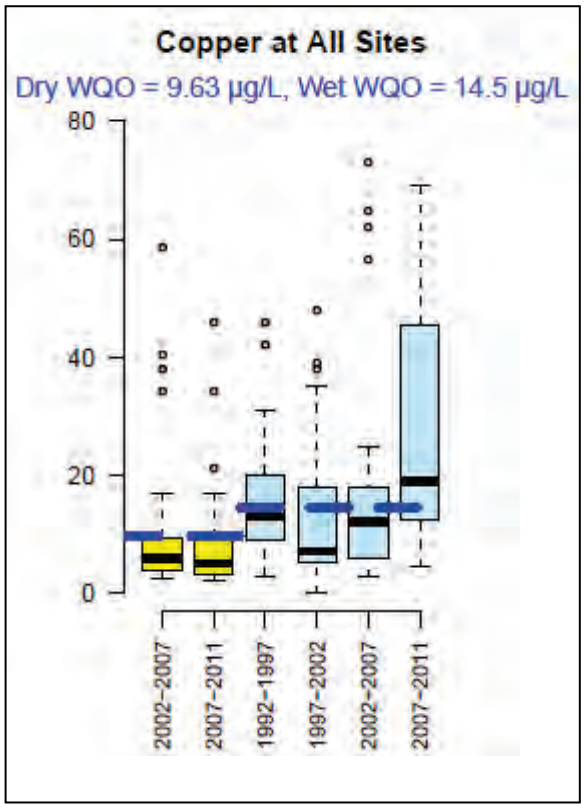
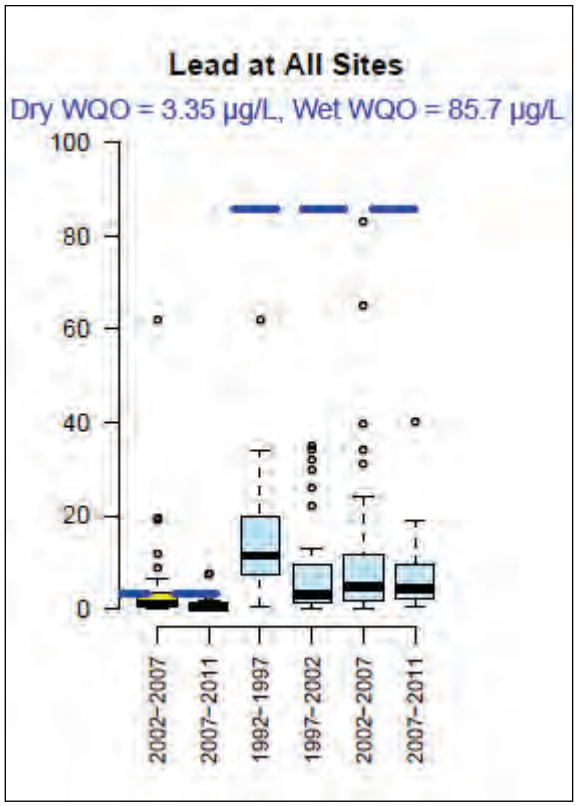
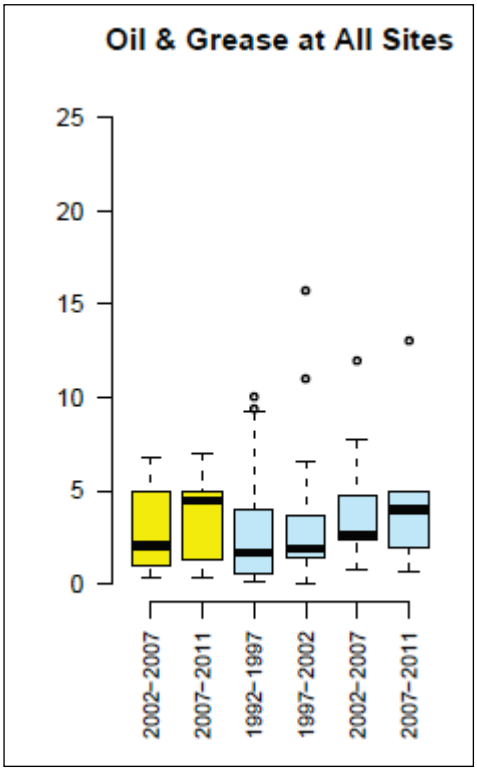


Figure 2-9. Summary Box Plots of 2007-2012 POC Concentrations during Dry and Wet Weather at All Sites Over the Course of Multiple Permit Terms[1]

1. Total aluminum and total iron concentrations in µg/L and *E. coli* and fecal coliform concentrations in MPN/100mL







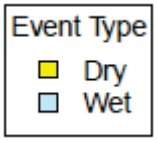


Figure 2-10. Summary Box Plots of 2002-2007 POC Concentrations during Dry and Wet Weather at All Sites over the Course of Multiple Permit Terms[1]

1. Total copper and total lead concentrations in µg/L. Oil and grease concentrations in mg/L.

Table 2-18. Comparison of Dry Weather Medians for Combined Data from All Sites from 2002-2007 and 2007-2011[1]

Parameter	Units	2002-2007 N	2002-2007 Median/ Geomean[2]	2007-2011 N	2007-2011 Median/ Geomean[2]	Statistically Significant Trend between 2002-2007 and 2007-2011?
Aluminum	µg/L	34	115	33	140	None
Copper	µg/L	34	5.9	34	5.1	None
Iron	µg/L	34	585	30	215	None
Lead	µg/L	34	1.1	30	0.5	Decrease
E. Coli	MPN/100mL	26	13,537	34	980	Decrease
Fecal Coliform	MPN/100mL	34	13,683	34	1,730	Decrease
Oil & Grease	mg/L	34	2.1	34	4.5	None

Notes:
1. Gray highlighting indicates Permit POCs. Non-highlighted parameters are additional second term permit POCs.
2. Geometric means (geomeans) are presented for pathogen indicators. Medians are presented for all other constituents.

Table 2-19. Comparison of Wet Weather Medians for Combined Data from All Sites from 2002-2007 and 2007-2011[1]

Parameter	Units	2002-2007 N	2002-2007 Median/ Geomean[2]	2007-2011 N	2007-2011 Median/ Geomean[2]	Statistically Significant Trend between 2002-2007 and 2007-2011?
Aluminum	µg/L	45	630	27	1,400	None
Copper	µg/L	43	12	27	19	Increase
Iron	µg/L	45	1,000	27	1,500	None
Lead	µg/L	43	4.8	27	4.4	None
E. Coli	MPN/100mL	40	7,783	27	4,125	Decrease
Fecal Coliform	MPN/100mL	44	8,562	27	16,448	None
Oil & Grease	mg/L	44	2.6	26	4.0	None

Notes:
1. Gray highlighting indicates Permit POCs. Non-highlighted parameters are additional second term permit POCs.
2. Geometric means (geomeans) are presented for pathogen indicators. Medians are presented for all other constituents.

The observations for the combined dry weather data from all sites included the following:

- Median dry weather metals concentrations are consistently lower than wet weather concentrations, as shown in box plots and tables above.
- Total aluminum concentrations were all close to the WQO with the exception of a few outliers.
- Total iron concentrations were close to the WQO in 2007-2012, while higher concentrations were seen in 2002-2007. However, there was no statistically significant difference between the two permit terms.

- Total copper concentrations were similar between 2002-2007 and 2007-2012 and medians were below the median hardness-based WQO during both five-year periods.

- Total lead medians were similar for 2002-2007 and 2007-2012. During both five-year periods, the medians were below the median hardness-based WQO.

- *E. coli* and fecal coliform ranges decreased from 2002-2007 to 2007-2012. These decreases and the decreases in geometric means were statistically significant.

- Oil and grease medians increased slightly from 1992 to 2011, but the increase between 2002-2007 and 2007-2012 was not statistically significant.

During wet weather, the following trends were observed:

- Total aluminum and total iron medians were above the WQO in both 2002-2007 and 2007-2012.

- Total copper medians were below the median hardness-based WQO except in 2007-2012.

- All total lead concentrations (including outliers) were below the median hardness-based WQO during all five-year periods.

- There was no statistically significant difference in total metals concentrations between 2002-2007 and 2007-2012, with the exception of copper, for which a statistically significant increase was shown. However, because only urban discharge statistics are presented in these tables, the statistics are not representative of cause and contribute exceedances. For this reason, total copper was not a POC in 2007-2012.

- There was a statistically significant decrease in *E. coli* concentrations.

- Fecal coliform concentrations did not show a clear trend.

- Oil and grease medians increased between 2002-2007 and 2007-2011, but the increase was not statistically significant and the range of concentrations remained similar.

Conclusions

Both the site by site and combined data analysis largely showed either a statistically significant decrease in constituent concentrations or no statistically significant trends between 2002-2007 and 2007-2012.

<u>Site by Site Analysis</u>

- The analysis compared the data from 2002-2007 to the data from 2007-2012 for all Permit POCs except for fecal coliform.
- For fecal coliform the datasets from 1992-1997; 1997-2002; 2002-2007; and 2007-2012 were compared to each other. This is due to the fact that the data for fecal coliform were available from the earlier permit terms.
- The comparisons were made on a site by site basis for dry and wet weather in box plots and tables.

- For the comparisons for each POC for each site, 4 out of 28 comparisons showed a statistically significant decrease from 2002-2007 to 2007-2012, 1 showed a statistically significant increase, and the remaining 23 comparisons did not show any trends.
- The decreases occurred at the following sites:
    - At CR-46, there was a statistically significant decrease in total iron, *E. coli*, and fecal coliform. This analysis suggests that there has been an improvement in the discharge from the CR-46 drainageshed.
    - At SC-1, there was a statistically significant decrease in total iron.
- Only one statistically significant increase was observed: an increase in fecal coliform concentrations at SC-1 from 2002-2007 to 2007-2012.

<u>Combined Data Analysis</u>

- The analysis compared combined dry weather data from all sites from 2002-2007 to 2007-2012 in box plots and tables.
- The analysis compared combined wet weather data from all sites from 1992-1997; 1997-2002, 2002-2007; and 2007-2012 in box plots and data from 2002-2007 and 2007-2012 in tables.
- Four out of fourteen comparisons between 2002-2007 and 2007-2012 in the tables indicated a statistically significant decrease in the discharge of POCs from 2002-2007 to 2007-2012. The decreases occurred during the following event types for the combined list of POCs:
    - During dry weather, total lead, *E. coli*, and fecal coliform concentrations showed a statistically significant decrease.
    - During wet weather, *E. coli* concentrations showed a statistically significant decrease.
- The only increase was seen during dry weather for total copper. As noted in the previous section, because this analysis only reviews urban discharge and not receiving water quality, total copper did not qualify as a POC in 2007-2012. This is because urban discharge during 2007-2012 did not possibly cause or contribute to water quality exceedances during 25% or more of event-waterbody combinations.

Overall, these results show that water quality in urban discharge has largely been maintained or has improved from 2002-2007 to 2007-2012.

2.4.2 Water Column Toxicity Monitoring

The water column toxicity monitoring component assessed toxicity in local receiving waters and, if found, attempted to determine the cause of toxicity. Toxicity monitoring was coordinated with urban discharge and receiving water monitoring, and was conducted at all receiving water sites listed in **Table 2-20**. Toxicity samples were collected from receiving waters during two wet events and two dry events each during each permit year.[12]

Water column toxicity was conducted in accordance with U.S. EPA methods. Short-term chronic toxicity tests were based on two freshwater species:

1) Three-brood (6-8 day) survival and reproduction test with water fleas (the crustacean *Ceriodaphnia dubia*)

2) Seven-day survival and growth test with larval fathead minnows (*Pimephales promelas*).

Using these two species, two criteria were used to define chronic toxicity, as follows:

1) If 100% mortality of either species was detected in a receiving water sample within 24 hours of test initiation, a dilution series testing was initiated (from 6.25% to 100% receiving water) to determine if toxicity was persistent.

2) If statistically significant toxicity[13] was found at the end of a 6 day test for *Ceriodaphnia dubia* or a seven-day test for fathead minnow, a Toxicity Identification Evaluation (TIE) was required

The results of the Permit toxicity data are shown in **Table 2-20** and **Table 2-21**. These tables also compare available toxicity data from the second term permit when toxicity testing was conducted twice during the permit term. Overall, when combined with the urban discharge and receiving water monitoring results, the toxicity testing provides a mechanism to evaluate possible effects of the stormwater discharges on aquatic life. The data in **Table 2-20** are summarized in **Figure 2-11**, in which the percent of samples that demonstrated toxicity each year is shown.

[12] Water column toxicity monitoring was not conducted during 2011-2012.

[13] Statistically significant toxicity is defined as a greater than or equal to 50% increase in fathead minnow or *Ceriodaphnia dubia* mortality or reduction in *Ceriodaphnia dubia* reproduction compared to the laboratory control.

Table 2-20. Comparison of Water Column Toxicity Detected from 2005-2012

		Upstream Receiving Water Sites			Urban Receiving Water Sites			
Event	**Date**	**MS-14RUS**	**CR-46RUS/ CR-1**	**DC-65RUS**	**MS-14R**	**CR-46R**	**DC-65R/ DC-66R**	**SC-1R**
2005-2006								
SE39	12/1/05	N/A	N/A	N/A	No[1]	No[1]	--	--
SE40	2/26/06	N/A	N/A	N/A	No	--	No	No
SE41	3/20/06	N/A	N/A	N/A	--	No	No	--
SE42	4/12/06	N/A	N/A	N/A	--	--	--	No
DW05	5/10/06	N/A	N/A	N/A	No	No	No	No
DW06	6/5/06	N/A	N/A	N/A	FG	No	CS	CR
2008-2009								
SE47	11/1/08	No	--	--	No	No	CS	No
DW11	2/4/09	--	--	No	FS	--	No	FS
SE48	2/5/09	--	--	No	FS	No	No	No
DW12	5/20/09	No	FS	No	No	No	CR	No
Makeup	6/4/09	--	--	--	No	No	--	No
2009-2010								
SE49	10/13/09	FS	CS, FS	--	No	No	CS	No
DW13	2/17/10	--	--	No	No	No	No	No
SE50	4/11/10	CS	--	No	No	No	No	No
DW14	6/8/10	No	No[1]	No	No	No	No	CR
2010-2011								
SE51	11/19-20/11	No	--	No	No	No	No	No
DW15	4/4/11	--	No	No	No	No	No	No
DW16	5/25/11	No	No	No	No	No	No	No
2011-2012								
DW17[2]	8/30/11	No	No	No	No	No	No	No
SE52[2]	10/5/11	No	No	--	No	FS	No	No

Notes:

-- = Sample not collected during this event.

CR = Significant reduction in *Ceriodaphnia dubia* reproduction.

CS = Significant reduction in *Ceriodaphnia dubia* survival.

FG = Significant reduction in fathead minnow growth.

FS = Significant reduction in fathead minnow survival.

N/A = Not applicable because site did not exist in 2002-2007 permit.

No = No significant toxicity.

1. Pathogen related mortality (PRM) was observed, which is a common side effect that does not necessarily indicate ambient toxicity.

2. Only one dry weather and one wet weather event were completed in 2011-2012.

Table 2-21. Possible Sources of Toxicity Observed from 2005-2012

Event	Date	Upstream Receiving Water Sites		Urban Receiving Water Sites			
		MS-14RUS	CR-46RUS	MS-14R	CR-46R	DC-65R	SC-1R
2005-2006							
DW06	6/5/06	N/A	N/A	FG: Not persistent	No	CS: Possibly non-polar organics, non-polar metal chelates, metabolically-active substances, and/or metals	CR: Not persistent
2008-2009							
SE47	11/1/08	No	--	No	No	CS: Not persistent	No
DW11	2/4/09	--	--	FS[2]	--	No	FS[2]
SE48	2/5/09	--	--	FS[3]	No	No	No
DW12	5/20/09	No	FS: Metals	No	No	CR: Not persistent	No
2009-2010							
SE49	10/13/09	FS: Possibly metals and/or metabolically active substances	CS, FS: Possibly metals, persistent organics and/or metabolically active substances	No	No	CS: Possibly particulate-associated contaminants (e.g., metals, persistent organics) and/or substance blocking enzyme activity	No
SE50	4/11/10	CS: Possibly diazinon	No	No	No	No	No
DW14	6/8/10	No	No	No	No	No	CR: Persistent, but inconclusive
2011-2012							
SE52	10/5/11	No	No	No	CR: Not persistent	No	No

Notes:

-- = Sample not collected during this event; CR = Significant reduction in *Ceriodaphnia dubia* reproduction; CS = Significant reduction in *Ceriodaphnia dubia* survival; FG = Significant reduction in fathead minnow growth; FS = Significant reduction in fathead minnow survival; N/A = Not applicable because site did not exist in 2002-2007 permit; No = No significant toxicity; 1. PRM was observed, which is a common side effect that does not necessarily indicate ambient toxicity; 2. Due to miscommunication with the lab, no TIE was conducted. A makeup event was conducted to test for toxicity again, but no toxicity was detected; 3. Due to miscommunication with the lab, no TIE was conducted. There were no qualifying wet weather events after SE48, so no makeup event was conducted.

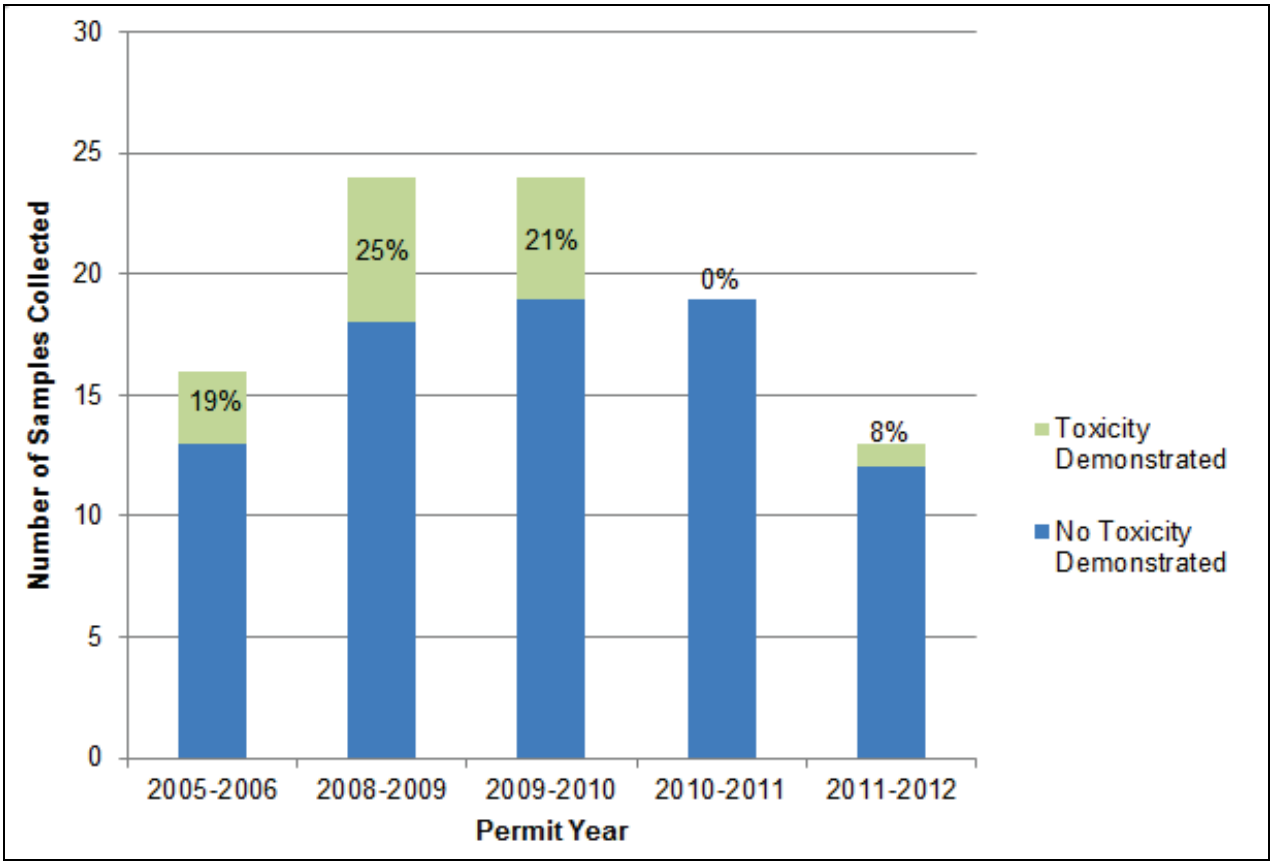


Figure 2-11. Percent of Samples Demonstrating Toxicity by Permit Year

Conclusions

As shown in **Figure 2-11**, there has been an overall decrease in toxicity during this Permit term, although 1 sample (representing 8% of all samples collected) demonstrated toxicity in 2011-2012. As shown in **Table 2-20**, DC-65RUS samples have not had detected toxicity. MS-14R has shown improvement with toxicity detected three times between 2005-2006 and 2008-2009, but not detected in the subsequent three years. In general, CR-46R has demonstrated very little toxicity, with only one sample demonstrating toxicity in 2011-2012.

The source of toxicity has always been either speculative and/or limited to broad categories (e.g. the only confirmed source of toxicity is “metals”), as shown in **Table 2-21**. Often toxicity has not been persistent. Furthermore, there are no clear trends in more prevalent toxicity at specific sites and overall toxicity in samples is decreasing. Therefore, after five years of toxicity monitoring, the program has shown limited utility.

2.4.3 Dry Weather Field Screening

City of Stockton

The primary purpose of the dry weather field screening is to identify potential IDs and ICs so that they can be addressed and/or eliminated. For the dry weather field screening, 20% of the outfalls were monitored each year from 2007-2008 to 2010-2011[14]. Each event was preceded by a non-rainfall period of at least two weeks. Sites that had sufficient flow were analyzed in the field for temperature, pH, phenols, chlorine, total copper, electrical conductivity (EC), methylene blue activated substances (MBAS, which are detergents/surfactants), and turbidity.

The field screening action levels, established by the Permittees in a letter to the Regional Water Board dated April 14, 2006, are shown in **Table 2-22**. The action levels were derived by comparing the City's water supply and water quality data to 2004-2005 dry weather field screening results. Action levels were selected to be sufficiently stringent enough to detect illicit discharges, but not target over watering or groundwater seepage.

Table 2-22. Dry Weather Field Screening Action Levels

Constituent	Units	Action Levels
Phenols	mg/L	>0.017
Total copper	mg/L	>2
EC	µmhos/cm	>700
MBAS	mg/L	>0.275
Turbidity	NTU	>55

Table 2-23 shows the results of the dry weather field screening that was conducted from 2007-2011. In the majority of cases, the outfalls did not have sufficient flow to monitor the field screening parameters. Of those outfalls that had sufficient flow, action levels were exceeded at 20% of the outfalls monitored. However, this represents only 3% of all the outfalls monitored. Only EC action levels were exceeded.

Once an action level was exceeded, source tracking upstream of the exceedance location was conducted[15] in order to isolate the discharge to a specific segment of the storm drain system, if possible.

[14] Pursuant to the program modifications noted in the 2010-2011 Annual Report, since dry weather field screening was conducted for four years, 80% of all outfalls were screened during the Permit term.

[15] The field procedure used to identify potential IDs and ICs through further investigation was provided to the Regional Water Board in the letter dated April 14, 2006.

Table 2-23. Dry Weather Field Screening History during 2007-2011

Year	Number of Outfalls Screened	Number of Outfalls with Sufficient Flow for Initial Screening	Number that Exceeded Action Level	Number of Outfalls with Sufficient Flow During Follow-Up Screening	Action Level Exceeded?	Suspected Source
FY0708	24	2	0	1	0	N/A
FY0809	23	3	2	3	2	Alum added to residential lake; groundwater infiltration
FY0910	23	8	0	8	0	N/A
FY1011	20	2	1	2	1	Residential landscaping
Total	90	15	3	14	3	
% of Total	100%	17%	3%	16%	3%	

For the cases where the EC action levels were exceeded, in many cases the source tracking was difficult because the EC measurements upstream of outfalls with the exceedances did not lead to a clear responsible party (e.g., food processing industries, car washes). In contrast, all the exceedances occurred in predominantly residential areas. This made access to upstream manholes limited due to gated communities. Some of the results included:

- In 2008-2009, the source of the first EC numeric action level exceedance was speculated to be groundwater seepage because EC levels were consistent with local groundwater EC levels. The second EC action level exceedance was also tracked to a primarily residential area where alum added to a residential lake was also a possible source. However, there were no clear signs of IDs or ICs.[16]
- In 2010-2011, source tracking indicated runoff from a gated community. Source tracking was hampered by lack of access to the gated community; it was speculated that high EC concentrations might be the result of irrigation runoff.

Based on these results, the ability of dry weather field screening to identify IDs and ICs in a cost effective manner is under consideration.

County of San Joaquin

The County has annually monitored all 46 of its outfalls and has not detected any IDs during this permit term.

2.5 SUPPLEMENTAL MONITORING

2.5.1 Sediment Toxicity Monitoring

The purpose of the sediment toxicity monitoring program was to: (1) characterize sediment toxicity within the SUA receiving waters subject to urban discharge; (2) assess the significance of the increase in urban pyrethroid usage; and, (3) based on the results, identify BMPs for controlling sources of sediment toxicity. Sediment toxicity samples were collected from receiving waters during a "post first-flush[17]" storm event and one dry season event during each Permit year as shown in **Table 2-24**. Sampling locations (see **Figure 2-12)** and monitoring schedule were based on site selection requirements summarized in Section 3.0 and Section 7.0 of the *Sediment Toxicity Work Plan* (Appendix H-8 of the SWMP).

Sediment toxicity monitoring included sampling of receiving water sites downstream of discharges from developments of various ages and land uses as described in **Table 2-25**. Sediment samples were collected and analyzed using standardized ten-day sediment toxicity testing[18] using the amphipod *Hyalella azteca (Hyalella)*, and for total organic carbon (TOC) and grain size[19] analyses. The sediment toxicity program established a percent reduction threshold (greater than 50% *Hyalella* mortality) as compared to the

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[16] The City sends out annual letters to local homeowner associations with outreach discouraging the use of chemicals in residential lakes and ponds. These lakes and ponds provide stormwater detention during wet weather events, which in turn benefits stormwater quality. In order to serve this purpose they must be allowed to overflow when they reach capacity.

[17] Post first flush timeframe is within two weeks of the qualifying storm event. A qualifying storm event is characterized as a rain event forecasted at least 72 hours in advance with at least a 75% probability to produce at least 0.25 inches of precipitation and preceded by a continuous three day dry period.

18 U.S. EPA standardized ten-day sediment toxicity testing method (EPA/600/R-99/064)

[19] #200 Sieve Wash Analysis (ASTM D4464M) analysis

laboratory control to initiate further chemical analyses consisting of chlorpyrifos and pyrethroid pesticides. Corresponding laboratory analytical data collected during the Permittees' Pesticide Plan, Detention Basin Monitoring Plan, and Urban Discharge Program were used to further evaluate the current results of *Sediment Toxicity Work Plan*.

Table 2-24: Summary of Sediment Toxicity Monitoring 2008-2011

Field Year	Receiving Water	Site ID	Event	
			Post First Flush	Dry Season
			Date	Date
2008/2009	Mosher Slough	MS-1D*	11/14/2008	5/26/2009
		MS-5R	11/14/2008	5/27/2009
		MS-14R	11/14/2008	6/2/2009
2009/2010	Calaveras River	CR-46R	10/20/2009	8/16/2010
		CR-39R	10/22/2009	6/21/2010
		CR-42R	N/A[a]	6/21/2010
2010/2011	Smith Canal	SC-5R	11/10/2010	6/16/2011
	Five-Mile Slough	5M-27R	11/10/2010	6/16/2011
2011/2012	Mormon Slough	MM-2R	10/12/2012	-[b]
	Walker Slough	WK-64R	10/12/2012	-[b]

Notes:

* Sediment toxicity sampling for the Detention Basin Monitoring Program at the La Morada Detention Basin was conducted concurrent with the *Sediment Toxicity Work Plan* program.

[a] CR-42R was erroneously sampled in place of CR-46R during the 6/21/2010 dry season event. Subsequently, CR-46R was sampled on 8/16/2010.

[b] Dry season 2011/2012 sampling for MM-2R and WK-64R is scheduled for May/June 2012.

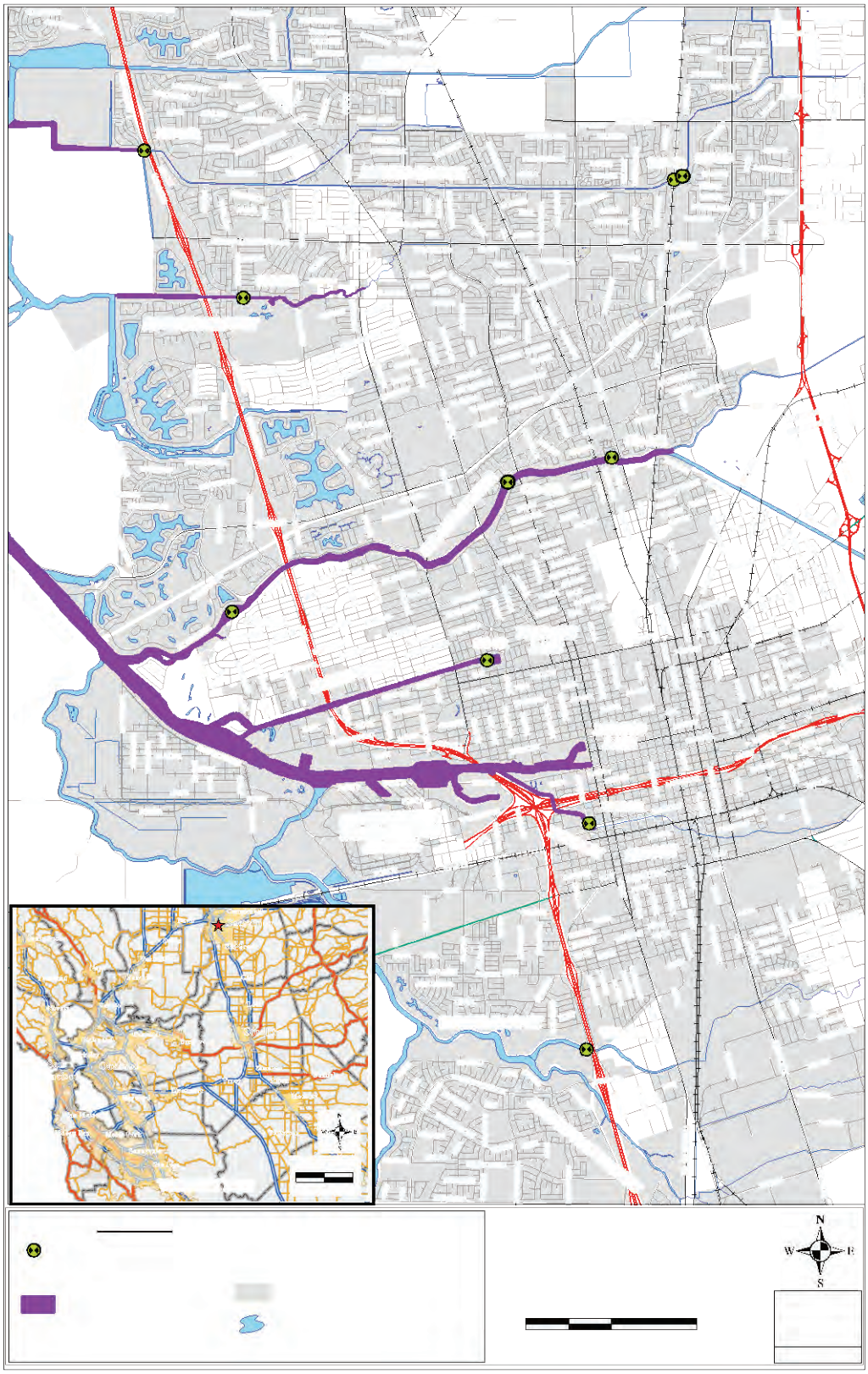

Figure 2-12. Sediment Toxicity Monitoring Locations 2008-2011

Table 2-25: Sediment Toxicity Work Plan Monitoring Locations 2008-2011

Receiving Water	Monitoring Location*	Site ID	Land Use	Approximate Development Age
Mosher Slough	Mariner's Drive Bridge	MS-14R	Residential/Commercial	10 – 25 years
	East of Union Pacific Railroad Tracks	MS-5R	Residential	10 years
	La Morada Detention Basin	MS-1D	Residential	10 years
Calaveras River	Brookside Road	CR-39R	Residential/Recreational	10 years
	West Lane Bridge	CR-46R	Mixed Use	25+ years
	El Dorado Bridge	CR-42R	Residential/Commercial	25+ years
Smith Canal	Yosemite Lake	SC-5R	Residential/Commercial	25+ years
Five-Mile Slough	Swenson Park Golf Course	5M-27R	Residential/Recreational	25+ years
Mormon Slough	Commerce Street	MM-2R	Mixed Use	25+ years
Walker Slough	Manthey Road Bridge	WK-64R	Mixed Use	25+ years

*Nearest cross street or urban feature Mixed Use = Residential/Commercial/Industrial Uses

Samples of unconsolidated fine-grain sediment were collected in the wadeable (less than two feet deep) waters at the MS-14R, MS-5R, La Morada Detention Basin (MS-1D), 5M-27R and CR-46R sites using either an Ekman grab sampler or a stainless steel shovel. Deeper water samples of unconsolidated fine-grain sediment were collected at the CR-39R, CR-42R, SC-5R, MM-2R, and WK-64R, sites using an Ekman grab sampler. Due to limited availability of soft, fine-grained substrate, sediment samples were collected from the upper two to four inches of surface sediment and, as necessary, over an area of approximately five square meters (m^2).

Several factors must be considered when interpreting the results of *Hyalella* sediment toxicity tests as they relate to environmental conditions and pesticide concentrations in the samples. Two properties of the sediment that can dramatically affect the toxicity of sediment samples are TOC and grain size. As TOC increases, the bioavailability of many hydrophobic pesticides (e.g., pyrethroids, chlorpyrifos) decreases, and therefore the toxicity decreases. For this reason, the analytical data for pyrethroids and chlorpyrifos are organic carbon-corrected in order to evaluate the toxicity data. Samples with grain size that are primarily comprised of fine sediments and clay are more likely to have increased concentrations of hydrophobic contaminants than samples comprised mostly of sand, assuming that there are similar contaminant contributions/inputs.

Hyalella effect thresholds are published in the literature for many, but not all, pyrethroids. However, it is important to note that the use of such literature values must be put into context for a few reasons. First, the literature values are based on the outcome of the test results in a limited number of laboratories and under the test conditions in those laboratories. One significant variable in the testing of *Hyalella* among laboratories is the type of food used in the laboratories, each of which may have a different effect on the organisms response to toxic stress based on the amount of organic carbon in the food; the amount and type of food may also affect the bioavailability of pyrethroids. However, one can evaluate the data and determine if there was a sufficient amount of pyrethroid toxicity units (TUs) to account for the observed toxicity.

Mosher Slough Sediment Sampling and Results (2008/2009 Field Year)

Sediment toxicity 2008/2009 monitoring results for Mosher Slough are summarized in **Table 2-26**. The November 2008 sediment toxicity testing indicated there were no significant reductions in *Hyalella* survival, although reductions in growth were reported. The May 2009 toxicity testing indicated there were significant reductions in survival in the MS-1D and MS-14R sediment samples, therefore follow-up analytical testing was performed (see **Tables 2-27 and 2-28)**; reductions in *Hyalella* growth were also reported in the MS-1D, MS-5R, and MS-14R sediment samples.

Table 2-26. Mosher Slough Sediment Toxicity Results (2008/2009)

					Toxicity Present Relative to Lab Control?			
Sample ID	***Date***	***Date Last Rain (>0.10")***	**TOC (mg/kg)**	**Grain Size**	***Hyalella azteca* Survival**	***Hyalella azteca* Growth**	**Mean % Survival**	**Mean Growth (mg)**
Lab Control							95	0.41
MS-1D	11/14/2008	11/2/2008 (0.45")	1,600	C	No	No	95	0.48
MS-5R	11/14/2008		7,400	F	No	Yes	93.8	0.31
MS-14R	11/14/2008		12,000	C	No	Yes	91.1	0.22
MS-14R (FD)	11/14/2008		NA	C	No	Yes	88.8	0.23
Lab Control							96.3	0.16
MS-1D	5/26/2009	5/1/2009 (0.31")	11,000	F	**Yes**	Yes	16.3	0.09
MS-1D (FD)	5/26/2009		NA	F	**Yes**	Yes	12.5	0.05
MS-5R	5/27/2009		6,100	C	No	Yes	88.8	0.06
MS-14R	6/2/2009[20]		11,000	C	**Yes**	Yes	22.5	0.08

Notes: TOC = Total Organic Carbon (SM5310B)
mg/kg = milligrams per kilogram = parts per million (ppm)
MS-1D = La Morada Detention Basin
MS-5R = Mosher Slough Upstream Receiving Water
MS-14R = Mosher Slough Downstream Receiving Water
FD = Field Duplicate
Sediment toxicity analyses performed by Pacific EcoRisk
mg = milligrams
C= Coarse (>50% sand)
F= Fine (>50% silt and clay)
NA = Not Analyzed
Bold indicates that the sediment sample was toxic as defined by the program.

[20] The MS-14R sample was initially collected on 5/27/2009; however, upon receipt at the lab, the sediment sample container was observed to have been damaged potentially compromising the sample. The 5/27/2009 sample was discarded and MS-14R site was resampled on 6/2/2012.

Table 2-27. Grain Size Results for Detention Basin MS-1D and Mosher Slough MS-14R Sediment Samples

Site ID	Sample Date	Percentage (%) Grain Size					Medium Grain Size
		Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Millimeters (mm)
MS-1D	5/26/2009			7.70	62.80	29.49	0.011
MS-14R	6/02/2009		59.44[1]		31.14	9.43	0.144

MS-1D = La Morada Detention Basin

MS-14R = Mosher Slough Downstream Receiving Water

Table 2-28. Confirmation Chemical Analytical Results for Detention Basin MS-1D and Mosher Slough MS-14R Sediment Samples

		Analytical Constituents[a,b]													
Site ID	**Sample Date**	**Chlorpyrifos (Dursban)**	**Allethrin**	**Bifenthrin (Biphenthrin)**	**Cyfluthrin (Baythroid)**	**Lambda-cyhalothrin**	**Cypermethrin**	**Deltamethrin (Tralomethrin)**	**Esfenvalerate (Fenvalerate)**	**Fenpropathrin (Danitol)**	**Tau-Fluvalinate**	**Permethrin**	**Tetramethrin**	**Solids (percent)**	**Total Organic Carbon**
	Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	%	mg/kg
	RL	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.1	
MS-1D	5/26/2009	0.64	<0.34	**98[1]**	**3.0**	0.44	1.5	<0.34	0.31[J]	<0.34	<0.34	**16**	<0.34	98[2]	10,300
	RL	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.1	
MS-14R	6/02/2009	24[1]	<0.71	**290[1]**	**10[1]**	**4.5**	4.8	<0.71	**2.4**	0.66[J]	<0.71	**210[1]**	<0.71	47[2]	37,600
	RL	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.1	
Method Blank		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.1	

Notes:

MS-1D = La Morada Detention Basin

MS-14R = Mosher Slough Downstream Receiving Water

Units: µg//kg = micrograms per kilogram (ppb = parts per billion) = ng/g = nanograms per gram (parts per billion)
mg/kg = milligrams per kilogram (ppm = parts per million)

[a] Permit.

[b] Pyrethroid isomers are typically reported as totals instead of the individual isomers except where individual isomers may be obtained.

Bold indicates concentrations above pyrethroid sediment median lethal concentrations (LC50) as compared to Amweg *et al,* 2005, when normalized to organic carbon concentrations

[J] Reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The "J" flag is equivalent to the DNQ Estimated Concentration flag.

[1] Result is an estimated concentration due to concentration exceeding linear range of calibration

[2] Percent Solids analysis performed past regulatory holding time per client request.

There was 16.3% survival in the MS-1D sample (5/26/2009[21]), significantly less than the Lab Control. An organic carbon correction for the pesticides analyzed in this sample indicated there were 18.8 TUs of pyrethroids, more than enough to have caused the observed toxicity. The pyrethroid concentrations detected in the MS-1D (bifenthrin, 98 micrograms per kilogram [μg/kg]; cyfluthrin, 3.0 μg/kg; and permethrin, 16 μg/kg) sediment sample could have caused acute toxicity and inhibited growth to *Hyalella*. Chlorpyrifos was also present in the sediment sample and likely contributed to the toxicity. The presence of a relatively elevated number of pyrethroid TUs is consistent with the sample being composed mostly of silt and clay (~92% of the sample matrix) and a relatively low/moderate TOC concentration.

During the 2008-2009[22] Detention Basin monitoring program, diazinon and pyrethroids were detected in all stormwater influent (SJI-1, SJI-2, and SJI-3) to and discharges (SJE/MS-1D) from the La Morada Detention Basin. The pyrethroid-induced sediment toxicity identified in the MS-1D sediment sample (5/26/2009) was not present in the MS-5R sediments. This could be attributed to the relatively coarse-grained nature of the available sediment at the MS-5R location, as it is inconclusive that the basin effectively limits pesticide contribution to Mosher Slough.

Since 2005, diazinon and chlorpyrifos have been detected in rainwater[23] and MS-14 stormwater discharge; since 2008, pyrethroid pesticides (notably bifenthrin, cyfluthrin, and permethrin) have been detected in both stormwater discharge (MS-14) and water column (MS-14R) samples on Mosher Slough. Detections of elevated concentration of pyrethroids in stormwater discharge samples do not directly correlate to elevated concentrations in the corresponding water column samples (see 11/01/2008 Urban Discharge SE47 Mosher Slough sampling results). Pyrethroids tend to degrade rapidly in water as they quickly partition to suspended solids and bed sediments. Sediment toxicity samples collected on 11/14/08 did not show significant toxicity in *Hyalella* survival, but did exhibit a statistically significant reduction in *Hyalella* growth. Pyrethroid induced toxicity may have been reduced due to the moderate organic carbon content and relatively coarse-grained sediment sample characteristics.

There was 22.5% survival in the MS-14R sample (6/2/2009), significantly less than the Lab Control. Based on performing an organic carbon correction for the pesticides analyzed in this sample, there were 7.6 TUs of pyrethroids, more than enough to have caused acute toxicity and inhibited growth to *Hyalella*. Chlorpyrifos was also present in the sample, and likely contributed to the toxicity. The presence of a lower number of pyrethroid TUs is consistent with the sample being composed mostly of sand (~59% of the sample matrix) and a relatively high TOC concentration.

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[21] 12.5% *Hyalella* survival as compared to the Lab Control was noted in the field duplicate sample collected at the MS-1D location on 5/26/2009.

[22] Detention Basin stormwater monitoring events were conducted on December 21, 2008 and February 5, 2009.

[23] See Pesticide Plan Section 9.1

Calaveras River Sediment Sampling and Results (2009/2010 Field Year)

Sediment toxicity 2009/2010 monitoring results for the Calaveras River are summarized in **Table 2-29**. The October 2009 toxicity testing indicated there were significant reductions in *Hyalella* survival in the CR-46R sediments thus follow-up analytical testing was performed (see **Tables 2-30 and 2-31)**; reductions in growth were also reported in the CR-46R and CR-39R samples. Although the June/August 2010 sediment toxicity testing reported a reduction in *Hyalella* survival in the CR-42R and CR-46R samples, the percent reduction compared to the laboratory control for both samples was below the threshold established by the program (greater than 50%) to initiate further chemical analyses. Reductions in growth were reported between the control and all of the sediment samples.

Table 2-29. Calaveras River Sediment Toxicity Results (2009/2010)

Sample ID	*Date*	*Date Last Rain (>0.10")*	TOC (mg/kg)	Grain Size	Toxicity Present Relative to Lab Control?			
					Hyalella azteca Survival	*Hyalella azteca* Growth	Mean % Survival	Mean Growth (mg)
Lab Control							91.3	0.14
CR-46R	10/20/2009	10/13/2009 (1.46")	27,300	F	**Yes**	Yes	32.5	0.06
CR-46R (FD)	10/20/2009		23,800	F	**Yes**	Yes	46.3	0.08
CR-39R	10/22/2009		13,600	C	No	Yes	88.8	0.11
Lab Control							100	0.16
CR-39R	6/21/2010	5/27/2010 (0.14")	13,500	F	No	Yes	95	0.15
CR-39R (FD)	6/21/2010		20,300	F	No	Yes	98.8	0.14
CR-42R	6/21/2010		15,600	C	Yes	Yes	63.8	0.09
Lab Control							88.8	0.064
CR-46R	8/16/2010	5/27/2010 (0.14")	4,050	C	Yes	Yes	57.5	0.046

Notes: TOC = Total Organic Carbon (SM5310B)
mg/kg = milligrams per kilogram = parts per million (ppm)
CR-46R = Calaveras River Upstream Receiving Water
CR-39R = Calaveras River Downstream Receiving Water
CR-42R = Calaveras River Central Receiving Water
FD = Field Duplicate
Bold indicates that the sediment sample was toxic as defined by the program.

Sediment toxicity analyses performed by Pacific EcoRisk
mg = milligrams
F= Fine (>50% silt and clay)
C= Coarse (>50% sand)

Table 2-30. Grain Size Results for the Calaveras River CR-46R Sediment Sample

Site ID	Sample Date	Percentage (%) Grain Size					Medium Grain Size
		Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Millimeters (mm)
CR-46R	10/20/2009			44.28	43.87	11.85	0.050

CR-46R = Calaveras River Receiving Water (West Lane)

Table 2-31. Confirmation Chemical Analytical Results for Calaveras River (CR-46R) Sediment Sample

		Analytical Constituents[a,b]													
Site ID	**Sample Date**	**Chlorpyrifos (Dursban)**	**Allethrin**	**Bifenthrin (Biphenthrin)**	**Cyfluthrin (Baythroid)**	**Lambda-cyhalothrin**	**Cypermethrin**	**Deltamethrin (Tralomethrin)**	**Esfenvalerate (Fenvalerate)**	**Fenpropathrin (Danitol)**	**Tau-Fluvalinate**	**Permethrin**	**Tetramethrin**	**Solids (percent)**	**TOC**
	Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	%	mg/kg
	RL	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	0.1	
CR-46R	10/20/2009	5.2	<1.6[1]	**11**	**36**	<1.6	7.1	<1.6	<1.6	<1.6	<1.6	**130**	<1.6	31%[2]	27,300

Notes:

CR-46R = Calaveras River Upstream Receiving Water

Units: µg/kg = micrograms per kilogram (ppb = parts per billion) = ng/g = nanograms per gram (parts per billion)
mg/kg = milligrams per kilogram (ppm = parts per million)

[a] Permit

[b] Pyrethroid isomers are typically reported as totals instead of the individual isomers except where individual isomers may be obtained.

Bold indicates concentrations above pyrethroid sediment median lethal concentrations (LC50) as compared to Amweg *et al,* 2005, when normalized to organic carbon concentrations

[1] Sample diluted prior to analysis in an effort to reduce matrix interferences resulting in (a) higher reporting limit(s).

[2] Sample received out of hold time by Caltest.

There was 32.5% survival in the CR-46R sample (10/20/2009), significantly less than the Lab Control. Based on performing an organic carbon correction for the reported pesticides, there was ~1.0 pyrethroid TUs in the CR-46R sediments which is consistent with the sample being composed of moderate amounts of sand (~44% of the sample matrix) and organic matter that was screened out prior to the grain size assessment, as well as a relatively high TOC concentration. Research by Amweg *et al*. 2005[24] indicates the concentration of pyrethroids (bifenthrin, cyfluthrin, and permethrin) detected in the sediment sample collected at CR-46R (10/20/09) are above the acute effect threshold for *Hyalella*; chlorpyrifos was also present in the sample and likely contributed to the toxicity.

For the Urban Discharge sampling event conducted on 10/13/09, chlorpyrifos and pyrethroids were detected at elevated concentrations in the stormwater discharge at the West Lane (CR-46) pump station, which is upstream of sediment sampling location CR-46R. It is reasonable to assume that pesticides detected in the 10/13/09 CR-46 stormwater discharge contributed to the toxicity observed in the CR-46R sediments (10/20/09).

[24] Amweg, E.L., D.P. Weston, N.M. Ureda. 2005. Use and toxicity of pyrethroid pesticides in the Central Valley, California, USA. Environmental Toxicology and Chemistry, 24:966-972; erratum 24:1300-1301.

Smith Canal Sediment Sampling and Results (2010/2011 Field Year)

Sediment toxicity 2010/2011 monitoring results for Smith Canal are summarized in **Table 2-32**. The November 2010 sediment toxicity testing indicated there were no significant reductions in *Hyalella* survival, although reductions in growth were reported. Although the June 2011 sediment toxicity testing reported a reduction in *Hyalella* survival in the SC-5R sample, the percent reduction compared to the laboratory control was below the threshold established by the program (greater than 50%) to initiate further chemical analyses; reductions in growth were also reported.

Table 2-32. Smith Canal Sediment Toxicity Results (2010/2011)

Sample ID	*Date*	*Date Last Rain (≥0.10")*	TOC (mg/kg)	Grain Size	Toxicity Present Relative to Lab Control?			
					Hyalella azteca Survival	*Hyalella azteca* Growth	Mean % Survival	Mean Growth (mg)
Lab Control							97.5	0.18
SC-5R	11/10/2010	11/7/2010 (0.76")	>36,000	F	No	Yes	92.5	0.10
SC-5R (FD)	11/10/2010		>37,000	F	No	Yes	93.8	0.10
Lab Control							95	0.15
SC-5R	6/16/2011	6/4/2011 (0.27")	>38,000	F	Yes	Yes	87.5	0.09

Notes: TOC = Total Organic Carbon (SM5310B)
mg/kg = milligrams per kilogram = parts per million (ppm)
SC-5R = Smith Canal/Yosemite Lake Receiving Water
Sediment toxicity analyses performed by Pacific EcoRisk
mg = milligrams
F= Fine (>50% silt and clay)
FD = Field Duplicate

Historic analytical data collected during the Urban Discharge and Pesticide Plan sampling programs indicate elevated concentrations of pyrethroids detected in the Smith Canal (Legion Park Pump Station, SC-1) discharges. It is reasonable to assume that the slight reductions in *Hyalella* survival and growth observed in the SC-5R sediment samples could have been caused by pyrethroids. High organic carbon content in all the Smith Canal samples may have reduced overall sediment toxicity

Five-mile Slough Sediment Sampling and Results (2010/2011 Field Year)

Sediment toxicity 2010/2011 monitoring results for Five-Mile Slough are summarized in **Table 2-33**. The November 2010 sediment toxicity testing indicated there was no significant reduction in *Hyalella* survival, although a reduction in growth was reported. The June 2011 sediment toxicity testing reported a reduction in *Hyalella* survival in the 5M-27R sample (82.5%) that was not reproduced in the field duplicate sample (93.8%) collected at that location; the percent reduction compared to the laboratory control was below the threshold established by the program (greater than 50%) to initiate further chemical analyses. Reductions in *Hyalella* growth were not observed in 5M-27R sediments collected on 6/16/2011.

Table 2-33. Five-Mile Slough Sediment Toxicity Results (2010/2011)

Sample ID	*Date*	*Date Last Rain (≥0.10")*	TOC (mg/kg)	Grain Size	Toxicity Present Relative to Lab Control?			
					Hyalella azteca Survival	*Hyalella azteca* Growth	Mean % Survival	Mean Growth (mg)
Lab Control							97.5	0.18
5M-27R	11/10/2010	11/7/2010 (0.76")	>35,000	F	No	Yes	93.8	0.13
Lab Control							95	0.15
5M-27R	6/16/2011	6/4/2011 (0.27")	>38,000	F	Yes	No	82.5	0.13
5M-27R (FD)	6/16/2011		>37,900	F	No	No	93.8	0.15

Notes: TOC = Total Organic Carbon (SM5310B)
mg/kg = milligrams per kilogram = parts per million (ppm)
5M-27R = Five-Mile Slough Receiving Water
Sediment toxicity analyses performed by Pacific EcoRisk
mg = milligrams
F= Fine (>50% silt and clay)
FD = Field Duplicate

High organic carbon content in all the Five-Mile samples may have reduced overall sediment toxicity.

Walker and Mormon Slough Sediment Sampling and Results (2011/2012 Field Year)

Sediment toxicity monitoring results for the "post first flush" Walker and Mormon Slough storm event are summarized in **Table 2-34**[25]. Although the sediment toxicity testing reported a reduction in *Hyalella* survival in the Walker Slough (WK-64R) and Mormon Slough (MM-2R) samples, the percent reduction compared to the laboratory control for both samples was below the threshold established by the program (greater than 50%) to initiate further chemical analyses. Reductions in growth were reported between the control and all of the sediment samples.

Table 2-34. Five-Mile Slough Sediment Toxicity Results (2010/2011)

Sample ID	*Date*	*Date Last Rain (≥0.10")*	TOC (mg/kg)	Grain Size	Toxicity Present Relative to Lab Control?			
					Hyalella azteca Survival	*Hyalella azteca* Growth	Mean % Survival	Mean Growth (mg)
Lab Control							91.3	0.20
WK-64R	10/12/2011		33,000	F	Yes	Yes	76.3	0.13
WK-64R (FD)	10/12/2011	6/5/2011 (0.59")	34,000	F	No	Yes	80	0.13
MM-2R	10/12/2011		27,000	C	Yes	Yes	65	0.10

Notes: TOC = Total Organic Carbon (SM5310B)
mg/kg = milligrams per kilogram = parts per million (ppm)
WK-64R = Walker Slough Downstream Receiving Water
MM-2R = Mormon Slough Downstream Receiving Water
FD = Field Duplicate
Sediment toxicity analyses performed by Pacific EcoRisk
mg = milligrams
F= Fine (>50% silt and clay)
C= Coarse (>50% sand)

High organic carbon content in all the Walker Slough and Mormon Slough samples may have reduced overall sediment toxicity. The toxicity in the sample collected at Mormon Slough (MM-2R) was likely reduced due to the relatively coarse grain size of the sediments.

Conclusions

Although toxicity testing conducted during the Sediment Toxicity monitoring program indicated reductions in *Hyalella* survival occurred during both wet and dry weather; in general, the percent reduction compared to the laboratory control was below the threshold established by the program (greater than 50%) to initiate further chemical analyses. Subsequently, the limited sample dataset collected precludes a more rigorous statistical treatment; however, the following deductions can be made:

- Toxicity present relative to laboratory control using *Hyalella* survival was noted in 75% of dry weather sediment samples as compared to 44% in wet weather sediment samples (**Table 2-35**).
- Sediment toxicity testing indicated that reductions in *Hyalella* growth were ubiquitous (observed in 88% of the samples) within the SUA waterways (**Table 2-36**).
- Pyrethroid induced toxicity was likely reduced due to the relatively high amount of organic carbon and coarse grained character of the available sediments (**Table 2-36**).

[25] The dry season Walker and Mormon Slough sediment toxicity sampling event is scheduled for May/June 2012

- Shallow water sediments collected from economically depressed, mixed-use areas appear to demonstrate the most significant reductions in *Hyalella* survival (**Table 2-36**).

Table 2-35: 2008-2011 Sediment Toxicity Work Plan Monitoring

Waterbody	Site ID	Number of Events By Type	
		Wet Weather	Dry Weather
Mosher Slough	MS-1D	1	**1**
	MS-5R	1	1
	MS-14R	1	**1**
Calaveras River	CR-46R	**1**	**1**
	CR-39R	1	1
	CR-42R	-	**1**
Smith Canal	SC-5R	1	**1**
Five-Mile Slough	5M-27R	1	**1**
Mormon Slough	MM-2R	**1**	-
Walker Slough	WK-64R	**1**	-
Toxicity reported present relative to laboratory control		44%	75%

Bold indicates toxicity present relative to laboratory control - = Not Sampled

Since 2004, diazinon, and chlorpyrifos have been detected in wet weather urban runoff and receiving water samples. Since 2008 (**Table 2-37**), pyrethroid pesticides (including bifenthrin, cyfluthrin, cypermethrin, Lambda-cyhalothrin, and permethrin), diazinon, and chlorpyrifos have been detected in urban runoff and receiving water samples primarily during wet weather events. Sediment toxicity observed at Mosher Slough (MS-14R) and the Calaveras River (CR-46R) on 6/2/2009 and 10/20/2009, respectively, can reasonably be attributed to elevated concentrations of pyrethroids (including bifenthrin, cyfluthrin, and permethrin) detected in Mosher Slough (MS-14D) and Calaveras River[26] (CR-46) urban runoff samples on 5/20/2009 and 10/13/2009, respectively (**Table 2-37**).

The Urban Discharge sampling results over the past few years have indicated moderate to high pyrethroid concentrations in stormwater discharge to Smith Canal, but receiving water samples typically do not contain elevated pyrethroids as pyrethroids rapidly partition to suspended solids and bed sediments. Similarly, the Smith Canal sediment toxicity does not appear to be reflective of pyrethroid concentration in stormwater discharge. Laboratory analytical results collected during the Sediment Toxicity and Low DO Plan monitoring programs have consistently reported high TOC (>10,000 mg/kg) concentrations in Yosemite Lake sediments. In addition, Smith Canal drains a relatively large portion of Stockton (3,306 acres), through a single pump station. When active, the pump station discharge can be voluminous, and sediment in Yosemite Lake is known to be subjected to high-velocity flow. The difference in pyrethroid content in the discharge vs. the receiving water and the apparent low sediment toxicity may be due to periodic and vigorous sediment mixing in Yosemite Lake that is atypical compared to other sediment toxicity sampling locations.

[26] Chlorpyrifos was also detected at elevated concentrations at CR-46 during the 10/136/2009 sampling event.

Data collected during the Urban Discharge, Pesticide Plan, Detention Basin, and Sediment Toxicity monitoring programs suggest that the chlorpyrifos contribution to the SUA waterways was predominantly from agricultural application and rainwater, while urban runoff was the primary source of pyrethroid contribution. Although the widespread residential use of chlorpyrifos was phased out in 2005, agricultural use remains high. In addition, continued, albeit sporadic, positive detections of diazinon and, to a lesser extent, chlorpyrifos in predominantly residential discharges (MS-14, MS-1D, SC-1) indicate that remnant[27] application by residential users remains a contributing source of the chemicals to the waterways.

[27] Use of existing insecticides/pest control chemicals that contain diazinon and chlorpyrifos.

Table 2-36: Sediment Toxicity Work Plan Summary Results (November 2008 – October 2011)

														Pesticides[b] in Sediment (ug/kg)				
				Primary Residential Characteristics				Toxicity Present in *Hyalella azteca* Survival Relative to Lab Control										
Receiving Water	**Site ID**	**Land Use**	**Average Age (~years)**	**Housing Type**	**Economic (Average Income)**	**Sample Date**	**Water Depth[a] (feet)**	**Post First Flush**	**Dry**	**Mean % Survival**	**Growth**	**Grain Size**	**TOC (mg/kg)**	**Bifenthrin**	**Cyfluthrin**	**Lambda-cyhalothrin**	**Esfenvalerate (Fenvalerate)**	**Permethrin**
Mosher Slough	**MS-1D**	**R**	**10**	**Single**	**Middle**	11/14/2008	1	No		95	No	C	1,600					
						5/26/2009	**dry[28]**		**Yes**	**16.3**	**Yes**	**F**	**10,300**	**98**	**3.0**			**16**
	MS-5R	R	10	Single	Middle	11/14/2008	2	No		93.8	Yes	F	7,400					
						5/27/2009	2.5		No	88.8	Yes	C	6,100					
	MS-14R	**R / C**	**10 - 25+**	**Mixed Multi/Single**	**Low/ Middle**	11/14/2008	3.5	No		91.1	Yes	C	12,000					
						6/2/2009	**3**		**Yes**	**22.5**	**Yes**	**C**	**37,600**	**290**	**10**	**4.5**	**2.4**	**210**
Calaveras River	**CR-46R**	**Mixed**	**25+**	**Single**	**Low**	**10/20/2009**	**2**	**Yes**		**32.5**	**Yes**	**F**	**27,300**	**11**	**36**			**130**
						8/16/2010	1		Yes	57.5	Yes	C	4,050					
	CR-39R	R / Rec	10	Single	High	10/22/2009	11.6	Yes		88.8	Yes	C	13,600					
						6/21/2010	9		No	95	Yes	F	13,500					
	CR-42R	R / C	25+	Mixed Multi/Single	Low- Middle	6/21/2010	6		Yes	63.8	Yes	C	15,600					
Smith Canal	SC-5R	R / C	25+	Mixed Multi/Single	Upper Middle	11/10/2010	5.5	No		92.5	Yes	F	>36,000					
						6/16/2011	4.5		Yes	87.5	Yes	F	>38,000					
Five-Mile Slough	5M-27R	R / Rec	25+	Single	Upper	11/10/2010	1	No		93.8	Yes	F	>35,000					
						6/16/2011	1		Yes	82.5	No	F	>38,000					
Mormon Slough	MM-2R	Mixed	25+	Mixed	Low	10/12/2011	2.5	Yes		76.3	Yes	F	33,000					
Walker Slough	WK-64R	Mixed	25+	Single	Low	10/12/2011	1.5	Yes		65	Yes	C	27,000					

Notes: **Bold** indicates the percent reduction in Hyalella azteca survival as compared to the laboratory control was below the threshold established for the program (greater than 50%).
TOC = Total Organic Carbon
R = Residential C = Commercial I = Industrial Mixed = Residential/Commercial/Industrial Uses Single = Single Residential Multi = Duplex/Apartment Rec = Recreational (Parks, Golf Courses, etc.)
Units: mg/kg = milligrams per kilogram = parts per million (ppm)

a = Approximate water column depth at sampling point
b = **Bold** indicates concentrations above pyrethroid sediment median lethal concentrations (LC50) as compared to Amweg *et al,* 2005, when normalized to organic carbon concentrations

[28] MS-1D sediment sample was collected above residual standing water in the detention basin.

Table 2-37. Pesticide Results for Preceding or Contemporaneous Stormwater Program Sampling Events

					Analytical Constituents[a]																
	Site ID	Stormwater Program	Sample Event	Sample Date	Diazinon	Chlorpyrifos (Dursban)	Allethrin	Bifenthrin (Biphenthrin)	Cyfluthrin (Baythroid)	Lambda-cyhalothrin	Cypermethrin	Deltamethrin (Tralomethrin)	Esfenvalerate	Fenvalerate	Fenpropathrin (Danitol)	Tau-Fluvalinate	Permethrin	Prallethrin	Tetramethrin	Resmethrin	TOC
			Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	Mg/L
La Morada Detention Basin	SJI-1	DB	WW01	12/21/2008	**0.1399**	<0.002	<0.002	0.0588	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.002	NA	<0.025	NA
			WW02	2/05/2009	0.0202	<0.002	<0.002	0.0682	0.0086	0.0059	0.0151	<0.002	0.0014	0.0017	<0.002	<0.002	0.1527	<0.002	NA	<0.025	NA
	SJI-2		WW01	12/21/2008	**2.0585**	<0.002	<0.002	0.054	0.0525	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.002	NA	<0.025	NA
			WW02	2/05/2009	0.0877	<0.002	<0.002	0.0518	0.0182	0.0037	0.0089	<0.002	0.0009	0.0009	<0.002	<0.002	0.0995	<0.002	NA	<0.025	NA
			WW02 (FD)		0.0899	<0.002	<0.002	0.0447	0.017	0.0045	0.0074	<0.002	0.0005	<0.002	<0.002	<0.002	0.0842	<0.002	NA	<0.025	NA
	SJI-3		WW01	12/21/2008	**0.4761**	<0.002	<0.002	0.1148	0.0386	0.0095	0.0634	<0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.002	NA	<0.025	NA
			WW02	2/05/2009	0.0063	<0.002	<0.002	0.0283	0.0146	0.0085	0.014	<0.002	0.0014	0.0008	0.0007	<0.002	0.1413	<0.002	NA	<0.025	NA
	SJE		WW01	12/21/2008	**0.7339**	<0.002	<0.002	0.0844	0.0184	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.002	NA	<0.025	NA
			WW01 (FD)		**0.7171**	<0.002	<0.002	0.0652	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.002	NA	<0.025	NA
			WW02	2/5/2009	0.0123	<0.002	0.2146	0.2146	0.0136	0.0048	0.1396	<0.002	0.0013	0.0017	<0.002	<0.002	0.1368	<0.002	NA	<0.025	NA
Mosher Slough	MS-14	UDRWT	SE47	11/1/2008	<0.004	<0.002	<0.002	0.4371	0.0726	0.0213	0.0295	<0.002	0.0025	0.0019	0.0015	<0.002	0.3457	<0.002	NA	<0.025	29
		Pesticide	WW01	12/21/2005	0.0852	<0.002	<0.002	0.2403	0.0496	0.0081	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.2615	<0.002	NA	<0.025	NA
		UDRWT	DW12	5/20/2009	0.0942	<0.002	<0.002	0.0048	0.0196	<0.002	<0.002	<0.002	<0.002	0.0007	<0.002	0.0011	<0.025	<0.002	NA	<0.025	4.2
Calaveras River	CR-46	UDRWT	SE49	10/13/2009	<0.004	**0.477**	<0.002	0.0474	0.045	0.0717	0.0266	<0.002	0.0049	0.0018	0.0061	<0.002	<0.002	<0.002	NA	<0.025	28
		UDRWT	DW14	6/8/2010	<0.00381	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0238	<0.0019	NA	NA	5.8
Smith Canal	SC-1	UDRWT	SE51	11/19/2010	0.0029	0.0041	<0.0001	0.032	0.0023	0.0036	0.005	0.0016	0.0006		<0.0002	NA	0.020	NA	<0.0002	NA	7.8
		UDRWT	DW16	6/20/2011	<0.0028		<0.00028		<0.0019	<0.0019	<0.0019	<0.0019	<0.0019		<0.00094	<0.0028	<0.0019	<0.00028		NA	

Notes:

Mosher Slough MS-14 = Kelley Drive Pump Station
Calaveras River CR-46 = West Lane Pump Station

Units: µg/L = micrograms per liter (ppb = parts per billion)
mg/kg = milligrams per kilogram (ppm = parts per million)

[a] Pyrethroid isomers are typically reported as totals instead of the individual isomers except where individual isomers may be obtained.

Bold indicates concentrations above Basin Plan Water Quality Objectives (WQOs) for chlorpyrifos and diazinon as presented in Section 9, Table 9.1. There are no applicable WQOs for pyrethroids.

As indicated in Section 9.1 (Pesticide Plan), as diazinon and chlorpyrifos are phased out, pyrethroids are replacing them as the most commonly used pesticides. Pyrethroids comprise the active ingredient in a variety of commercially available products for domestic and industrial pest control including:

- Allethrin (Raid)
- Bifenthrin (Talstar, Capture, Ortho Home Defense Max)
- Cyfluthrin (Baygon)
- Deltamethrin (ant chalk)
- Cypermethrin (Raid, ant chalk)
- Lambda-cyhalothrin (Spectracide, Triazicide, Hot Shot, Real Kill, Terro)
- Resmethrin (Scourge)
- Esfenvalerate/Fenvalerate (fly and tick control)

Application of pyrethroid insecticides to impervious surfaces increases the potential of pyrethroids being mobilized by stormwater runoff. Pyrethroids are hydrophobic and tend to bind to soil and dust. Outreach to consumers regarding the proper use and application of pesticides, particularly application to appropriate surfaces and avoiding application prior to expected rain events, is an effective BMP to reducing pyrethroid-induced toxicity in receiving waters. Users of the products should avoid any application that would allow the product to mobilize away from the intended area of use (i.e., granular products containing pyrethroid applied to sidewalks, driveways, or bare soil can be washed into storm drains) via runoff caused by stormwater or domestic (landscape irrigation, car washing, recreation) activities.

Public outreach is an important component of the Permittees' IPM program (see Section 9).

2.5.2 Bioassessment

The bioassessment monitoring program was designed to detect biological trends in the receiving waters of the SUA and to collect data to contribute to the Surface Water Ambient Monitoring Program (SWAMP). However, the ultimate goal of the bioassessment monitoring is to assess the biological integrity of the receiving waters within the SUA and to identify probable causes of biological responses not detected by more traditional chemical and physical water quality analyses.

Bioassessment monitoring was required by the second term permit and was successfully completed in spring 2004 and spring 2005. Bioassessment monitoring consisted of quantitative biodiversity measurements of benthic macroinvertebrates and qualitative evaluation of habitat quality to allow calculation of an Index of Biological Integrity (IBI) for a waterbody. Methods were developed under the advisement of the California Department of Fish and Game for 2004 and included dredging benthic materials in non-wadeable reaches. In 2005, with the input of SWAMP members and the Regional Water Board, the methods were modified to include the use of artificial substrate samplers in non-wadeable reaches in place of dredging. The Permit required an assessment of the data collected in 2004 and 2005 and a report was submitted as Appendix H-4 of the 2007-2008 Annual Report. 17 reaches were monitored on Mosher Slough, Calaveras River, Smith Canal, and Duck Creek/Walker Slough, in keeping with the waterbodies monitored in the baseline monitoring program (see **Figure 2-1)**. In general, the results of the 2004 and 2005 bioassessment monitoring effort indicated that the waterbodies of the SUA were subject to the influence of many human activities that result in both physical and chemical impacts, which is typical of urbanized areas. However, the report was only a preliminary analysis as adequate reference conditions were not available and standard regional criteria had not been established for the Delta. The assessment recommended continued monitoring once a regional IBI was developed.

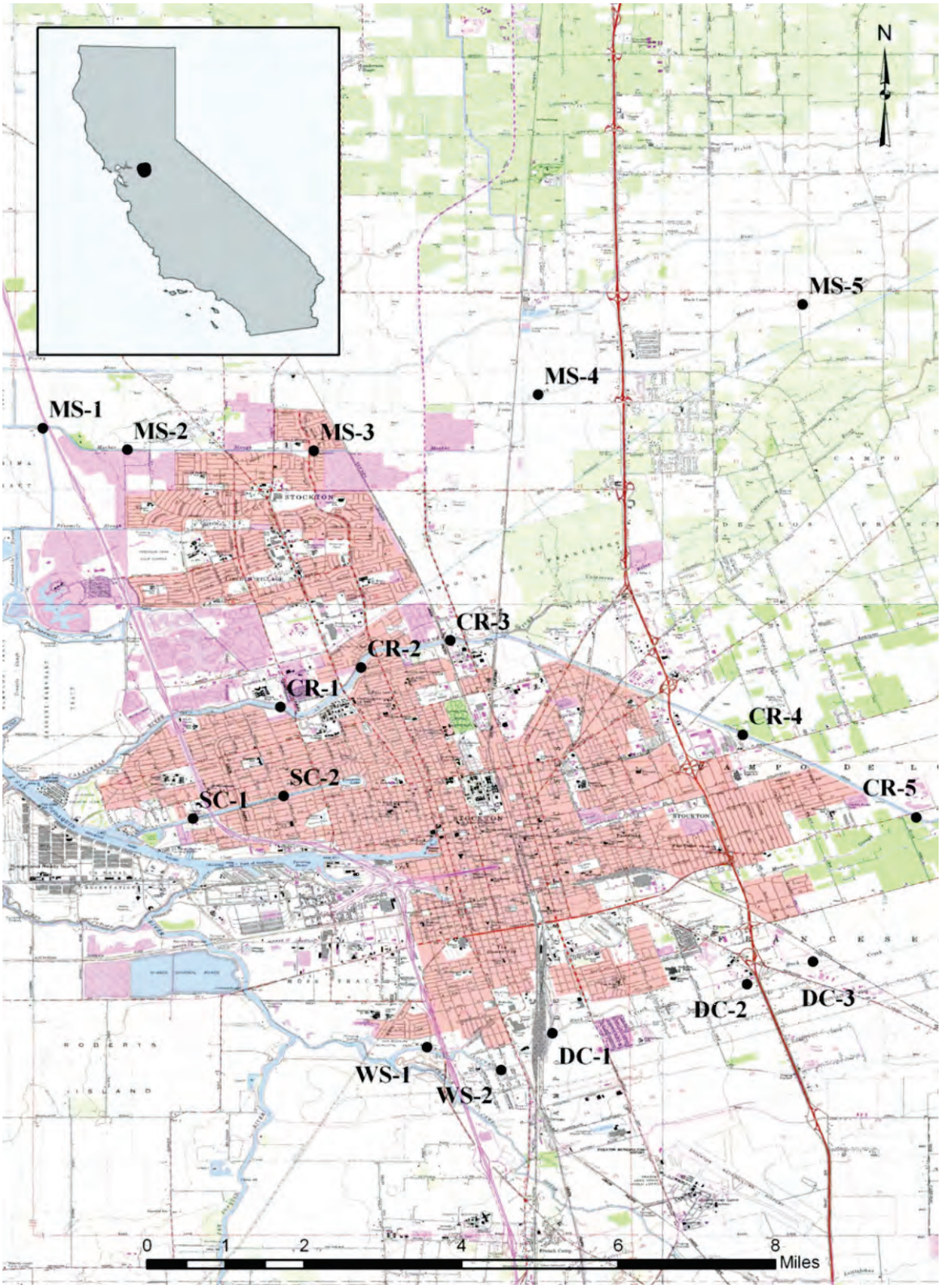

Figure 2-13. Bioassessment Monitoring Sites

Since the development of a regional IBI was expected to take some time, the Permittees opted to conduct additional bioassessment monitoring in 2009-2010 so that there would be additional data. The Permit also required the Permittees to "participate and coordinate" with the SWAMP "to determine coordinated needs for the initial development of an IBI for the region." The same 17 reaches monitored in 2004 and 2005 were monitored again in spring 2010. Of the 17 reaches, 15 were sampled because 2 of the reaches were dry. The two dry reaches were at Mosher Slough sites above Morada Lane (MS-4) and Hildreth Lane (MS-5).

The Permittees chose to use updated SWAMP methods for bioassessment in 2010. Due to use of different sampling devices in 2004 (Ponar Dredge and kick-net), 2005 (Hester-Dendy and kick net), and 2010 (Ekman Dredge and kick-net) it was not appropriate to draw strong conclusions over this time period. For example, the Hester-Dendy sampled a hard artificial substrate that allowed for organisms to colonize the substrate and may have over-represented the hard substrate at the reach (clearly the case with the study sites in this evaluation). This provided a false impression of not only the number of organisms present, but also of the types of organisms that could actually reside in the habitats at the various reaches. However, general trends of less biological impact and greater biological impact were assessed

Bioassessment included quantitative habitat ranking based on scoring of favorable vs. unfavorable substrate, sediment deposition, and channel alteration. In addition qualitative observations were made including:

- **Habitat diversity** - Diversity of particle sizes (clay, fines, sand, gravel, etc.)
- **Habitat complexity** - Diversity of habitat features such as boulders, woody debris, and overhang vegetation
- **Canopy cover**

Sediment deposition and channel alteration reflects greater site disturbance and biological impacts, which lowers the habitat ranking, while favorable substrate improves the habitat ranking. Greater habitat diversity, habitat complexity, and canopy cover increase the types of habitats and therefore the diversity of taxa that are present at a site. Canopy cover, for example, creates shade, leaf litter, and exposed roots, increasing the types of habitat at a site.

A summary of the habitat assessment is shown in **Table 2-38**. Habitat scores from 2004-2005 are compared to those from 2010.

Table 2-38. Summary of Bioassessment Habitat Evaluation

Site	Habitat Ranking	Habitat Diversity	Habitat Complexity	Canopy Cover	2004-2005 Habitat Score (0-200)	2010 Habitat Score (0-200)	Improvement?
Mosher Slough*							
MS-1	Suboptimal	Low	Low	Moderate	86	110	Improved
MS-2	Marginal	Low	Low	Moderate	97	97	Same
MS-3	Suboptimal	Moderate	Low	Moderate	86	150	Improved
Calaveras River/Diverting Canal							
CR-1	Optimal	Low	Low	Moderate	108	177	Improved
CR-2	Optimal	Low	Low	Moderate	74	177	Improved
CR-3	Optimal	Low	Low	Moderate	70	177	Improved
CR-4	Optimal	Low	Low	Moderate	79	177	Improved
CR-5	Optimal	Low	Low	Moderate	108	177	Improved
Smith Canal							
SC-1	Suboptimal	Low	Low	Moderate	76	110	Improved
SC-2	Suboptimal	Low	Low	Moderate	76	110	Improved
Walker Slough/Duck Creek							
WS-1	Suboptimal	Low	Low	Moderate	98	113	Improved
WS-2	Suboptimal	Low	Low	Limited	86	110	Improved
DC-1	Optimal	Moderate	Low	Limited	96	177	Improved
DC-2	Optimal	Low	Low	Moderate	88	173	Improved
DC-3	Optimal	Low	Low	Moderate	84	177	Improved

*MS-4 and MS-5 were not monitored because the sites were dry

The summary habitat scores have shown a clear improvement, indicating the potential for improved benthic health. Calaveras and Duck Creek show the greatest potential with optimal waterbody ranking through their reaches.

Benthic macroinvertebrate assessment is based on the following variables:

- **Taxa richness** – Total number of taxa (groups of aquatic organisms judged to have similar characteristics)

- **Organism abundance** – Total number of organisms
- **Taxa tolerance -** Percent of various taxa present that are either sensitive or insensitive to environmental conditions including constituent concentrations, but also the type of substrate and sedimentation.
- **Trophic measures –** Relative proportion of types of taxa (e.g., ratio of collector taxa to predator taxa).

Trends based on these variables are summarized in **Table 2-39**.

Table 2-39. Bioassessment Trends Based on 2004, 2005 and 2010 Assessments

Site	Variables Observed which Tend to Indicate Less Disturbance	Variables Observed which Tend to Indicate More Disturbance	Trends
Walker Slough and Duck Creek	Increase in taxa richness	Increase in taxa tolerance	No clear trends
Calaveras River and Stockton Diverting Canal	Moderate tolerance and highest taxa richness in study	Increase in tolerance values from 2004 and 2005	No clear trend
Mosher Slough/Mosher Creek	High species abundance, increase in number of taxa since 2004 and 2005, and decrease in dominance by a single taxon since 2004 and 2005	Population composed of primarily highly tolerant taxa	Less biological impact than in 2004 and 2005
Smith Canal	Increase in number of taxa and high taxa richness	Overall higher tolerance	No clear trend
Overall, for all sites	Substantial increase in taxa richness. Increase in two types of taxa that are less tolerant and decrease in one type of taxa that is more tolerant to create a more balanced benthic community.	Low taxa diversity caused by low taxa richness. Dominant percentage of one or two taxa, resulting in high overall tolerance values. As in 2004 and 2005, all waterbodies demonstrate biological impact.	Overall inconclusive trends

Adequate reference conditions were not available and regional criteria had not been established for the Central Valley. The current reference condition protocols for bioassessment monitoring are designed for western Sierra streams and not for tidal sloughs and low gradient urban waterbodies. Because of inherent differences between the waterbodies and sloughs of this study and the mountain streams where accepted biocriteria and sampling methods have been developed, it was not appropriate to make direct comparisons between data obtained through this sampling effort and the metric values or indices established elsewhere in California. However, bioassessment monitoring efforts conducted by the Permittees provided information that can be used to identify the presence/absence of biological trends and to provide baseline conditions.

Overall, the results of the 2010 bioassessment monitoring effort indicated that the waterbodies within the SUA experienced an increase in the relative level of biological impact. Some measures of the overall biological impact assessment suggest improving conditions, resulting in an overall inconclusive trend for measuring urban influence on stream communities. As in 2004 and 2005, each sampling reach included in the 2010 monitoring can be characterized as impacted based on presence of tolerant taxa, relatively low taxa richness, and dominant percentages of one or two taxonomic groups. Although the overall conclusion of the 2010 bioassessment data did not differ from that obtained in the 2004 and 2005, there

was a substantial increase in species richness, a decrease in percent of some tolerant species, as well as an increase in some intolerant species. These values are a clear indication that the waterbodies of the SUA have the capacity to support a healthy aquatic community. Mosher Slough showed improvement with trends indicating overall lower biological impact. Additional impacts may be caused by the configuration of the Delta and the location of Stockton within the Delta. This assessment therefore served to establish a continuing baseline dataset for determination of trends upon completion of a regional IBI.

Currently the State Board is developing biojectives for wadeable and perennial streams, which are characteristic of Stockton waterbodies. The biojectives will provide narrative and/or numeric benchmarks that describe conditions necessary to protect aquatic life beneficial uses. The State Board is establishing biojectives such that there is statewide consistency, as well as regional flexibility. It is recommended that any future assessments be based on these biojectives and corresponding causal assessment guidance.

2.5.3 Detention Basin Monitoring

Detention basin monitoring was designed to evaluate the effectiveness of La Morada Basin[29] in removing various constituents. The basin drainageshed is primarily residential in land use and discharges to Mosher Slough. The basin is designed for a ten year storm with a depth of roughly 16 ft. and a detention time of 24 hours.

A Detention Basin Monitoring Work Plan was included in Appendix H-5 of the SWMP and described influent and effluent wet weather monitoring, dry weather sediment chemistry monitoring, and sediment toxicity monitoring during both wet and dry weather. A revised Detention Basin Sampling and Analysis Plan was developed in 2008-2009 to set standard procedures for conducting this monitoring and was included as Appendix H-5 of the 2008-2009 Annual Report.

Influent and effluent water samples were monitored during two wet weather events during 2008-2009 and one wet weather event in 2010-2011[30] for the following constituents.

- Conventionals (e.g., total dissolved solids [TDS], total suspended solids [TSS], turbidity)
- Pathogen indicators
- Chlorpyrifos and diazinon
- Pyrethroids
- Total mercury
- Methylmercury

Sediment chemistry monitoring was conducted during one dry weather event in 2008-2009 and one dry weather event in 2010-2011 and included the following constituents.

- Chlorpyrifos and diazinon
- Total mercury
- Pyrethroids

This Sampling and Analysis Plan was revised from a 2003 workplan developed for the City in 2003: "Detention Basin Workplan City of Stockton, California."[31] Similar influent and effluent monitoring, as

[29] The La Morada Basin was formerly called both Basin 2 and the San Joaquin Area Flood Control Agency (SJAFCA).

[30] Only one wet weather event was monitored due to a lack of qualifying storm events.

well as sediment chemistry monitoring, was conducted based on this workplan in 2003-2004 and 2005-2006, with the addition of pyrethroid and mercury monitoring during the 2007-2012 Permit based pm the new Sampling and Analysis Plan. During 2007-2012, sediment was also collected from the detention basins during one post wet weather event and one dry weather event for toxicity testing with *Hyalella azteca* during both 2008-2009 and 2010-2011

In the 2011 Annual Report, influent and effluent data from this permit term and the previous permit term were compared in depth for constituents monitored during both permit terms. Generally, La Morada Basin showed:

- Inconsistent removal of conventionals and diazinon[32].
- A trend of removal for pathogen indicators, which was surprising, since detention basins are not designed to remove these constituents.
- No trends in pyrethroid, mercury, or methylmercury removal during this Permit term.

Sediment chemistry and sediment toxicity monitoring also did not reveal any trends. Several factors must be considered when interpreting the results of *Hyalella* sediment toxicity tests as they relate to environmental conditions and pesticide concentrations in the samples. TOC and grain size can dramatically affect the toxicity of sediment samples.

- As TOC increases, the bioavailability of many hydrophobic pesticides (e.g., pyrethroids, chlorpyrifos) decreases, and therefore the toxicity decreases.

- Samples with grain size that are primarily comprised of fine sediments and clay are more likely to have increased concentrations of hydrophobic contaminants than samples comprised mostly of sand, assuming that there are similar contaminant contributions/inputs.

The only sample that exhibited toxicity was collected during a dry weather event in 2008-2009 at MS-1D. Based on performing an organic carbon correction for the pesticides that were analyzed in the MS-1D sample, there were 18.8 TUs of pyrethroids, more than enough to have caused the toxicity observed in the sample; chlorpyrifos was also present in the sample, and likely contributed to the toxicity. It was believed that the presence of a relatively elevated number of pyrethroid TUs was consistent with the sample being composed mostly of silt and clay (~92% of the sample matrix) and a relatively low/moderate TOC concentration. However, the other three samples collected during this permit term did not exhibit statistically significant toxicity, despite finer sediments and clay composition. The range of TOC concentrations did not appear to affect toxicity either. No pesticides were detected in sediment chemistry data collected in 2008-2009 and 2009-2010, but bifenthrin was detected during the 2010-2011 event.

The La Morada Basin was selected for monitoring because it was one of the detention basins with the longest retention times in the SUA and it had been monitored during the second permit term. However, its retention time (24 hours) is still considered to be a relatively short retention time for water quality purposes.

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[31] The original workplan "Detention Basin Monitoring Workplan City of Stockton, California" was prepared for the City by CDM March 2003 (CDM Project No. 2500-38409)

[32] Chlorpyrifos was not analyzed in the 2011 Annual Report due to QA/QC issues in the 2002-2007 permit term.

2.5.4 BMP Effectiveness Study

Two BMP effectiveness studies were required by the third term Permit, with the suggestion that one include monitoring of a low impact development (LID) BMP. The Permittees chose to continue the study of the media filter stormwater treatment (MFST) system at the Legion Park Pump Station (LPPS) initiated in 2006 and begin a new study of a Filterra unit that was recently installed at the City's Waterfront Promenade and Marina Development Project area. Several options for the LID BMP were evaluated, including a porous pavement installation and a swale, but the Filterra unit was ultimately selected based on site accessibility and feasibility of monitoring.

Legion Park Study

The LPPS MFST is a structural stormwater treatment control measure consisting of 156 perlite-filled, radial-flow filter cartridges mounted in an underground vault that serves a sedimentation basin to remove large sediment prior to filtration. The perlite used with this system is intended to remove TSS, oil and grease, and nutrients. The drainage area of the LPPS is approximately 1,860 acres, and the LPPS itself includes five pumps that discharge effluent from the station's wet well into Yosemite Lake. The LPPS also includes a low-flow pump that discharges dry weather flow, light precipitation runoff, and early portions of larger wet weather events. The LPPS MFST system is connected to—and designed to provide continuous treatment of discharges from—this low-flow pump. The LPPS MFST system was not designed to treat the total flow from the LPPS.

The City began monitoring of the MFST system in April 2006. Two rounds of monitoring were conducted during the second term permit (April-May 2006 and January-April 2007), and monitoring was continued (June 2009-June 2010) to satisfy the requirements of the Permit. In total, 15 events (12 dry weather and 3 wet weather) were monitored for:

- Pathogen indicators
- Cations
- Conventionals
- Hydrocarbons
- Metals
- Nutrients
- Organochlorine (OC) Pesticides
- Organophosphate (OP) Pesticides
- Pyrethroids

In a memorandum submitted to the Regional Water Board in December 21, 2010, the results of monitoring conducted at the LPPS during 2007, 2009, and 2010 were analyzed in detail. The 2006 monitoring results (for two dry weather events and one wet weather event) were not evaluated because these events were conducted primarily for the development of monitoring procedures, and these procedures were revised for subsequent events. In addition, although samples were collected for the final 2006 event, the low-flow pump was not functioning at the time, so these data were not representative.

As detailed in the December 2010 memorandum, data that met specific evaluation criteria were assessed for significant differences between influent and effluent concentrations. Only dry weather event data were analyzed. Statistically significant removal of TSS, oil and grease, and nutrients (i.e., the constituents that could potentially be removed by the perlite filtration media used) did not occur. It is possible that low or negative removal of certain constituents may have occurred, to some extent, because the influent concentration was comparable to the theoretical, irreducible concentration value or range. It was also noted that the MFST system was not being inspected and maintained per the schedule recommended within the operations and maintenance guidelines for the MFST system, which may have influenced the observed results. Any effects of maintenance frequency on LPPS MFST system performance have not been verified.

LID BMP Study

Due to the downturn in the economy, there were limited new development-related BMPs within the SUA that were feasible for monitoring. The Permit suggested that an LID BMP be monitored, and multiple LID BMPs were investigated. A Filterra unit installed as part of the City's Marina Redevelopment Project was identified as a possible BMP for study. Other options reviewed, but ruled out, included porous pavement (also at the City's Marina Redevelopment Project) and a swale at Morelli Park. Neither of these was feasible. The porous pavement treated a very limited area and collecting representative influent and effluent samples was infeasible. The sale at Morelli Park was infeasible due to accessibility and safety issues, as well as challenges associated with collecting an effluent sample.

The City's Redevelopment Agency was required by the Army Corps of Engineers to conduct water quality monitoring of the Stockton Channel for a five-year period to assess the effects of the Downtown Marina Redevelopment Project and its associated upland development. The Filterra unit was installed prior to the Permittees' involvement, and the Permittees did not have control over its design

The Filterra device is a pre-cast concrete box with a small tree planted in a bed filled with engineered soil media. It was installed along the edge of a parking lot and receives drainage from approximately 0.42 acres of the parking lot. It was designed to receive, retain, and treat stormwater runoff from the adjoining paved surfaces. The initial Sampling and Analysis Plan for the Filterra unit indicated that the Permittees would sample five wet weather events during each of two years: 2010-2011 and 2011-2012. The unit was monitored for:

- Conventionals
- Metals
- TSS, Turbidity, and suspended sediment concentration (SSC)
- Nutrients
- Pyrethroids

Because the unit was not designed for monitoring, it proved impossible to separate treated effluent from untreated sheet flow runoff from the parking lot, culminating in unreliable monitoring results. For this reason, only two events were sampled, and monitoring was discontinued in 2011-2012.

2.6 CONCLUSIONS

Each of the stormwater monitoring plan elements addresses different MRP objectives. Conclusions based on these objectives are presented in this section. The conclusions are followed by recommendations for modifications to the monitoring program MRP to best direct resources to fulfill these objectives.

2.6.1 Urban Discharge and Receiving Water Monitoring

Objectives:

- Assess impacts on receiving waters from urban runoff
- Characterize urban runoff
- Identify sources of pollutants
- Assess overall health and evaluate long-term trends in receiving water quality

Conclusions:

- Cause and contribute exceedances from both 2002-2007 and 2007-2012 have been evaluated to determine the POCs that pose the greatest impact from urban runoff to receiving waters. This Permit term, the list of 7 POCs in 2002-2007 was reduced to a subset of the 2002-2007 list of 4 POCs:

Second Permit Term POCs	Permit POCs
• Total copper	• Total aluminum
• Total lead	• Total iron
• Total aluminum	• Fecal coliform
• Total iron	• *E. coli*
• Fecal coliform	
• *E. coli*	
• Oil and grease	

- Long term trends in POCs in urban runoff were assessed in box plots and statistically significant changes were determined in order to characterize urban runoff. Overall urban runoff quality was maintained or had improved.
    - At specific sites, dry and wet weather trends for Permit POCs were assessed using data from 2002-2007 to 2007-2012 only (with the exception of fecal coliform, for which the analysis used data from 1992 to 2012). The following trends were observed:
        - For the comparisons for each Permit POC for each site, 4 out of 28 comparisons showed a statistically significant decrease from 2002-2007 to 2007-2012. One showed a statistically significant increase, and the remaining 23 comparisons did not show any statistically significant trends. The statistically significant changes were seen in dry weather data only.
        - There was a statistically significant decrease in total iron, fecal coliform, and *E. coli* concentrations at CR-46.

        - There was a statistically significant decrease in total iron concentrations and a statistically significant increase in fecal coliform concentrations at SC-1.
    - Using combined data from all sites, trends were assessed for second term permit POCs and Permit POCs using box plots and tables listing statistically significantly trends.
        - Four out of fourteen comparisons between 2002-2007 and 2007-2012 indicated a statistically significant decrease in the concentration of POCs from 2002-2007 to 2007-2012.
        - During dry weather, total lead, fecal coliform, and E. coli concentrations showed a statistically significant decrease.
        - During wet weather, E. coli concentrations showed a statistically significant decrease.
        - During wet weather, total copper showed a statistically significant increase.
- Site-by-site analysis showed that wet weather concentrations of total aluminum and total iron exceeded dry weather concentrations suggesting that wash off of sediment containing these metals may be a source to urban runoff.

MRP Modifications:

The Permittees have been monitoring storm events since 1992 and dry weather events since 2004. They have monitored 51 storm events and 16 dry weather events since the initiation of these programs. These data are from sites with residential, commercial, industrial, and mixed land uses, and they encompass a wide range of storm conditions (e.g., first flush, early/mid/late season storms, short/long antecedent conditions). This is a robust dataset and more than sufficient to draw meaningful trends.

- Constituents that are no longer of concern (are not POCs or have been determined to not cause WQO exceedances as part WQBPs) will no longer be monitored in the urban discharge and receiving water program. The Permittees will no longer monitor for diazinon.
    - Overall, the Permittees monitor for about 50 pollutants and parameters at each site during each event. This is a comprehensive list of pollutants and parameters and an assessment of constituents that may no longer be of concern is appropriate.
    - OP pesticides have been phased out and there have been no cause and contribute exceedances of diazinon or chlorpyrifos during this permit term. Diazinon has not been detected above the WQO during the Permit term as part of the Pesticide Plan (See Section 9) with the exception of one rainwater sample. Additional monitoring of diazinon is unlikely to yield new information.
- Monitoring at DC-65 (at Odell Ave over-crossing) and downstream DC-65R will be moved to DC-66 (at Airport Way) and downstream DC-66R <u>during dry weather monitoring only.</u>
    - During both wet and dry weather from 2007-2011, the baseline monitoring program included sampling at the DC-65 and the DC-65R urban receiving water site, as well as the DC-65RUS upstream receiving water site. During 2010-2011, the Permittees discovered that the DC-65 pump discharge had been diverted to the sewer from roughly April 15 to September 15 since the mid-90s as part of the Permittees' Pollution Prevention Program. Therefore, the Permittees determined that previous dry weather sampling had largely not been representative of urban discharge. However, wet weather sampling had been representative of wet weather discharge as the pump had been discharging during the wet weather season. DC-66 is not diverted to the sanitary sewer and is representative of dry weather urban discharge. The downstream receiving water location will be moved from DC-65R to be closer to DC-66 and representative of DC-

66's influence. The change during dry weather only will maintain continuity with wet weather data from DC-65, which has been determined to be representative, but will ensure that new dry weather data are now representative of dry weather urban discharge to Duck Creek.

2.6.2 Water Column Toxicity Monitoring

Objectives:

- Assess impacts on receiving waters from urban runoff
- Assess overall health and evaluate long-term trends to receiving water quality

Conclusions:

- Water column toxicity data from 2005 to 2011 rarely identified impacts on receiving waters from urban runoff
- Based on diminishing toxicity, the overall long-term health of receiving waters appears to be improving

MRP Modifications:

The Permittees have conducted water column toxicity monitoring at receiving water sites since 2002. Toxicity was determined based on *ceriodaphnia dubia* survival and reproduction and *Pimephales promelas* survival. During the second term permit, water column toxicity was conducted during two permit years and in the Permit, this was increased to annual sampling. During each year toxicity testing was conducted, toxicity monitoring was coordinated with the urban discharge and receiving water program so that water chemistry data could be used in conjunction with TIEs to attempt to identify the pollutants causing toxicity.

- The Permittees will discontinue this program.
    - Over 93 event-waterway combinations have been monitored for toxicity[33], as shown in **Table 2-20**. Most often the toxicity can only be speculatively attributed to very broad groups of constituents, as shown in **Table 2-21**. For instance during the first flush storm of 2009-2010, three samples demonstrated toxicity. The sources of the toxicity were attributed to the following groups, respectively, for each sample:
        - Possibly particulate-associated contaminants (e.g., metals, persistent organics) and/or substance blocking enzyme activity
        - Possibly metals and/or metabolically active substances
        - Possibly metals, persistent organics and/or metabolically active substances

    Therefore, the program has not been very useful in identifying the impact of urban discharge. The most specific sources suggested have been metals in general and diazinon, both of which are addressed by the Permittees' current pollution prevention activities. Therefore, the program has not resulted in additional pollution prevention. In addition, in many cases the toxicity is not persistent. These results make it very difficult to develop toxicity reduction measures.

[33] This does not include a count of the makeup event on 6/4/09 because those samples made up for previous samples that were not properly tested due to miscommunication with the lab.

2.6.3 Dry Weather Field Screening

Objectives:

- Identify sources of pollutants

Conclusions:

City of Stockton

- 80% of all outfalls were screened during this Permit term[34].
- In general the field screening did not prove successful in identifying illicit discharges as only 17% of outfalls have had sufficient flow for sampling and only 3% have exceeded action levels that generated a response to identify the ID. Action levels have been exceeded for EC only.
- Of the three outfalls exceeding EC action levels, the following sources/illicit discharges have been speculated.
    - Alum added to a residential lake: Source tracking led to a largely residential area and conversation with an area homeowner indicated alum recently added to one of the area lakes might have caused the higher EC level.[35] However, the source was not confirmed.
    - Groundwater intrusion: Source tracking did not lead to any clear upstream sources. Groundwater in the area had EC levels comparable to the EC measured at the outfall, so it was speculated that groundwater intrusion was the most likely source.
    - Residential landscaping and pool maintenance activities: Source tracking led to a gated community to which the City did not have access. It was merely speculated that sources in this community could have been landscaping.

County of San Joaquin

- The County has screened all of its 46 outfalls annually during this Permit term
- No IDs have been detected

MRP Modifications:

City of Stockton

- The City will discontinue dry weather field screening because outfall monitoring has not been effective at identifying sources of pollutants. ID investigation should rely on the public hotline and using Permittee field maintenance crews to identify potential IDs.

County of San Joaquin

- The County will discontinue dry weather field screening because it has not detected any IDs. Instead the County will provide training to engineering divisions, utilities and road maintenance to notice and report dry weather flows. For more information on ID response, see **Section 3**.

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[34] The Permittees monitored 20% of outfalls during each Permit year except for 2011-2012

[35] The City annually sends letters to homeowner's association regarding the control of use of chemicals in residential lakes. However, the lakes benefit the City in that they detain stormwater and in order to serve this purpose they must be allowed to overflow when they reach capacity.

2.6.4 Sediment Plan and Sediment Toxicity Monitoring

Objectives:

- Assess the impacts on receiving waters from urban runoff

Conclusions:

- Statistically significant toxicity, as defined by the Sediment Plan, was observed on Mosher Slough and the Calaveras River, but not Smith Canal, Walker Slough, Five-Mile Slough or Mormon Slough.
- These samples accounted for 18% of all samples collected.
- Toxicity detected in these samples was from sediment in shallow waterbodies located in low to middle income areas.

MRP Modifications:

- Sediment toxicity monitoring will continue as part of the proposed program.

2.6.5 Bioassessment

Objectives:

- Assess the physical and biological impacts on receiving waters from urban runoff

Conclusions:

- Mosher Slough showed an improvement with less biological impact
- However, the waterways within the SUA are subject to substantial influence of human activities that include both physical (e.g., habitat degradation via sedimentation) and chemical factors (e.g., stormwater runoff).
- Overall waterbody health could not be determined because a regional IBI is not in place.

MRP Modifications:

- The Permit's fact sheet states that future monitoring should be adapted, in part, to link more directly with the SWAMP long-term goal of utilizing bioassessment to develop biojectives for a variety of eco-regions and land-use dominated areas in California. Further assessment of physical and biological impacts on receiving waters will be determined using biojectives once they are adopted with associated implementation guidance.

2.6.6 Detention Basin Monitoring

Objectives:

- Characterize urban runoff
- Measure and improve effectiveness of SWMP

Conclusions:

- The La Morada Detention Basin effectiveness study was completed. Influent and effluent monitoring did not show consistent removal of pollutants.
- The detention basin was designed for flood control and not for pollutant removal thus the lack of consistent pollutant removal was not surprising.

MRP Modifications:

- La Morada Basin was specifically chosen for monitoring during this Permit because of its longer detention time (24 hours) compared to other detention basins in the SUA. There are no other detention basins that are better suited for effectiveness assessment at this time. Therefore it is recommended that this program be discontinued.

2.6.7 BMP Effectiveness Studies

Objectives:

- Measure and improve the effectiveness of the SWMP

Conclusions:

- Monitoring of the Legion Park MFST system study was completed and showed statistically significant removal of TSS, oil and grease, and nutrients did not occur.
- It is possible that low or negative removal of certain constituents may have occurred, to some extent, because the influent concentration was comparable to the theoretical, irreducible concentration value or range.
- The Legion Park system was also not being inspected and maintained per the schedule recommended within the operations and maintenance guidelines for the MFST system, which may have influenced the observed results.
- The Permittees attempted to evaluate the effectiveness of the LID BMP Filterra unit. However, the Filterra unit was installed prior to the Permittees' involvement, and as a result the installation did not allow for an effective evaluation.
- It proved impossible to separate treated effluent from untreated sheet flow runoff from the parking lot, resulting in inconclusive results.

MRP Modifications:

- Discontinue BMP Effectiveness Study.

2.6.8 Overall Waterbody Health

Urban discharge and receiving water monitoring, water column toxicity monitoring, and bioassessment all measured different aspects of aquatic health:

- Urban discharge and receiving water monitoring characterized water chemistry in urban discharge and at representative locations on Mosher Slough, the Calaveras River, Duck Creek and Smith Canal.
- Water column toxicity monitoring was conducted at the same receiving water sites to assess the overall quality of aquatic systems in the receiving waters.
- Bioassessment monitored multiple sites along each of these waterbodies to assess the biological integrity of the receiving waters.

Figure 2-13 has been developed to provide a more holistic view of waterbody health in the SUA and consider multiple lines of evidence. Each water body has a summary water quality indicator graphic that presents the overall chemical, toxic, and biological conditions of the water body. Color coding is used to rate waterbody health as follows:

- Water chemistry ratings were developed for the following constituents.

- Total aluminum
- Dissolved aluminum
- Total copper
- Dissolved copper
- EC
- Total iron
- Dissolved iron
- Total lead
- Dissolved lead
- Nitrate + nitrite
- Oil and grease
- pH
- TDS
- Total zinc
- Total mercury
- DO
- Chlorpyrifos
- Diazinon
- *E. coli*
- Fecal coliform

- Water quality for chemistry was based on the following benchmarks:
  - If less than 25% of receiving water samples for a given constituent exceeded the water quality objective, the constituent is not considered a receiving water POC and receives a green rating. The green box indicates the number of constituents that did not qualify as receiving water POCs
  - If 25%-75% of samples exceeded the WQO, the pollutant is listed in the yellow box
  - If >75% of samples exceeded the WQO, the pollutant is listed in the red box
- Water column toxicity was ranked using the same benchmarks:
  - If <25% of urban receiving water samples demonstrated toxicity, the box is green
  - If 25%-75% of urban receiving water samples demonstrated toxicity, the box is yellow
  - If >75% of urban receiving water samples demonstrated toxicity, the box is red
- Bioassessment was ranked based on trends from 2004-2005 to 2010
  - If there was an general decrease in biological impact, the box is green
  - If there was no clear trend, the box is yellow
  - If there was a general increase in biological impact, the box is red

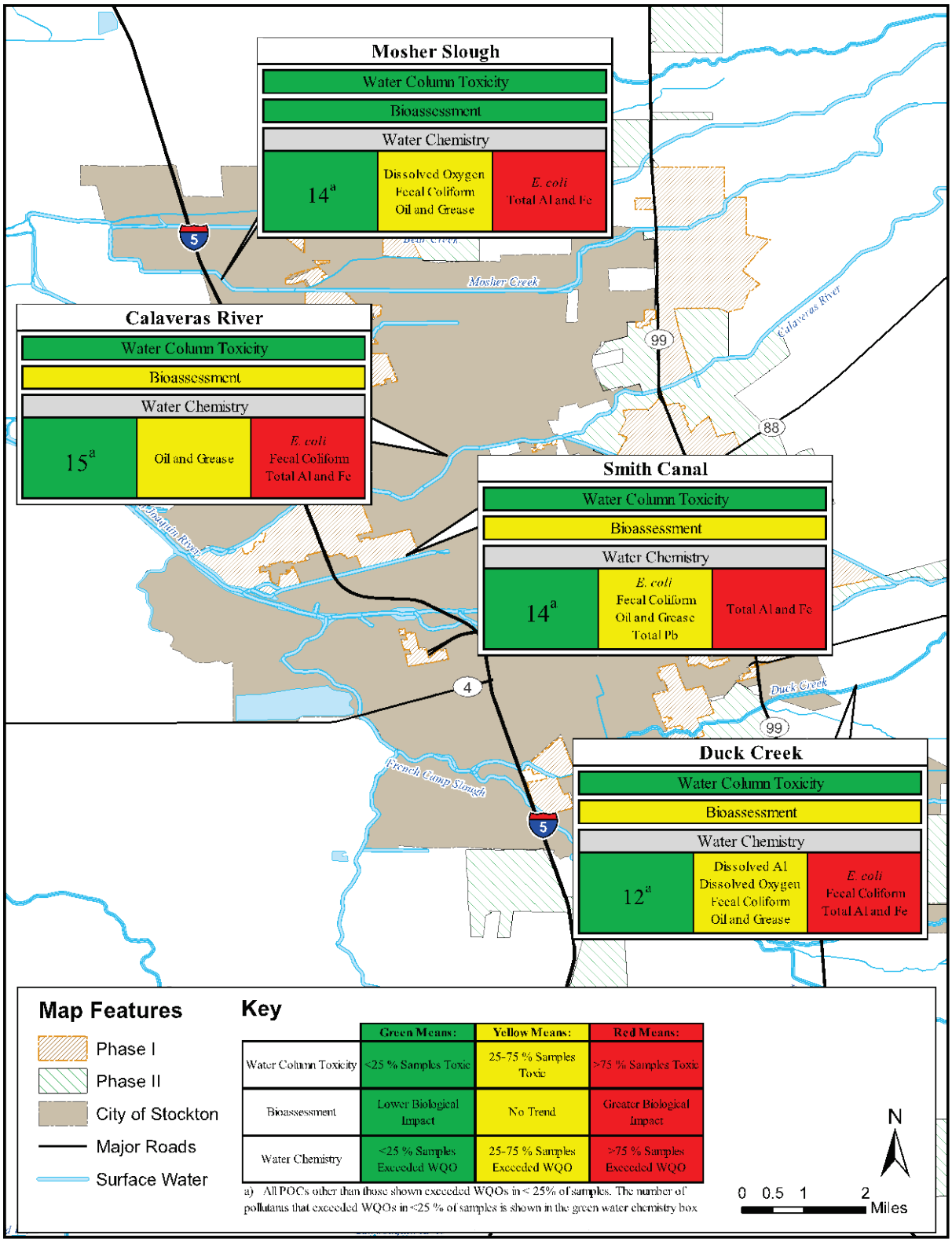


Figure 2-14. Long-Term Receiving Waterbody Health Summary

Overall, Figure 2-12 shows that there are similar POCs for receiving water to those for cause and contribute exceedances based on both urban discharge and receiving water samples (see Section 2.4.1). These are:

- Total aluminum
- Total iron
- *E. coli*
- Fecal coliform

Some additional POCs were identified:

- DO
- Oil and grease
- Dissolved aluminum
- Total lead

Overall, the majority of constituents were below the WQO (12-15 out of 20 constituents). Water column toxicity has rarely been detected on all waterbodies. All waterbodies show inconclusive trends in biological impact with the exception of Mosher Slough, which showed an improvement with less bioligical impact from 2004-2005 to 2010.

On Mosher Slough, in addition to the cause and contribute POCs, DO and oil and grease[36] were receiving water POCs. 14 constituents were not of concern. Mosher Slough showed an overall improvement with lower biological impact due to higher specieis abundance, increase in taxa, and decrease in dominance by a single taxa as shown in **Table 2-25**. Water column toxicity was rare and has decreased in recent years as previously discussed. This would suggest that waterbody health on Mosher Slough may be improving

On Calaveras River, oil and grease was identified as a receiving water POC in addition to cause and contribute POCs. However, 15 constituents were not of concern. Bioassessment showed inconclusive trends. Water column toxicity was rare, although one sample demonstrated toxicity in 2011-2012. Bioassessment indicated inconclusive trends.

On Smith Canal, oil and grease and total lead were receiving water POCs in addition to the cause and contribute POC. However, 14 pollutants were not of concern. Water column toxicity was rare. Bioassessment indicated inconclusive trends.

Duck Creek has the most indicators of poor waterbody health. In addition to cause and contribute POCs, dissolved aluminum, DO, and oil and grease were receiving water POCs on Duck Creek. However, 12 constituents were not of concern. Water column toxicity monitoring in recent years has shown lower demonstration of toxicity. Bioassessment indicated inconclusive trends in waterbody health.

These results indicate that most constituents were not receiving waterbody POCs. Mosher Slough appears to have the best waterbody health while Duck Creek had the most indication of poor waterbody health.

[36] It should be noted that the water quality objective for oil and grease is zero. Thus any trace of oil and grease would result in an exceedance although there were no signs that the oil and grease was impacting the beneficial uses of the receiving water. Basin Plan policy for oil and grease notes that oils, greases, waxes, or other materials cannot form a visible film or coating on the water surface or on the stream bottom. Thus the use of zero as as the water quality objectives presents a worse case scenario for assessing the waterbody overall health.

2.7 PROPOSED 2012-2017 WATER QUALITY MONITORING PROGRAM

Revisions of the MRP are appropriate to ensure that the Permittees are directing their resources to the most critical water quality issues and collecting data to support management decisions to address these water quality issues. It is also appropriate for the Permittees to complement their monitoring data with other monitoring sources, provided the monitoring conditions and sources are similar to those in the SUA. Therefore the Permittees are proposing this 2012-2017 monitoring program to better meet the goals of monitoring. In addition, the monitoring program may include monitoring as part of the Regional Monitoring Program (RMP) under development by the Regional Water Board.

The ultimate goal of the monitoring program is to reduce the degradation of waters of the State and waters of the U.S. by urban runoff and protect their beneficial uses. The current monitoring program is intended to assess the impact of urban discharge on receiving waters but it not well suited to determine the sources of pollutants in order to implement control measures. In addition, the current program does not focus on the impairment of beneficial uses. The 303(d) listings and TMDLs developed for waterbodies in the SUA directly assess these issues. Therefore, this program focuses on pollutants for which waterbodies are 303(d) listed and implements an intensive monitoring approach to determine the source of pollutants in urban discharge by identifying "hot spots." The Permittees, however, recognize the value of the historic data collected by urban discharge and receiving water monitoring and will continue monitoring for an extensive suite of constituents at historic sites.

The proposed monitoring program will be directed by management questions to ensure that monitoring is successfully achieving the ultimate goal of preventing degradation of receiving waters by urban runoff and protecting beneficial uses. These management questions allow for step-based evaluation of these goals and adaptive management to prioritize monitoring. These management questions are discussed in detail in Section 2.7.2. Use of these management questions will allow the Permittees to methodically assess waterbody health, identify sources of pollution and identify BMPs to address sources of pollution.

2.7.1 Watershed Characteristics

The SUA contains over fifteen watersheds, which drain to local sloughs, creeks, and rivers. These waterbodies are listed, roughly from north to south, in **Table 2-40**.

Table 2-40. Watersheds in the SUA

- Pixley Slough
- Little Bear Creek
- Bear Creek*
- Old Mosher Slough
- Mosher Slough*
- Five-Mile Slough*
- Fourteen-Mile Slough*
- Calaveras River*
- Smith Canal*
- Stockton Deep Water Ship Channel*
- Mormon Slough*
- Little Johns Creek*
- Duck Creek*
- Walker Slough*
- French Camp Slough
- Diverting Canal
- Weber Slough

* Listed as major natural watersheds in the SUA in the Permit

The monitoring that has been conducted, as indicated in **Figure 2-14**, has helped determine POCs for this proposed program, as discussed below.

The watersheds that have historically been monitored as part of the Stormwater Program for the longest period of time are:

- Mosher Slough
- Calaveras River
- Smith Canal
- Duck Creek

The results of historic monitoring on these waterbodies are discussed in Section 2.4.1. Section 2.4.1 identified POCs for these waterbodies. These POCs are:

- Total aluminum
- Total iron
- *E. coli*
- Fecal coliform

For the purposes of monitoring, total aluminum and total iron will not be monitored, since they have been determined to be correlated with wet weather events and are common naturally occurring components of soil. Therefore, it is likely they wash off with sediments and are not controllable beyond the scope of the current Stormwater Program. The current Stormwater Program has a number of control measures and BMPs that address erosion and sediment. In the Permittees' respective Stormwater Quality Control Criteria Plans (SWQCCPs), LID policies and objectives are given for new development and redevelopment sites. For example, the SWQCCPs specifically discourage development in areas that are susceptible to erosion, and encourage minimization of impervious cover. Reductions in impervious cover increase infiltration and decrease the velocity of runoff thereby preventing erosion. In addition, the City and County require BMPs to minimize and/or eliminate the discharge of sediment from construction sites. Where applicable, the City and County require sites to obtain coverage under the State Water Resource Control Board's General Construction Permit.

During the Permit term, the Permittees conducted four WQBPs. These consisted of the Pesticide Plan, the Pathogen Plan, the Mercury Plan and the Low DO Plan. Aspects of these programs will continue as part of the proposed program. The WQBPs, have identified six pollutants that are of concern in the SUA:

- *E. coli*
- Fecal coliform
- Chlorpyrifos
- Diazinon
- DO
- Mercury

These correlate with the 303(d) listings for Mosher Slough, Calaveras River, Smith Canal and Duck Creek. Of these, no cause or contribute exceedances have occurred as part of the urban discharge and receiving water program except for *E. coli* and fecal coliform. In addition, as part of the Pesticide Plan (See Section 9), which includes extensive monitoring of waterbodies throughout the SUA, diazinon was not detected in 2010-2011. While it was detected between 2008 and 2010, it was not detected above the Department of Fish and Game WQO in any urban discharge or receiving water sample. It was only detected in rainwater outside of the SUA. The absence of detection in urban runoff and receiving water suggests that the phase-out by the U.S. EPA (completed in 2005) had been effective in reducing diazinon impacts by stormwater. The 2010-2011 monitoring results confirm this trend. Therefore, diazinon is considered to have been studied as part of the WQBPs and will not be monitored for further study.

WQOs are currently under development for pyrethroids. As emerging POCs, pyrethroids will be monitored. In addition, sediment toxicity monitoring will continue as the Permittees are still working to fully understand the sediment toxicity that has been observed. It is believed that pesticides are the primary cause of sediment toxicity.

Accordingly, the final group of constituents that will be monitored are:

- *E. coli*
- Fecal coliform
- Chlorpyrifos
- Pyrethroids
- DO
- Mercury (and methylmercury)
- Sediment toxicity

The pollutants will be studied in depth as part of the proposed monitoring program for the fourth term permit.

2.7.2 Water Quality Monitoring Program Management Questions

The key management questions that the Permittees are establishing as drivers for the fourth term permit water quality monitoring program are listed below. They are taken from the "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California[37]" developed by Regional Water Quality Control Boards (Los Angeles, Santa Ana, San Diego), municipal permittees, Heal the Bay and the Southern California Coastal Water Research Project (SCCWRP). Their development was partially funded by the State Water Resources Control Board and the Southern California Stormwater Monitoring Coalition.

The rationale for monitoring driven by management questions is that monitoring should be based on decision making. These questions direct the level of monitoring to be commensurate with the potential for impact, allowing for strategic allocation of funds. More monitoring can be allocated to areas with the greatest probability of an impact's occurrence and be based on the impact's extent and magnitude. Most importantly, monitoring can be adaptive based on the answers to each question (Questions 1 through 5, listed below). The answers to each of these questions lead to the subsequent question and ultimately to actions that can be taken to address the problems identified. In particular the answer to Question 4 allows for targeted pollution prevention activities and then leads to an assessment of the effectiveness of these activities through long-term monitoring of receiving waters through Question 5. Therefore, these questions are intended to be answered and reassessed throughout the course of more than one permit term.

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

Although the answers to the questions may vary from sub-watershed to sub-watershed, the approach for answering the questions and data currently available is generally the same. Each of the questions will be addressed for the sub-watersheds that are targeted for the monitoring program. The current state of

[37] Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. 2004. Model Monitoring Technical Committee. Technical Report 419. Southern California Coastal Water Research Project. Westminster, CA.

knowledge for each of these questions will be summarized for the sub-watersheds that are included as a part of the proposed monitoring program. In addition, the proposed monitoring program will assist in providing additional information for all of the questions.

Q1 – Are Conditions in the Receiving Waters Protective, or Likely to be Protective, of Beneficial Uses?

The 303(d) list and TMDLs developed thus far and/or are currently under development assist the Permittees in addressing Question 1. The 303(d) listings and TMDLs determine if conditions are impacting beneficial uses and identify the pollutants that are most likely the source of the impairment.

Q2 – What is the Extent and Magnitude of the Current or Potential Receiving Water Problems?

The 303(d) list and TMDLs developed thus far and/or are currently under development assist the Permittees in addressing Question 2. In addition, the Urban Discharge and Receiving Water monitoring stations that have been historically monitored as a part of the stormwater program also provide information for this question.

Q3 – What is the Relative Urban Runoff Contribution to the Receiving Water Problem(s)?

The 303(d) list and TMDLs developed thus far and/or are currently under development assist the Permittees in addressing Question 3. In addition, the Urban Discharge and receiving Water monitoring stations that have been historically monitored as a part of the stormwater program also provide information for this question. The Permittees also propose that Question 3 be addressed, in part, with a model that could be developed and calibrated over the course of a year of monitoring in each watershed in conjunction with the monitoring proposed in response to the following question.

Q4 – What are the Sources to Urban Runoff that Contribute to Receiving Water Problem(s)?

Although there are some data and information that has previously been developed within the literature to assist with answering this question, the focus of the Permittees' fourth term permit monitoring will be answering Questions 4 and 5 through a targeted monitoring and BMP implementation approach.

Q5 – Are Conditions in the Receiving Waters and the Outfall Discharges Getting Better or Worse?

This question will be answered through the ongoing monitoring that is proposed at the historical monitoring sites. This will then complement the previous efforts to assess long term trends.

2.7.3 Proposed Water Quality Monitoring Program (2012-2017)

The previous water quality monitoring effort has provided considerable data to support the stormwater management program and to characterize urban runoff and the conditions of the local water bodies. During this permit term it is proposed that a more focused monitoring effort is conducted within key urban waterbodies on a rotating basis. The basic concept is to conduct an extensive watershed specific monitoring effort that provides broader geographical coverage and comprehensive outfall source monitoring. This will allow better use of the Permittees' limited resources but still provide the information to assist in answering the monitoring questions described above.

The following bullets highlight the proposed monitoring effort:

- **Locations -** Six urban waterbodies will be monitoring on a rotating basis. These waterbodies include the historical monitoring locations.
    - Mosher Slough
    - Calaveras River
    - Smith Canal
    - Duck Creek
    - Five Mile Slough
    - Mormon Slough

- **Timeframe for Monitoring** - Each water body will be monitored for two years with a staggered schedule to accommodate resource demands, as shown in **Table 2-41**.
- **Monitoring Sites** - For each waterbody/watershed the following is proposed:
    - Within each waterbody, where applicable, the historical urban discharge/receiving water co-located monitoring site will be monitored for a comprehensive suite of constituents.
    - Three to five outfalls and two to three paired receiving water sites will be monitored for the identified POCs on each waterbody.
    - One receiving water site will be monitored for sediment toxicity on each historic waterbody.
    - Two sites determined to be representative of rainwater and atmospheric deposition in the SUA will be monitored for mercury and pesticides. The Permittees will coordinate with the Regional Water Board to the extent appropriate to assess the contribution of air pollution sources to mercury and pesticides in stormwater.
- **Monitoring Events**
    - Each water quality site will be monitored for three storm events per year with variable targeted storm intensity (guideline of 0.15’’- 0.25’’ in intensity): one storm targeted for the first flush, one between December and March and one between March and June.
    - Each water quality site will be monitored for four dry weather events, attempting to capture two dry weather events (June to October), two wet season dry weather events (dry weather event defined as event proceeded by one week of dry weather).
    - Most wet weather samples will be grab samples taken during the first flush at the outfall site and roughly an hour later at the receiving water sites.
    - Dry weather samples will be taken as grab samples at all sites.
    - Sediment toxicity will be monitored 2-4 days following one storm event and two dry weather events
- **Monitored Constituents**
    - A full suite of constituents will be monitored for the historical monitoring urban discharge and urban receiving water locations only. At urban discharge stations, these samples will be collected using a flow weighted composite sample during wet weather. The suite of monitoring constituents will consist of the Permit MRP’s urban discharge and receiving water monitoring suite with the exception of nutrients (nitrate, nitrite, and phosphorus) which have not resulted in any cause or contribute exceedances during the second term permit term and this Permit term and diazinon which has been phased out, has not resulted in any cause or contribute exceedances during the Permit term, and has not been detected above the WQO as part of the Pesticide Plan (see **Appendix B-4** for list of constituents).
    - For all of the other stations, water quality monitoring will only be conducted for the constituents identified as POCs within the given watershed. These include *E. coli*, fecal coliform, chlorpyrifos, pyrethroids (as an emerging POC), mercury (and methylmercury), and DO.
    - Sediment toxicity will be monitored at urban receiving water sites.

Table 2-41. Staggered Waterbody Monitoring

Waterbody	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Mosher Slough							
Calaveras River							
Smith Canal							
Duck Creek							
Mormon Slough							
Five-Mile Slough							

2.7.4 Urban Watershed Monitoring

The following sections detail the monitoring that will occur in each watershed. Each watershed will be monitored for its own set of constituents based on 303(d) listing, TMDLs developed, urban discharge and receiving water determination of POCs, and WQBP monitoring (See **Section 9**). The following section consists of the following elements for each watershed-specific plan

- Description of the waterbody
- Selected monitoring sites in each waterbody shown in maps
- Monitoring that will take place at each site shown in tables.
- Rationale for the selection of each monitoring site

Monitoring sites are subject to change based on new information gathered by the Permittees.

Mosher Slough

Mosher Slough is one of Stockton's least-improved waterways and is located in the northern portion of the SUA. The urbanized portion of Mosher Slough flows naturally only when it receives input from upstream agricultural flow/tail waters or surface runoff (stormwater). In general, Mosher Slough is a shallow waterway that increases in depth west of the SUA; at high tide, the water level immediately west of I-5 is approximately four to five feet above mean sea level. Land use within the urbanized portion of the Mosher Slough watershed is dominantly residential with a small percentage being commercial and public lands. To the west of I-5, land use is predominantly agricultural. In addition to urban runoff, Mosher Slough receives inflow from upstream agricultural runoff and agricultural return (tail water). Monitoring sites are shown in **Figure 2-16** and listed in **Table 2-42**.

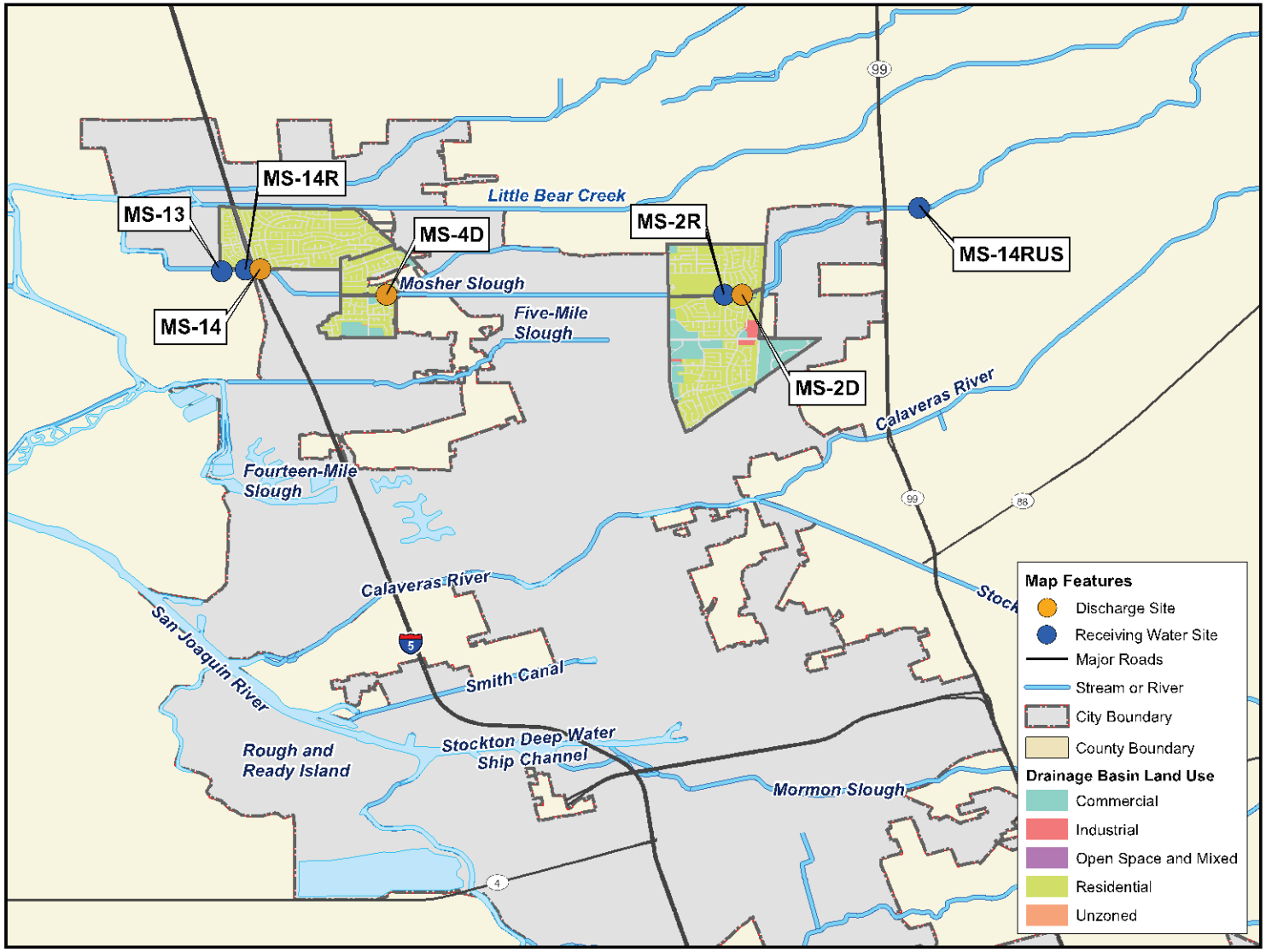


Figure 2-16. Mosher Slough Monitoring Sites and Discharge Site Drainagesheds

Table 2-42. Mosher Slough Monitoring Sites and POCs Monitored

Constituents Monitored	Type of Monitoring	Sites Monitored						
		MS-14RUS	MS-2D	MS-2R	MS-4D	MS-14	MS-14R	MS-13
Full suite of constituents[1]	Water quality					C	G	
E. coli and fecal coliform	Water quality BMP effectiveness monitoring	G	G	G	G	G	G	G
Chlorpyrifos and pyrethroids	Water quality	G	G	G	G	G	G	G
Mercury (and methylmercury)	Water quality	G	G	G	G	G	G	G
DO, nutrients, oxygen demanding substances, and field parameters	Water quality monitoring					G	G	
Sediment toxicity	Sediment toxicity						Sed	

Notes:
1. See Appendix B-4.
G = Grab
C = Composite
Sed = Sediment

As mentioned previously, Mosher Slough receives mostly residential runoff from the SUA. MS-2D discharges flow from an older residential establishment. MS-4D was selected as a midpoint along the waterbody and discharges from a primarily residential area. MS-2D, paired MS-2R, and MS-4D have also been monitored as part of the Pathogen Plan. MS-14 and MS-13 were selected to cover the areas downstream of I-5 where Mosher Slough has the most 303(d) listings. MS-14 drains a lower income area with duplexes and some commercial contributions. In contrast, MS-13 drains a younger, higher income residential area. In addition, MS-14 and MR-14R have been historically monitored since 1992 and 1997, respectively, as part of urban discharge and receiving water monitoring and subsequently as part of the Pesticide Plan and Mercury Plan. MS-14R would most likely be influenced by discharge from both MS-14 and MS-13. MS-14 and MS-14R are the only sites monitored for DO because only the area downstream of I-5 is 303(d) listed and upstream DO concentrations are unlikely to contribute to downstream concentrations. It is not logistically feasible to place an in-situ water quality data recorder at MS-14R.

Calaveras River

The Calaveras River watershed[38] is a tributary to the SJR Delta System flowing southwest from the Sierra Nevada foothills through Calaveras, Stanislaus, and San Joaquin Counties and drains approximately 470 square miles. Within the SUA, land use along the Calaveras River is predominantly residential and commercial, but also includes industrial uses. Outside of storm runoff between November and March, the

[38] Department of Water Resources, *Calaveras River Fish Migration Barriers Assessment Report*, September 2007.

Calaveras River receives limited upstream agricultural flow from the Stockton Diversion Canal and "old" Calaveras channel. Monitoring sites are shown in **Figure 2-17** and listed in **Table 2-43**.

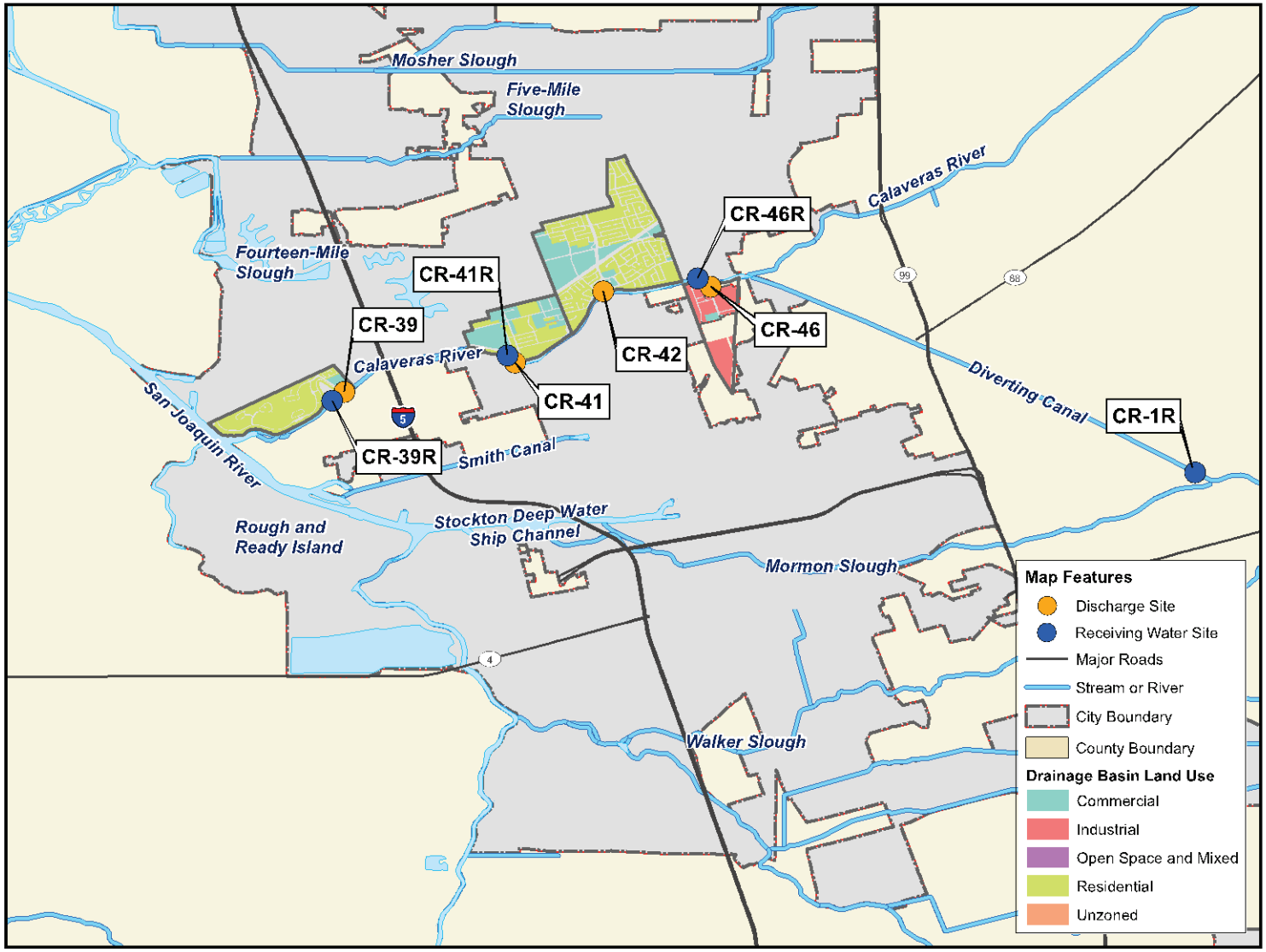


Figure 2-17. Calaveras River Monitoring Sites and Discharge Site Drainagesheds

Table 2-43. Calaveras River Monitoring Sites

Constituents Monitored	Type of Monitoring	Sites Monitored							
		CR-1R	CR-46	CR-46R	CR-42	CR-41	CR-41R	CR-39	CR-39R
Full suite of constituents[1]	Water quality		C	G					
E. coli and fecal coliform	Source ID water quality monitoring	G	G	G	G	G	G	G	G
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
Mercury (and methylmercury)	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
DO, nutrients, oxygen demanding substances, and field parameters	Water quality monitoring	G	G	G	G	G	S	G	S
Sediment toxicity	Sediment toxicity			Sed					

Notes:
1. See Appendix B-4.
G = Grab
C = Composite
Sed = Sediment
S = Sonde

Site CR-1R is upstream of the SUA, outside SUA influences, and, in addition, was chosen because of its history with urban discharge and receiving water monitoring and the Pathogen Plan. CR-46 was selected because it consistently has flow and based on its monitoring history as part of urban discharge and receiving water monitoring since 1992 and its subsequent history as part of the Pathogen Plan and Mercury Plan. It drains a predominantly commercial/residential area with minor industrial uses. CR-46R is paired with CR-46 and has similarly been monitored by the aforementioned programs. CR-42, CR-41, and CR39 each drain mixed commercial and residential areas. CR-41 is paired with CR-41R and CR-39 is paired with CR-39R. These five sites were selected based on their spaced location on the waterbody and their history as part of the Pathogen Plan. CR-39 and CR-39R have also been historically monitored as part of the Mercury Plan and DO Plan. Sondes will be placed at CR-41R and CR-39R, where flow can sustain the equipment.

Smith Canal

Smith Canal is a tidally influenced, shallow, east-west constructed freshwater slough that extends approximately 2.6 miles east from its confluence with the SJR to its upstream terminus at Yosemite Lake in central Stockton. The canal has an average depth of four to six feet (with a ten foot maximum depth at the mouth) and an approximate ebb to flood stage difference of up to four feet. Smith Canal has a mixed-use watershed. Besides direct groundwater inputs and tidal exchange, all inputs to Smith Canal are from the SUA's stormwater system.

Low DO monitoring will not be pursued on Smith Canal as the causes of low DO have already been studied in depth. In the Smith Canal Drainage Area Analysis and DO Work Plan Final Report (dated

October, 2, 2006) the City analyzed the causes of low DO in Smith Canal. It was concluded in the report that:

- While potentially a contributing factor, results of the 2004-2005 *in-situ* monitoring program indicated that the primary source of turbidity is not sediment transport from the storm drain system, but more likely the result of oxygen demanding substances with resuspended lake sediments.
- Biologically-active (reduced) sediments occur when there are sufficient quantities of mass and nutrients, but insufficient oxygen, to promote complete decomposition. DO concentrations of 0 mg/L were measured near the bottom of the water column in Smith Canal during stratified measuring, suggesting such sediments may be present.
- It is likely that as Smith Canal has gradually filled-in over the years, bottom sediments have had an increasingly important influence on DO concentrations. Sedimentation in Smith Canal has also provided a large reservoir of fine particles that are easily suspended during high-kinetic energy events, including storms and high wind conditions.
- Mechanisms that may be responsible for sediment resuspension include: (1) discharges from the storm drain system triggering resuspension of fine lake sediments and canal sediments proximal to the drainage locations; and (2) winds, which, by inducing shear on the water surface, may also induce shear on the bottom sediments by moving the water column in a "conveyor belt" fashion.
- However, resuspension of sediments is likely not responsible for the observed declines in DO concentrations during the dry season, and thus there may be two different mechanisms affecting DO during the wet season and dry seasons. The extended period of low DO below the stated WQO of 5.0 mg/L during the warm dry season months appear to be primarily a function of the canal's morphology, climatic, and biological influences. Morphology, such as limited depths (5.5 ft measured in Yosemite Lake during June) creates warm conditions. Warm temperature limits the amount of oxygen that can be dissolved in water. *In-situ* monitoring indicated that the eastern portion of the canal (SC-5R and SC-2R; see **Figure 2-17**) is a very warm water body (May through September in canal temperatures averaged 25 degrees C).

Sites that will be monitored are shown in **Figure 2-18** and listed in **Table 2-44**.

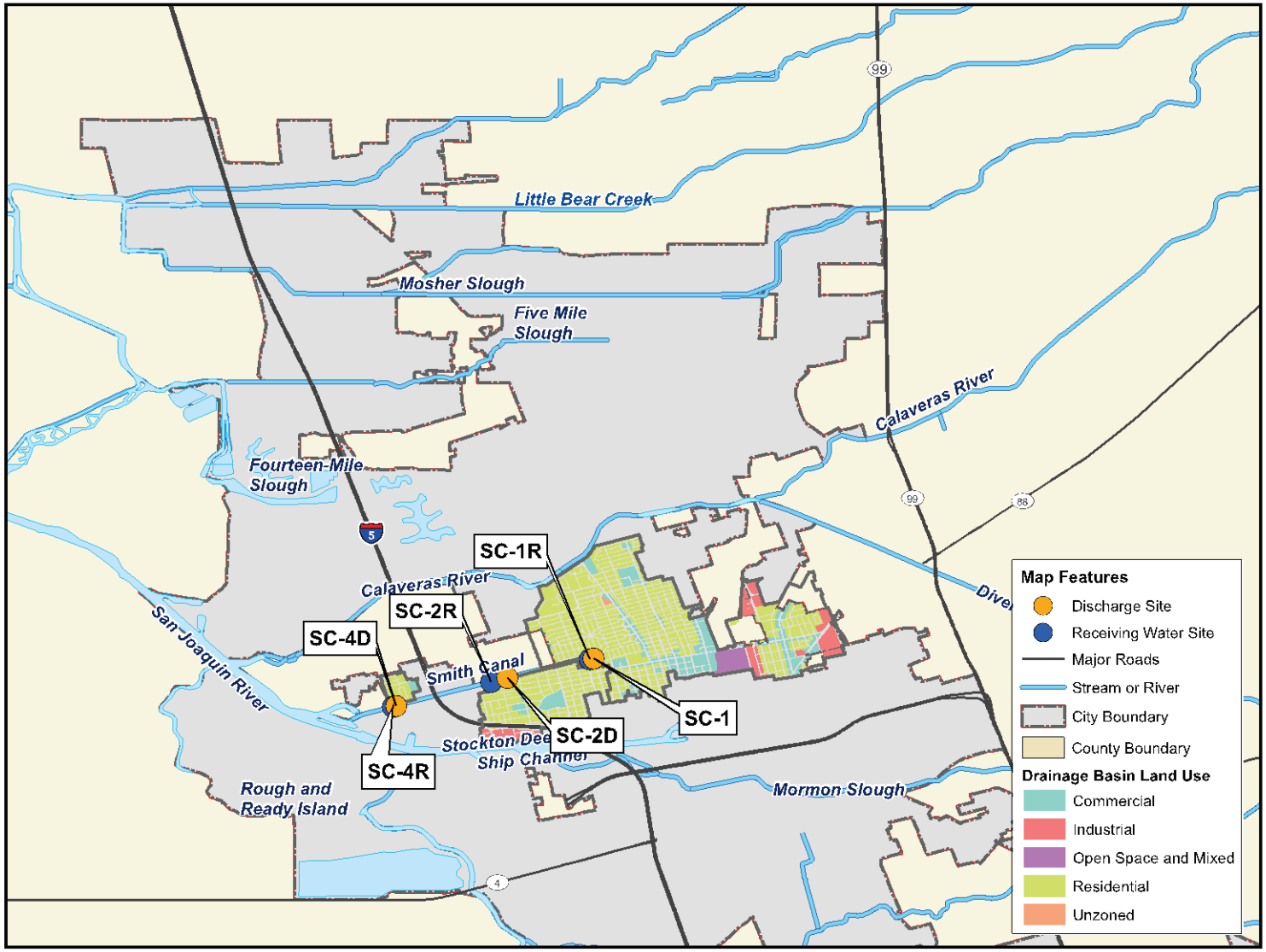


Figure 2-18. Smith Canal Monitoring Sites and Discharge Site Drainagesheds

Table 2-44. Smith Canal Monitoring Sites

Constituents Monitored	Type of Monitoring	Sites Monitored					
		SC-1	SC-1R	SC-2D	SC-2R	SC-4D	SC-4R
Full suite of constitutents[1]	Water quality	C	G				
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G	G	G
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G
Sediment toxicity	Sediment toxicity		Sed				

Notes:
1. See Appendix B-4.
G = Grab
C = Composite
Sed = Sediment

Monitoring will take place at SC-1 and paired SC-1R, which are both in Yosemite Lake and represent the upstream portion of Smith Canal. SC-1 has also been historically monitored as part of urban discharge and receiving water monitoring and the Pathogen and Mercury Plans and SC-1R has been historically monitored as part of the Pathogen, Pesticide, and Mercury Plans. SC-2D, paired SC-2R, SC-4D, and paired SC-4R are spaced midway and at the western end of Smith Canal, respectively (as shown in **Figure 2-17**) and have also historically been monitored as part of the Pathogen Plan.

Duck Creek/Walker Slough

Duck Creek's headwaters are in Stanislaus County from which it meanders westerly approximately 33 miles before ending approximately three miles south/southwest of downtown Stockton. East of the SUA, Duck Creek flows through predominantly open space and agricultural areas. Between El Dorado Street and I-5 Duck Creek drains into Walker Slough which continues approximately 700 feet west to its confluence with French Camp Slough. From the convergence point, Walker Slough extends approximately 600 feet west to its confluence with the SJR. Duck Creek/Walker Slough has a mixed-use watershed with residential, commercial and industrial land uses. Duck Creek/Walker Slough receives inputs from groundwater, tidal exchange, the stormwater system and agricultural runoff and agricultural return (tail water). Sites that will be monitored are shown in **Figure 2-19** and listed in listed in **Table 2-45**.

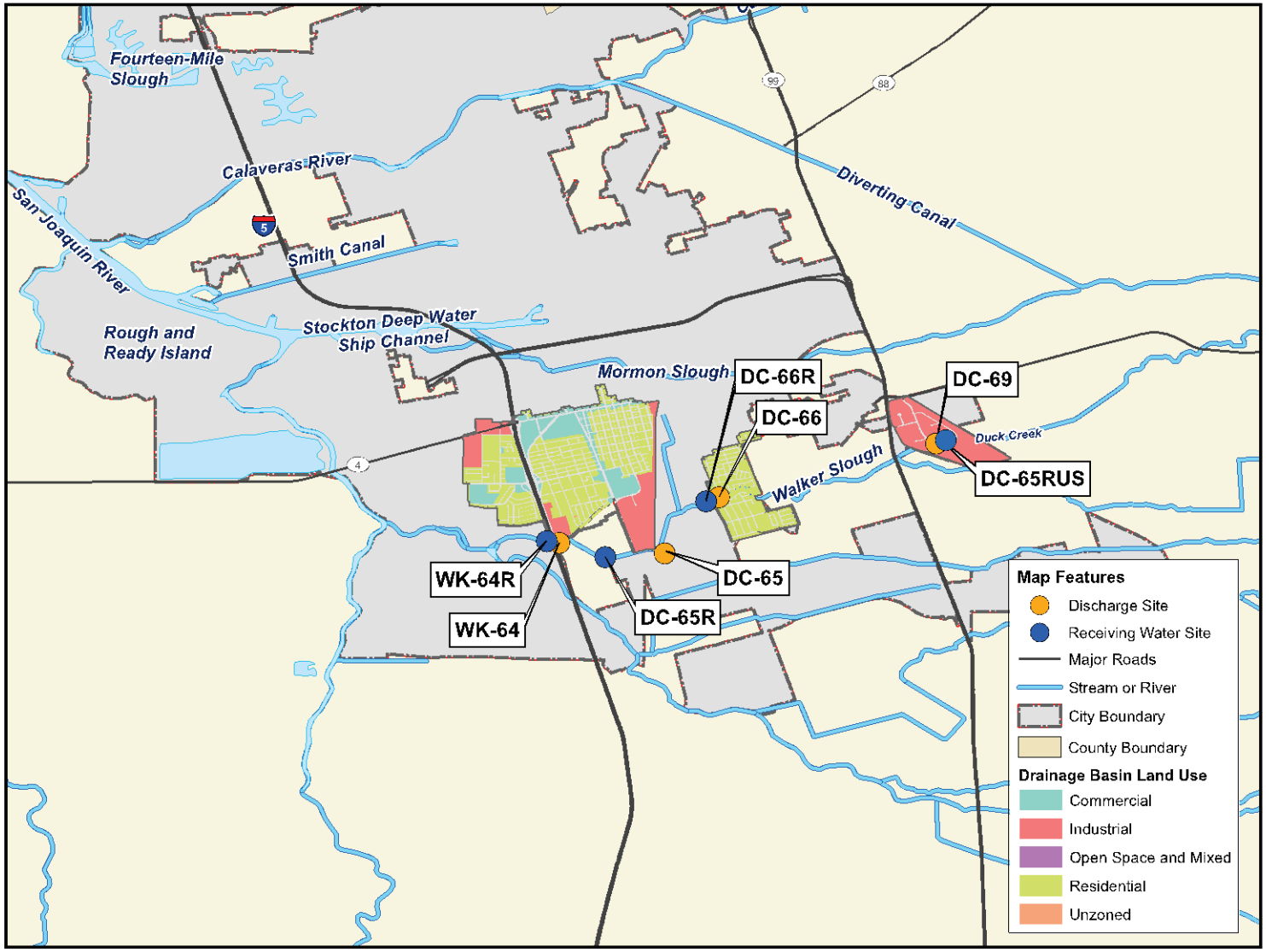


Figure 2-19. Duck Creek/Walker Slough Monitoring Sites and Discharge Drainagesheds

Table 2-45. Duck Creek Monitoring Sites

Constituents Monitored	Type of Monitoring	Sites Monitored							
		DC-65RUS	DC-69	DC-66[2]	DC-66R[2]	DC-65[3]	DC-65R[3]	WK-64	WK-64R
Full suite of constituents[1]	Water quality	G		G	G	C	G		
E. coli and fecal coliform	Source ID water quality monitoring	G	G	G	G	G	G	G	G
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
Mercury (and methylmercury)	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
DO, nutrients, oxygen demanding substances, and field parameters	Water quality monitoring	G	G	G	G	G	G	G	G
Sediment toxicity	Sediment monitoring						Sed		

Notes:
1. See Appendix B-4.
2. These sites will be monitored during dry weather only
3. These sites will be monitored during wet weather only
G = Grab
C = Composite
Sed = Sediment

Each of the sites selected has been historically monitored as part of the Pathogen Plan, with the exception of DC-65 and DC-65R, which are historical baseline monitoring sites. DC-65RUS represents the water entering the SUA. DC-69 drains an industrial area and was selected for monitoring because it is on the eastern most reach of Duck Creek. Other sites were selected to space urban discharge and receiving water sites evenly along Duck Creek and Walker Slough. DC-65 drains a predominantly industrial area and is paired with DC-65R. DC-66 drains a mixed-use area and is paired with DC-66R. WK-64 also drains a mixed-use area and is paired with WK-64R.

Mormon Slough

Mormon Slough has a mixed-use watershed with residential, commercial, and industrial land uses. It receives inputs from groundwater, tidal exchange, and the stormwater system. Mormon Slough originally extended from its confluence with the Stockton Deep Water Ship Channel to the Calaveras River at the Bellota Weir. The Stockton Diversion Canal was built in 1910 to carry flows from Mormon Slough around the east side of the City and back to the Calaveras River. In 1969, the USACE modified Mormon Slough from its confluence with the Stockton Diversion upstream to the Bellota Weir to convey additional flood flows. Flow is not released downstream of the Bellota Weir except when flood releases

are made from Hogan Dam or when stormwater flows into the river and channels. Consequently, stretches of Mormon Slough remain dry for days to months at a time during the winter and early spring. Overall, the slough is very shallow. Sites that will be monitored are shown in **Figure 2-20** and listed in **Table 2-46**.

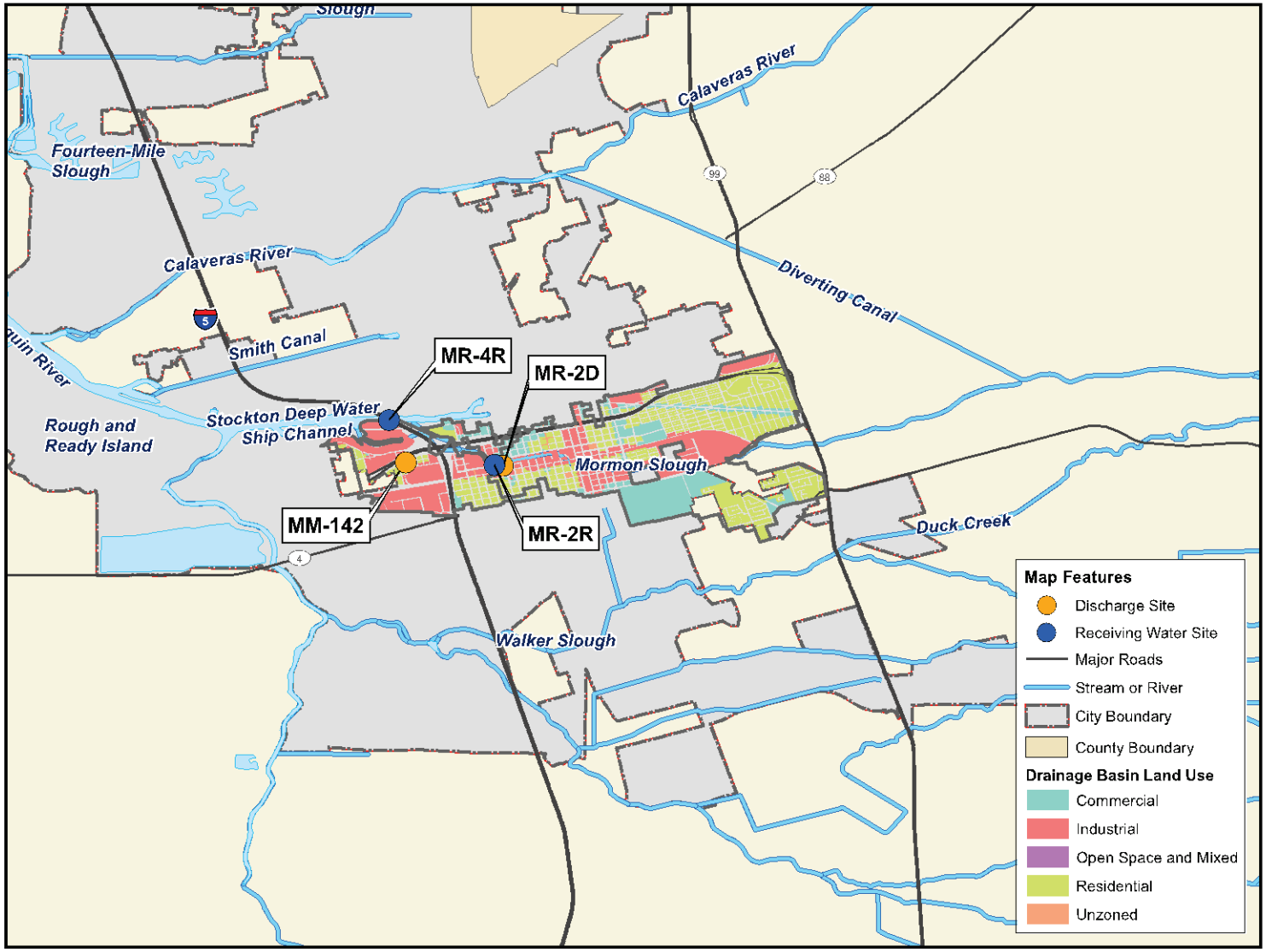


Figure 2-20. Mormon Slough Monitoring Sites and Discharge Drainage

Table 2-46. Mormon Slough Monitoring Sites

Constituents Monitored	Type of Monitoring	Sites Monitored			
		MM-142	MR-2D	MR-2R	MR-4R
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G
DO, nutrients, oxygen demanding substances, and field parameters	Water quality monitoring	G	G	G	S

Notes:
G = Grab
C = Composite

MM-142 and MR-2D are the only pump stations on Mormon Slough. All other urban discharges are from gravity outfalls and are submerged. Therefore, these two stations were the only option for urban discharge sampling. MR-2D, MR-2R and MR-4R have all been historically monitored as part of the Pathogen Plan. MR-2D and MM-4R have also been historically monitored as part of the Pesticide Plan and Low DO Plan. MR-2D drains a mixed-use area. MR-2R is paired with MR-2D and is directly downstream. MR-4R was selected as the farthest downstream location on Mormon Slough. A sonde can also be safely placed at this location for DO and field parameter measurements.

Five-Mile Slough

Five-Mile Slough's watershed has primarily residential land use with some commercial land use. The waterbody meanders westward through residential areas, including the City's Swenson Park Golf Course, and unincorporated areas to Fourteen-Mile Slough, where a weir control tidal inflow from Fourteen-Mile Slough. During the summer, flow is reduced by diversion irrigation water from Five-Mile Slough to the park and golf course. It receives inputs from groundwater, tidal exchange, and the stormwater system. West of I-5, the slough is estimated to be approximately ten feet deep. East of I-5 the slough is very shallow; water depth generally does not exceed four feet in the deepest portion of the waterbody. During the dry season, about one quarter of the easternmost channel is dry. Sites that will be monitored are shown in **Figure 2-21** and listed in **Table 2-47**.

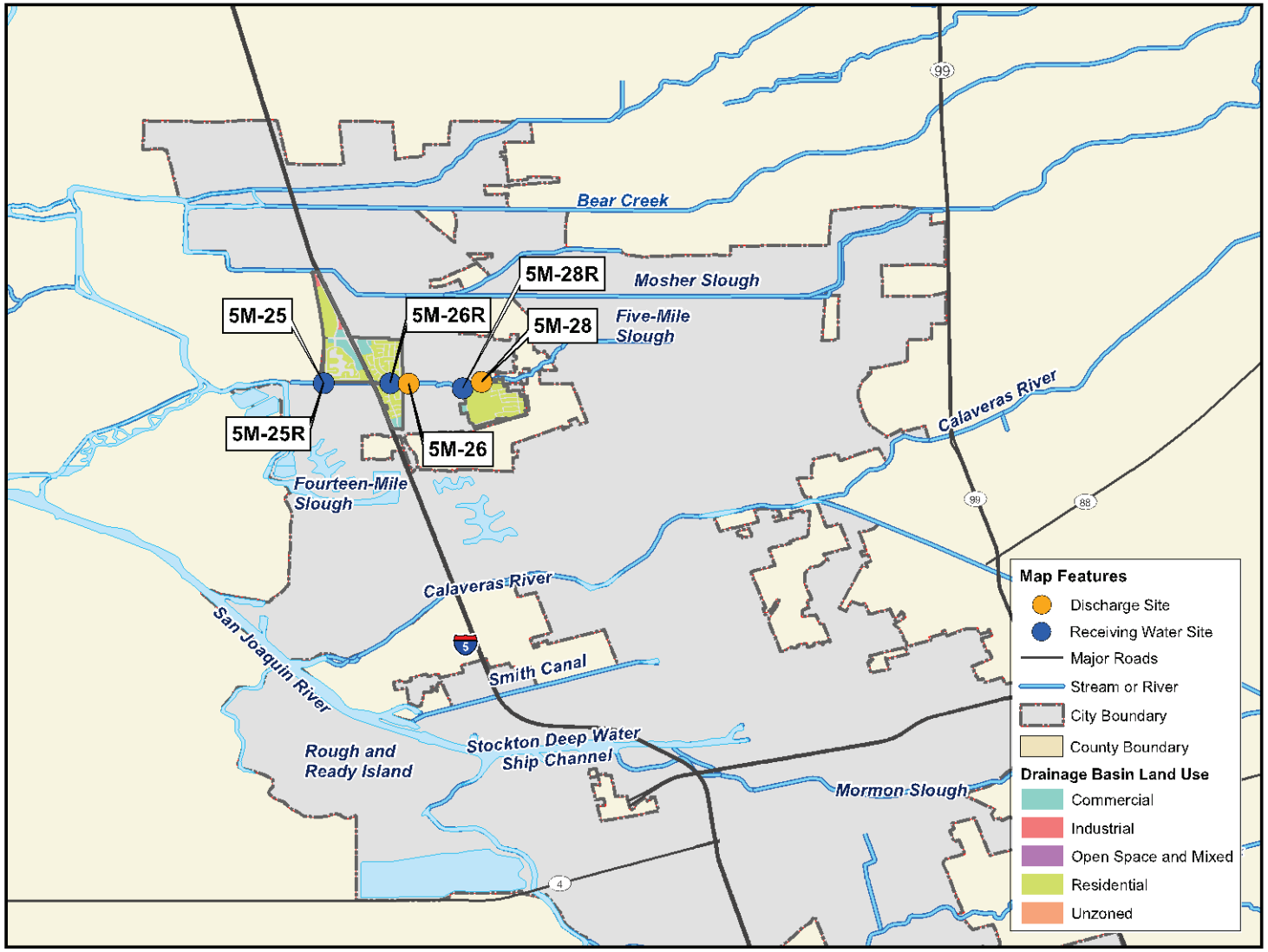


Figure 2-21. Five-Mile Slough Monitoring Sites and Discharge Site Drainagesheds

Table 2-47. Five-Mile Slough Monitoring Sites

Constituents Monitored	Type of Monitoring	Sites Monitored					
		5M-28	5M-28R	5M-26	5M-26R	5M-25	5M-25R
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G	G	G
Chlorpyrifos	Water quality	G	G	G	G	G	G
DO, nutrients, oxygen demanding substances, and field parameters	Water quality monitoring	G	G	G	G	G	S

Notes:
G = Grab
C = Composite
AD = Atmospheric deposition
S = Sonde

Each of the sites listed in **Table 2-47** has historically been monitored as part of the Pathogen Plan. In addition, 5M-25 and 5M-25R have been monitored as part of the DO Plan and 5M-28R has been monitored as part of the Pesticide Plan and DO Plan. The sites were chosen for this history and also to evenly spacing sites along the waterbody as shown in **Figure 2-20**. 5M-28 drains a predominantly residential area and is paired with 5M-28R. 5M-26 drains a residential and commercial area and is paired with 5M-26R. Finally, 5M-25 drains a mixed-use area and is paired with 5M-25R. As indicated, these urban discharge sites represent discharges from a range of land uses. A sonde can be safely placed at 5M-25R for downstream DO and field parameter measurements.

2.7.5 Regional Monitoring Program

The Executive Officer is authorized to revise the MRP to allow the Permittees to participate in regional, statewide, national or other monitoring programs in lieu of or in addition to the MRP. As the RMP is developed, the Permittees will reevaluate the proposed program.

Section 3

Illicit Discharges (ID)

OVERVIEW

An ID is defined as any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. IDs include the disposal of materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain system.

Illicit Discharge (ID)

Any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations.

Illegal Connection (IC)

Undocumented and/or unpermitted physical connections from a facility to the storm drain system or receiving water.

ICs are a subset of IDs. ICs are defined as undocumented and/or unpermitted physical connections from a facility to the storm drain system or receiving water (e.g., a sanitary sewer connection to the storm drain).

Because IDs and ICs can be a significant source of pollutants to the storm drain system and receiving waters, the purpose of this Program Element is to ensure implementation of a comprehensive approach for detecting, responding to, investigating and eliminating these types of discharges and connections in an efficient and effective manner.

CONTROL MEASURES

The Control Measures outlined in **Table 2-1** and discussed in more depth within this section form the basis of the Illicit Discharges Program Element.

Table 2-1. Control Measures for the Illicit Discharges Program Element

ID	Control Measure
ID1	Detection of Illicit Discharges and Illegal Connections
ID2	Illegal Connection Identification and Elimination
ID3	Investigation/Inspection and Follow Up
ID4	Enforcement
ID5	Training

ID1 – Detection of Illicit Discharges and Illegal Connections

2007-2012 IMPLEMENTATION

Detection of IDs through the availability of a public hotline, conducting dry weather monitoring, and utilizing field crews ensures that the Illicit Discharges program is proactive in identifying and eliminating problematic discharges. This control measure reflects the Permittees' efforts to detect and eliminate IDs and ICs and provides several mechanisms for receiving information.

The Permittees conduct a number of activities that facilitate the proactive detection of IDs and ICs. These include public reporting, dry weather monitoring, and field crew inspections, as outlined below.

- **Public Reporting:** The Permittees have established, maintain, and advertise the 24-hour Hotlines to encourage the public to report water pollution problems.
- **Dry Weather Field Screening:** The Permittees have implemented a dry weather field screening program to survey all outfalls within 5 years (see also Section 8). All outfalls are monitored for temperature, pH, chlorine, copper, phenols, DO, EC, and detergents. If flow is detected at outfalls, it is traced upstream to the source.
- **Field Crew Inspections:** Field staff are trained to recognize illegal discharges so that, during their normal maintenance activities, they can identify signs of previous, current, or potential non-stormwater discharges/connections or illegal dumping into the storm drain system. Once they are discovered, the field staff notify the appropriate Stormwater Management Program for follow-up investigation.

ASSESSMENT

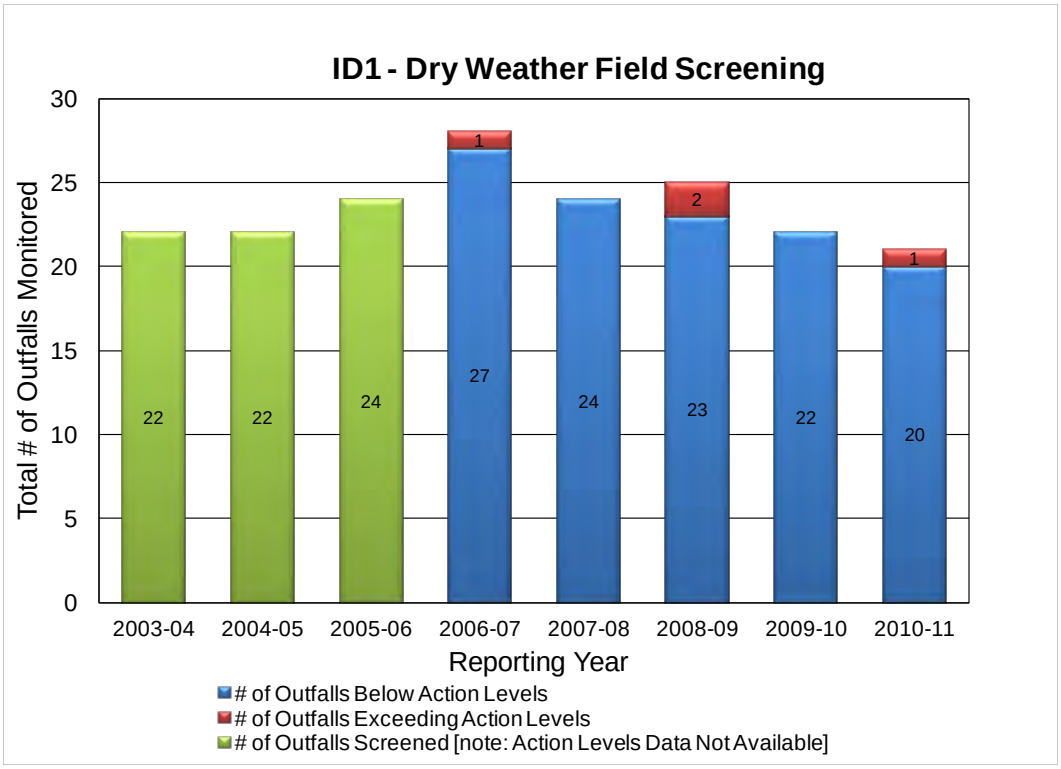
In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

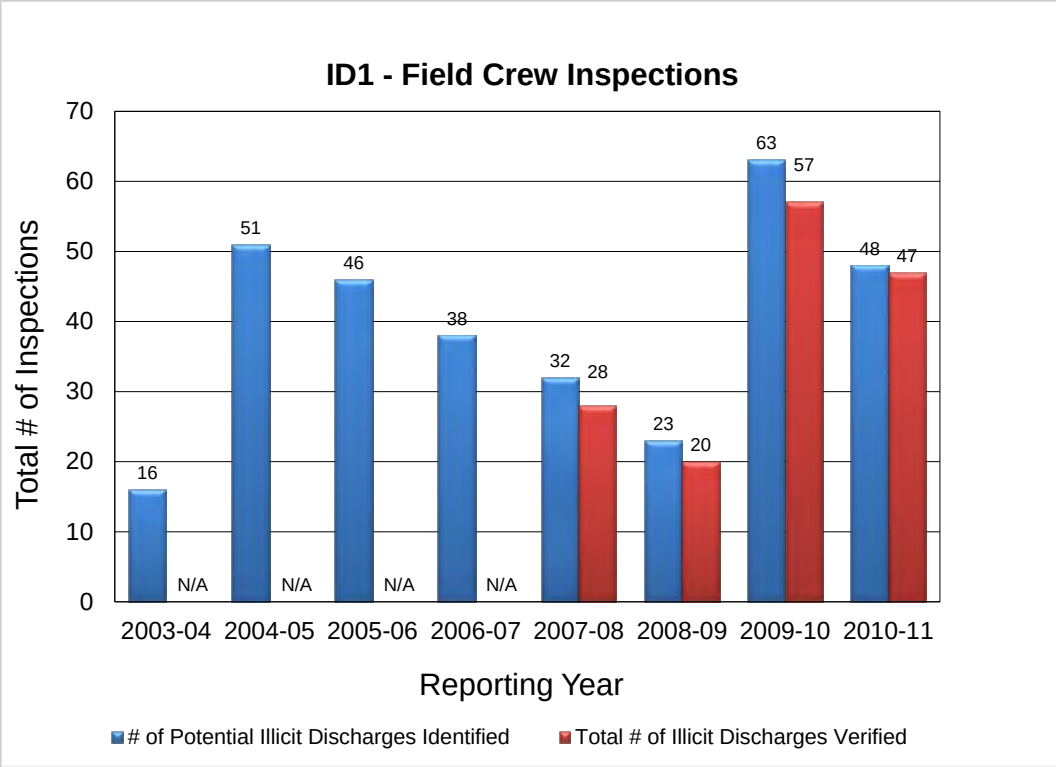
The City has facilitated the reporting of IDs by establishing and maintaining a hotline number, a general stormwater information number, and a web-based public reporting system ("Ask Stockton") and then widely advertising them as part of the public outreach program. This has been accomplished by including the hotline number and/or website in public education materials, on the City's Web site, and in the local telephone book. **(L1)**

The City has facilitated the reporting of IDs by coordinating with other departments and agencies. This has been accomplished by advertising the hotline number internally, conducting internal meetings, providing telephone numbers and flow charts, and reviewing internal forms. **(L1)**

The City has continued to monitor outfalls as a part of the dry weather field screening to identify dry weather flows and "hot spots" that may need additional source identification studies. Out of 116 total outfalls monitored since 2006-2007, only 3% have exceeded action levels. Since 2006-2007, four (4) outfalls have exceeded the established action levels for EC, triggering follow-up for source identification. The source identification indicated that the EC exceedances were likely caused by a discharge from a Homeowner's Association residential lake, groundwater infiltration, residential landscaping activities, and/or pool maintenance activities. **(L1)**



City field crews are critical to the IDs program since they are the eyes and the ears of the City and are in the field every day. As such, they have been trained to identify potential IDs while conducting routine maintenance activities. Since 2003, 317 potential IDs have been identified. Since 2003-2004, the field crews have become more aware of what constitutes an ID and have progressed from reporting incidents that may not have been problematic to reporting IDs that are verified in the field and addressed. The success rate of the field inspectors has increased in recent years (from 88% in 2007-2008 to 98% in 2010-2011). **(L3)**



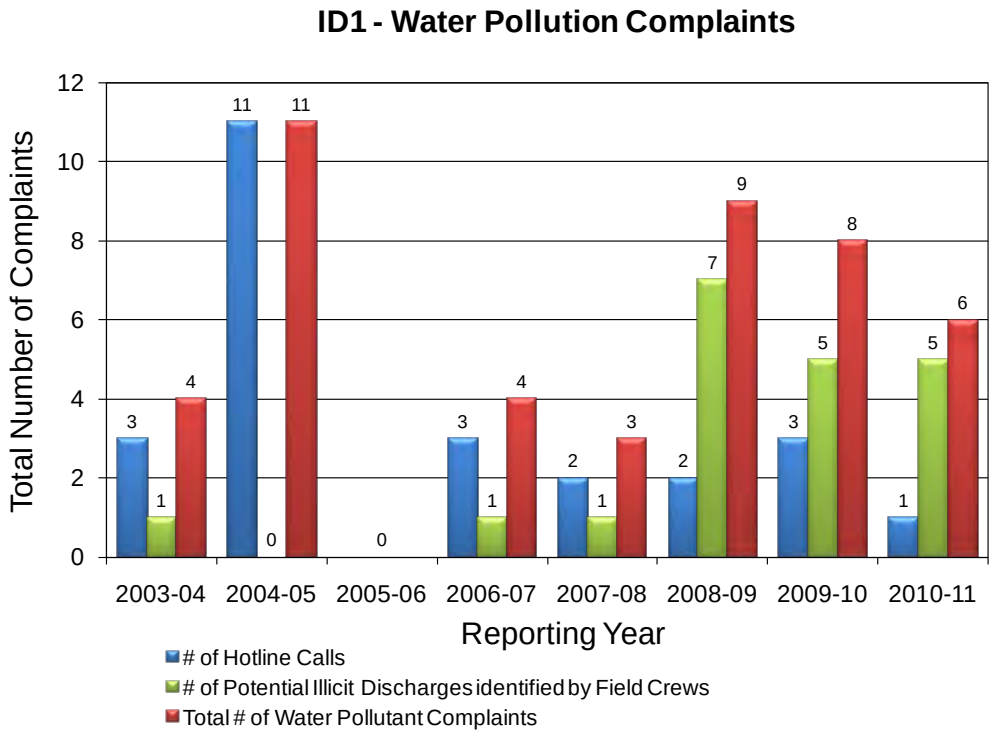
County of San Joaquin

The County has facilitated the reporting of IDs by establishing and maintaining a 24-hour hotline number and then widely advertising it as a part of the public outreach program. This has been accomplished by including the hotline number in public education materials, on the County website, and in the local telephone book. **(L1)**

The County has facilitated the reporting of IDs internally by coordinating with other County Departments and agencies and with the City. The hotline has been an effective means of communication and has been disseminated by advertising the hotline number internally, conducting internal meetings and training sessions, and providing telephone numbers and flow charts. **(L1)**

The public and County staff is aware of the hotline and have provided notifications/complaints through this reporting mechanism. **(L2)**

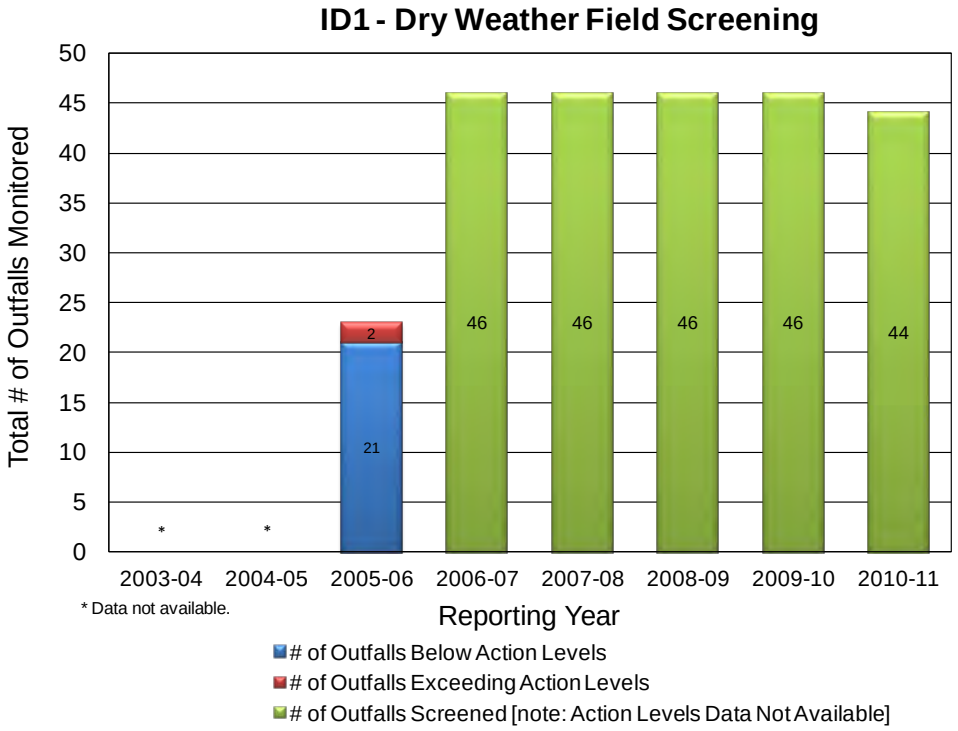
- Since 2003, the County has received and responded to 25 notifications/complaints of IDs from the hotline. The advertising of the 24-hour hotline number and agency coordination continue to be an integral part of the public outreach program. Field crews are also reporting IDs as they observe them.



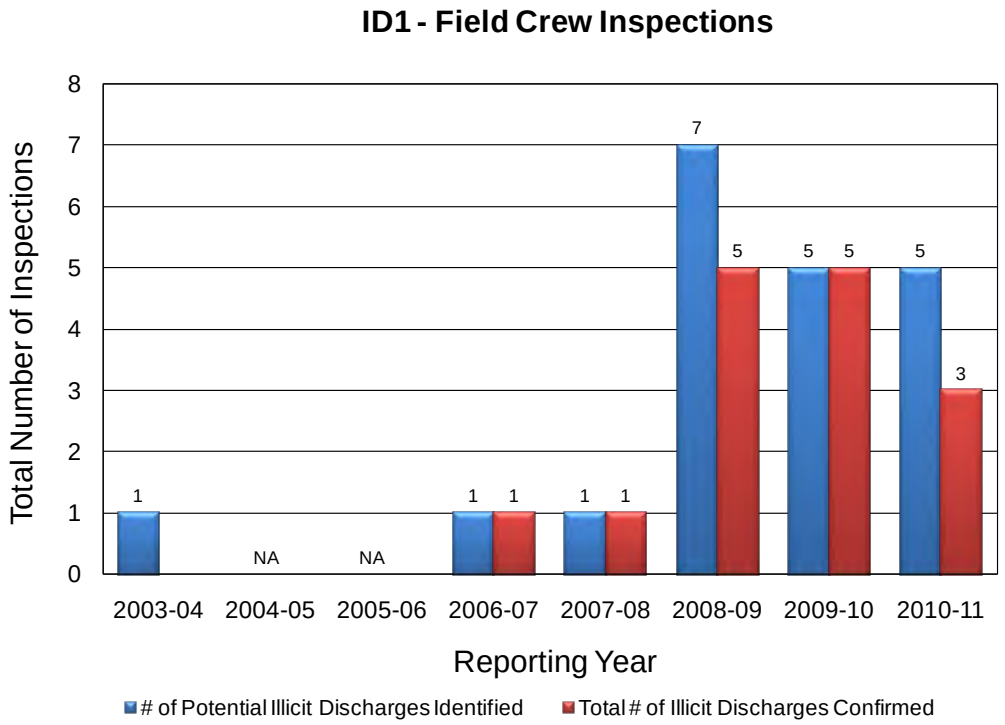
The County reviewed and revised internal procedures and/or forms as needed in order to ensure that complaints were addressed efficiently. The County reviewed the procedures for internal communications between Departments and Divisions. The communication procedures reflect the combined effort of Office of Environmental Health Services (OEHS), Office of Emergency Services (OES), Public Works and various Divisions within Public Works. The County also reviewed the complaint documentation form and determined that no revisions were necessary. **(L1)**

The County has developed and is implementing spill response procedures for sewage, non-hazardous, and hazardous spills. The County also continues to review and modify the response procedures as needed. **(L1)**

The County has continued to monitor the outfalls as a part of the dry weather field screening to identify dry weather flows and "hot spots" that may need additional source identification studies. Since 2005, only 2 of the 251 (0.79%) screened outfalls have exceeded action levels. In both cases, the outfalls exceeded the action level for EC. These two sites were visited on the day following the exceedance, and, again, only EC exceeded the action levels. It is likely that urban irrigation water, which tends to be high in salts due to evaporation, was entering the urban drainage system at or above these locations. During this Permit term, the County has annually monitored all of its outfalls and has not detected any IDs. The County has noted that in most cases, the screened outfalls have had either no flow or very low flow. **(L1)**



County field crews are critical to the ID Program, since they are the eyes and the ears of the County and are in the field every day. As such, they have been trained to identify illegal discharges while conducting routine maintenance activities in the field. Since 2003, 20 illegal discharges have been identified. Of those, 15 were verified as illegal discharges and were addressed. **(L2)**



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- The primary modification to Control Measure ID1 is to eliminate the Dry Weather Field Screening. Since the Permittees began this effort in 2005, a total of six (6) outfalls (four [4] detected by the City and two [2] detected by the County) have exceeded the established action levels for EC for triggering source identification studies. In sum, only 1.6% of all screened outfalls (6 of 367) have exceeded action levels, and all of these exceedances were for EC. Other, more cost-effective mechanisms exist for detection and elimination of IDs and ICs (e.g., field crew inspections during regular maintenance activities).

The objective of this Control Measure is to:

- Proactively detect IDs and ICs through a variety of mechanisms, such as public reporting and field crew inspections.

This objective will be met through implementation of specific performance standards, as detailed below.

Maintain and Advertise Hotline/Ask Stockton

The Permittees have each established, maintain, and publicize a 24-hour Hotline[1] to encourage the public to report water pollution problems. The Permittees have facilitated the reporting of IDs by advertising the hotline numbers internally, as well as externally.

- Business Hours – During normal business hours, City and County personnel are available to answer and direct calls to the appropriate department.
- Evenings and Weekends
    - City: After hours, calls are automatically deferred to 911 and the Fire Department dispatcher.
    - County: After hours, calls are directed to the County sheriff. If the discharge is hazardous, County OES will be contacted for immediate cleanup. If the discharge is non-hazardous, a Department of Public Works after-hours contact person will be contacted to schedule a cleanup.

In addition, the City has established a web-based public reporting system called Ask Stockton. The Stormwater Program uses Ask Stockton to address various stormwater related issues, questions, and concerns. Ask Stockton is advertised through the City web site, utility bill inserts, and various outreach materials created throughout the City.

[1] **City:** 209-937-8341; **County:** 209-468-3055 and 866-755-4955

Field Crew Inspections

Field staff are the eyes and ears of the Permittees and are trained to recognize illegal discharges so that, during their normal maintenance activities, they can identify signs of previous, current, or potential non-stormwater discharges/connections or illegal dumping into the storm drain system. Once they are discovered, the field staff notify the MUD – Stormwater Management Program (City) or Public Works – Water Resources Division (County) for follow-up investigation. The Permittees' primary spill response investigators conduct follow-up inspections and accompany field crews during cleanup to ensure that reported spills are properly cleaned up and identified ICs are corrected. Follow-up activities are described in Control Measures ID2 and ID3.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

- Facilitate reporting of IDs by maintaining the Hotlines/Ask Stockton and advertising them in the white pages, City and County websites, and stormwater-related public education materials.
- Continue field observations as part of maintenance operations and document and report evidence of non-stormwater discharges/connections or illegal dumping.

ID2 – Illegal Connection Identification and Elimination

2007-2012 IMPLEMENTATION

Similar to the Permittees' efforts to detect and eliminate IDs, the Permittees proactively detect ICs to the storm drain system. Upon identification of an IC, the Permittees investigate and eliminate ICs through a variety of mechanisms including, but not limited to, permitting or plugging the connection. As described in more detail in the Planning and Land Development program element, plan review includes confirmation that no IC is proposed. In addition, construction inspections are conducted upon project completion to ensure that the project was built correctly.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City has a number of provisions that effectively prevent illicit discharges and ICs. First, all new development plans are reviewed for possible ICs, and it is also verified that no such connections exist during the construction phase. Second, City staff has been trained to identify ICs and IDs in the field. Since 2004-2005, the City has identified and addressed a total of seven (7) ICs. **(L1)**

County of San Joaquin

The County has a number of provisions that effectively prevent ICs. First, all new development plans are reviewed for possible ICs and then verified that no such connection exists during the construction phase. Second, County staff have been trained to identify ICs in the field. Since 2003, no ICs have been identified. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for the upcoming Permit term for this Control Measure.

The objective of this Control Measure is to, upon identification of an IC, investigate and eliminate the connection through a variety of mechanisms including, but not limited to, permitting or plugging the connection. This objective will be met through implementation of specific performance standards, as detailed below.

Investigate and Eliminate Illegal Connections

As a part of their normal maintenance activities, Permittee field staff identifies signs of ICs to the storm drain system. Once discovered, the ICs are addressed and corrected/eliminated. Staff investigates the potential ICs within 21 calendar days to determine the source of the connection, the nature and volume of

discharge through the connection, and the responsible party for the connection. Staff then eliminates the identified IC(s).

Coordinate with Planning and Land Development Program

The Permittees requires that tentative parcel maps be reviewed to ensure that they are consistent with the City or County standards, including the storm drain standards. Plan reviews ensure that no ICs are proposed. All plan reviews are tracked in a database and construction inspections are conducted upon project completion to ensure that the project was built correctly.

Coordinate with Construction Program

The Permittees coordinate with their respective construction programs to ensure projects are built correctly and have no ICs:

- City: MUD Engineering (Permit Center) staff coordinate with the Planning Division to identify ICs during the Plan Review Stage. Information on all approved projects is communicated to MUD's Stormwater Construction Inspector to begin the required monthly inspections of active construction sites once any issues have been resolved and the project is active.
- County: A Violation File is initiated by the NPDES investigator when a complaint or alleged violation is discovered or reported (e.g., illegal dumping, spills or ICs). If the call, referral, or complaint is related to a construction site, a note is made in the Hotline Tracking Log and the situation is referred to the pertinent database.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

- Investigate and eliminate ICs discovered through response to IDs. Ensure that all ICs are investigated within 21 calendar days to determine the source of the connection, nature and volume of discharge through the connection, and the responsible party for the connection. All ICs shall be terminated or permitted within 180 days of completion of the investigation.
- Coordinate with the Planning and Land Development program to conduct plan reviews and identify illegal connections
- Coordinate with the Construction program to inspect projects and identify ICs

ID3 – Investigation/Inspection and Follow Up

2007-2012 IMPLEMENTATION

The investigation and inspection of potential IDs and ICs to the storm drain system, as well as appropriate follow-up actions, are essential in order to eliminate IDs and ICs. The response and follow-up actions may also include cleanup and/or other necessary actions to mitigate the impacts of the discharge.

In addition to the investigation and follow up activities, it is necessary to maintain a database for recording the information related to IDs and ICs and, to the extent possible, use a geographic information system (GIS) map to assist in analyzing and reporting information including the identification of trends and/or priority areas.

The Permittees have a comprehensive approach for responding to reported IDs. The approach includes response and investigation, cleanup, and record keeping and tracking. Related enforcement activities are addressed in ID4.

- Response and Investigation: When a notification or complaint is received, the responsible Permittee conducts an on-site assessment to determine the conditions of the discharge as soon as practicable (during or immediately following containment and cleanup). The investigation process includes determining whether the discharge is occurring on private or public property, whether the discharge is an authorized non-stormwater discharge, and whether the discharge is hazardous. If the ID is hazardous, staff follows appropriate protocols in notifying State and local agencies and protecting themselves from exposure. The Permittees address three types of spills: sewage, non-hazardous, and hazardous spills. Procedurally, the sewage and non-hazardous spills are addressed in the same manner, whereas the hazardous spills are responded to and addressed by a licensed contractor (for the City) and by the OES and/or OEHS (for the County).
- Cleanup: The main objective of the cleanup effort is to restore the impacted area back to its original state and prevent further environmental degradation in the area surrounding the incident. During this phase, the Permittees provide oversight to ensure that the discharge is removed and disposed of properly and to verify cleanup charges. Depending on the incident, the Permittees may serve the owner or occupant of the property with an invoice for the cleanup cost. The Permittees eliminate discharges by means of appropriate actions or legal procedures, depending on the type of discharge/connection detected.
- Recordkeeping and Tracking: The Permittees have each developed an Illicit Discharge Database and utilize the information to identify and respond to areas that required focused attention. IDs are mapped, and the information is evaluated for patterns and trends of IDs, with the objectives of identifying priority areas and tracking repeat offenders as needed.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

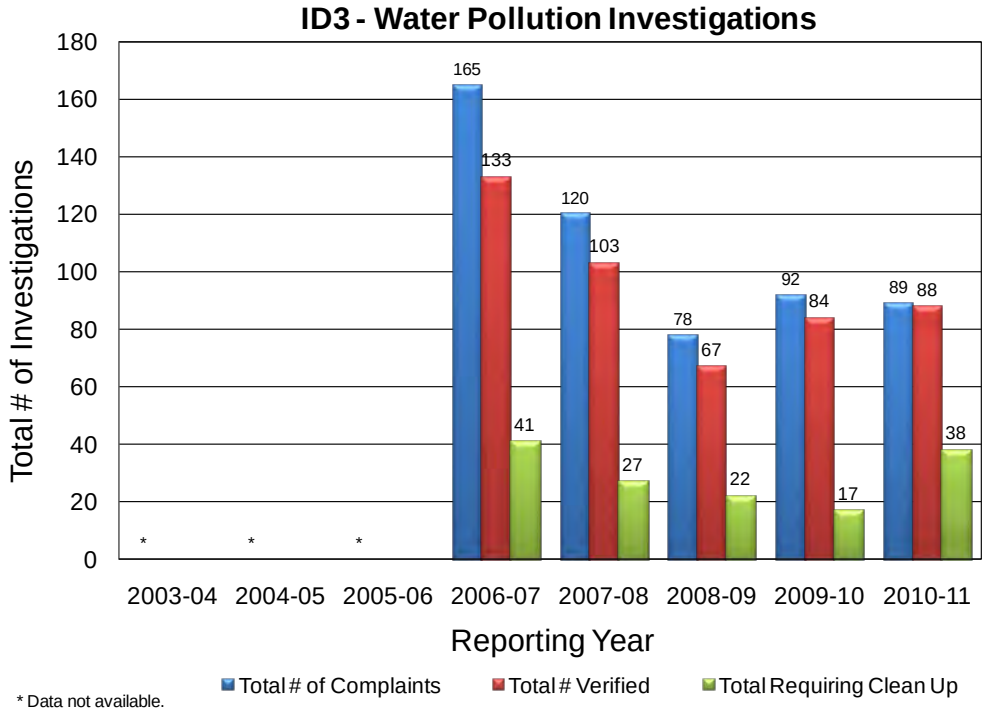
The City developed and maintains an Illicit Discharge Database. The City also maps the locations of the IDs and ICs on an annual basis. **(L1)**

The City has established *Spill Response Procedures for Non-Hazardous Materials and Waste* and responds to such incidents within two business days, ensuring that the incidents are cleaned up

appropriately. Since 2006-2007, the City has responded to 544 complaints/notifications from all sources. Of those, 475 were verified and addressed, and 145 required cleanup. **(L1)**

The City has developed an *Investigative Guidance Manual* to ensure that inspections of ID/IC are conducted in a uniform manner. The *Investigative Guidance Manual* covers protocols for obtaining permission to inspect, proper collection of evidence, and appropriate enforcement actions. This document has been distributed to and will continue to be used by MUD Environmental Control and MUD Stormwater staff. **(L1)**

Between 2006-2007 and 2010-2011, the percentage of water pollution complaints verified has increased from 81% to 99%, indicating increased awareness both on the part of the public and City staff. **(L2)**



In addition to verifying water pollution complaints, since 2003-2004, City staff have worked to identify the types of materials involved in the IDs or ICs. During the 2009-2010 reporting period, the City evaluated and optimized the waste categories it uses to categorize IDs in order to minimize the number of IDs described as miscellaneous or unidentified and more accurately characterize the pollutants and activities involved. **(L1)**

County of San Joaquin

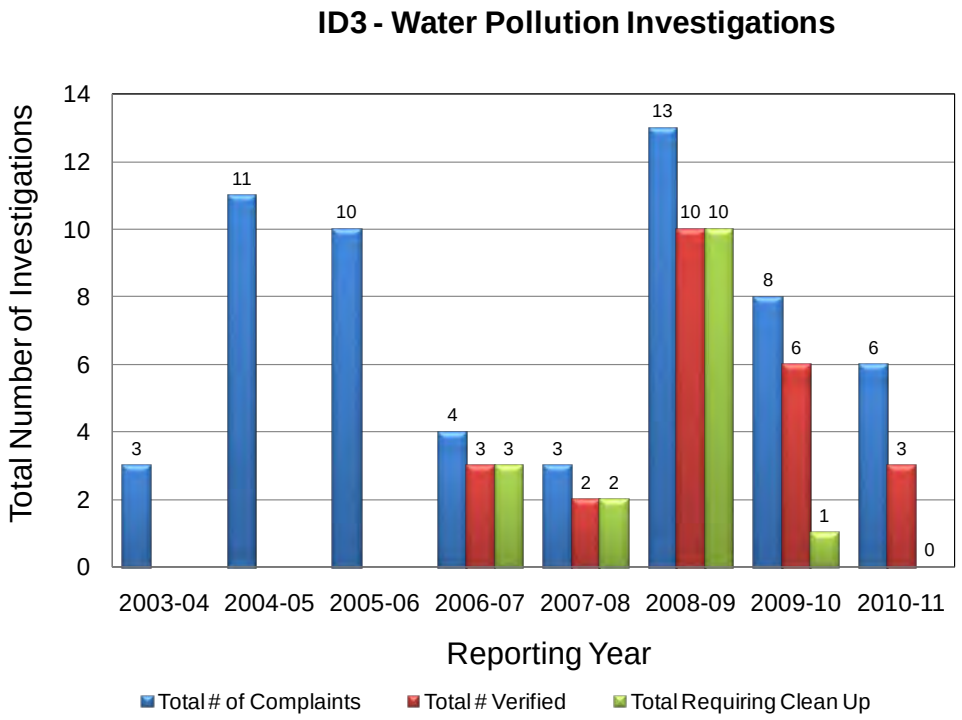
The County developed and maintains an Illicit Discharge database. The County also maps the locations of the IDs and ICs on an annual basis. **(L1)**

The County addresses sewage spills and non-hazardous spills using the *NPDES non-Construction Illicit Discharge and Illegal Connection Investigation-Enforcement Management* (ID2-15.01) procedures and follows procedures established by the OES for emergency spill response.

The County has developed an *Investigative Guidance Manual for the Illicit Discharges and Illegal Connections Program* to ensure that inspections of ID/IC are conducted in a uniform manner. The *Investigative Guidance Manual* covers protocols for obtaining permission to inspect, proper collection of

evidence, and appropriate enforcement actions. This document has been distributed to and will continue to be used by County Stormwater staff. **(L1)**

The County continued to coordinate the investigations and cleanups as necessary, and maintained the discharge database to identify any relevant trends. The County has responded to IDs within two (2) business days and ensured that the incidents are cleaned up. Since 2006, the County has responded to 58 complaints/ notifications. Of those, 24 were verified and addressed, and 16 required cleanup. [Note: The data for verification and cleanup were not available for 2003-2004 through 2005-2006.] **(L1)**



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for the upcoming Permit term for this Control Measure.

The objectives of this Control Measure are to:

- Upon identification of an ID, investigate the discharge and conduct any necessary follow-up actions to mitigate the impacts of the discharge
- Maintain a database for recording the information related to IDs and ICs and, to the extent possible, use a GIS map to assist in analyzing and reporting information including the identification of trends and priority areas

These objectives will be met through implementation of specific performance standards, as detailed below.

Respond to Illicit Discharges

When a notification or complaint is received, it is investigated within two business days and tracked to ensure that information is not lost. The responsible Permittee conducts an on-site assessment to determine the conditions of the discharge as soon as practicable (during or immediately following containment and cleanup). The investigation process includes determining whether the discharge is occurring on private or public property, whether the discharge is an authorized non-stormwater discharge, and whether the discharge is hazardous. If the ID is hazardous, staff follows appropriate protocols in notifying State and local agencies and protecting themselves from exposure.

The Permittees address three types of spills: sewage, non-hazardous, and hazardous spills. Procedurally, the sewage and non-hazardous spills are addressed in the same manner, whereas the hazardous spills are responded to and addressed by a licensed contractor (for the City) and by the OES and/or OEHS (for the County).[2]

Implement Investigative Guidance Manual

The Permittees both have developed *Investigative Guidance Manuals* that establish general guidelines that may be utilized to ensure that the procedures followed and information obtained during an investigation are defensible. Each *Investigative Guidance Manual* covers protocols for obtaining permission to inspect, proper collection of evidence, and appropriate enforcement actions.

- The City will continue to implement its *Investigative Guidance Manual* (Appendix B-4 in the 2009-2010 Annual Report).
- The County will continue to implement its *Investigative Guidance Manual for the Illicit Discharges and Illegal Connections Program* (Appendix B-1 of the 2009-2010 Annual Report).

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[2] City: *Spill Response Procedures for Non-Hazardous Materials and Wastes* (Appendix B-1 of the 2009-2010 Annual Report); County: *NPDES non-Construction Illicit Discharge and Illegal Connection Investigation-Enforcement Management* (ID2-15.01) procedures (Appendix B-1 of the 2009 SWMP)

Maintain Contractual Services for Cleanup and Removal of HAZMAT

The main objective of the cleanup effort is to restore the impacted area back to its original state and prevent further environmental degradation in the area surrounding the incident. During this phase, Permittee staff provides oversight to ensure that the discharge is removed and disposed of properly and to verify cleanup charges. Depending on the incident, the Permittee may serve the owner or occupant of the property with an invoice for the cleanup cost.

- The City eliminates discharges by means of appropriate actions or legal procedures, depending on the type of discharge/connection detected. IDs are eliminated by contacting the appropriate supervisor who oversees the activities that caused the discharge and notifying the individual of necessary actions. If hazardous or unknown substances are found, the City notifies Fire Dispatch to request HAZMAT response. Follow-up is conducted to ensure that abatement activities have been adequately implemented.
- The County's Public Works – Maintenance/Solid Waste Divisions staff or OES will clean up non-hazardous discharges when no responsible party can be found or the discharge must be cleaned immediately in the interest of public welfare or water quality. If necessary, the County will contract with a clean-up specialist to remove the discharge. In these cases, costs are passed on to the responsible party, when identified.

Maintain the Illicit Discharges Database

The Permittees will continue to maintain their respective Illicit Discharge Databases and utilize the information to identify and respond to areas that require focused attention. The Permittees use the database to track information related to reported IDs, including the types of pollutants involved, whether the discharge was verified, whether the source was identified, enforcement actions taken, (contractor) cleanup status, source of complaint, and whether the complaint was resolved within two business days.

Incorporate and Implement the Optimized Waste Categories

To minimize the number of IDs described as miscellaneous or unidentified and more accurately characterize the pollutants and activities involved, the City has evaluated and optimized the waste categories it uses to categorize IDs (see the Waste Categories Memorandum, Appendix B-5 of the 2009-2010 Annual Report). The Permittees will incorporate and use these optimized waste categories to track IDs. Doing so will allow the Permittees to effectively focus resources on the more prevalent types of incidents and/or the identified POCs. By targeting pollutants and associated activities for additional outreach efforts, the Permittees may be able to eliminate a large portion of the incidents that occur, thereby resulting in a more effective Illicit Discharge program. This approach would allow each ID to be tracked by facility type, activity causing the ID, and updated waste categories.

Map Reported Illicit Discharge Incidents and Locations

The Permittees will continue, to the extent they are able, to map the locations of the IDs and ICs on a GIS-based map and use the information to evaluate patterns and trends, with the objective of identifying priority areas and tracking repeat offenders.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

- Respond to IDs. Ensure that staff responds within two business days to reports of IDs, implementing activities to abate, contain, and clean up all IDs, including hazardous substances.

- Implement Investigative Guidance Manual or Enforcement Consistency Guide (ECG)
- Maintain contractual services for cleanup and removal of HAZMAT
- Maintain the Illicit Discharges Database
- Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response.
- Identify reported IDs in the database on a map using a convenient scale and in a format that is easily discernible. Evaluate the information annually for patterns and trends of IDs, with the objectives of identifying priority areas and tracking repeat offenders for elimination of IDs.

ID4 - Enforcement

2007-2012 IMPLEMENTATION

The Enforcement Control Measure establishes policies and procedures and outlines the progressive levels of enforcement available to the Permittees. By utilizing progressive enforcement, the Permittees ensure that the program is effective at reducing IDs and ICs.

The Permittees each have implemented a progressive enforcement and referral policy so that the enforcement actions match the severity of violation and include distinct, progressive steps. In general, the progressively severe corrective actions involve verbal warnings followed by written warnings and legal action, if necessary. IDs by businesses are addressed in a more formal manner, depending upon the compliance history of the facility. Corrective actions are taken when a responsible party is identified.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

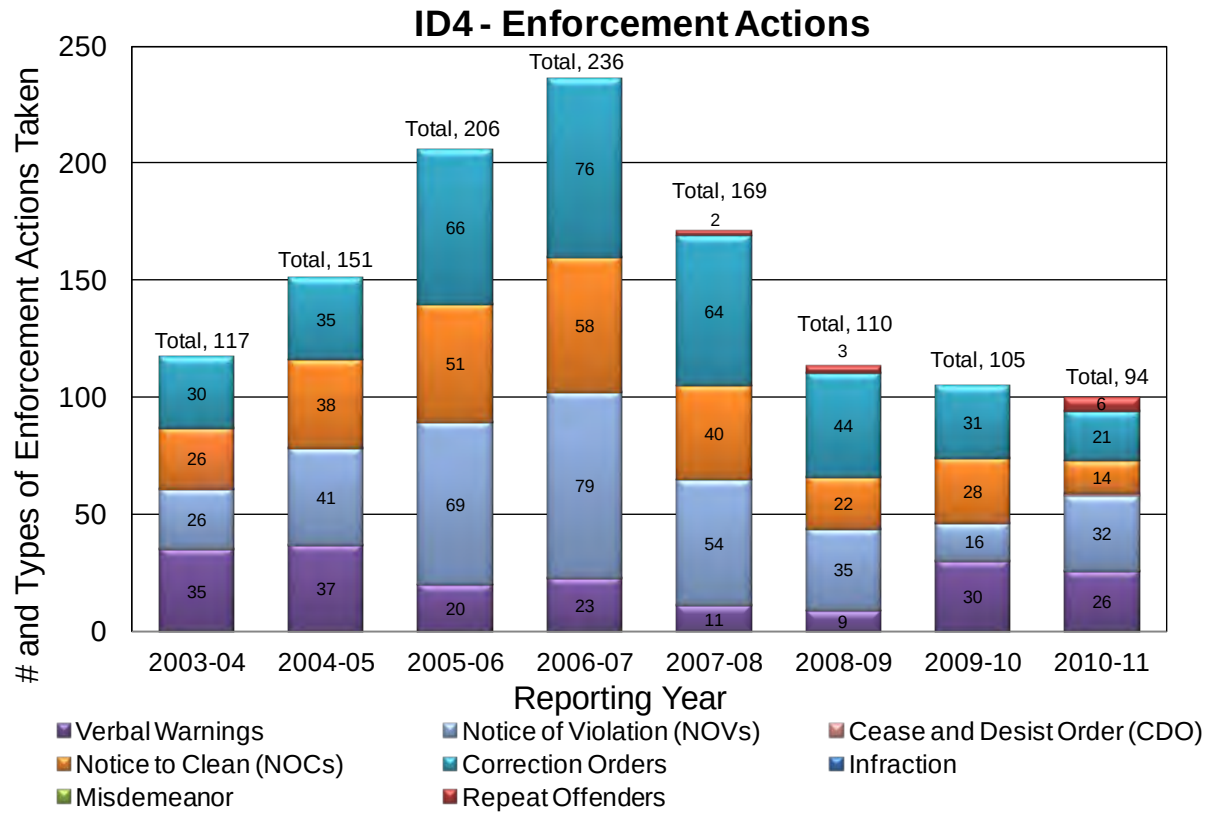
City of Stockton

The City has developed and is currently implementing its *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* to ensure consistency in the enforcement of local ordinances and provides guidelines and protocols for enforcing violations. **(L1)**

The City enforced against ID/ICs and utilized progressive enforcement when necessary. Since 2003, the City has pursued 1,199 enforcement actions. Of these enforcement actions, there were 191 (16%) verbal warnings, 367 (31%) correction orders, 352 (29%) notices of violation, 277 (23%) notices to clean, and one (0.1%) cease and desist order **(L1)**.

Since 2006-2007, there have been 714 enforcement actions in response to 544 notifications/complaints of IDs and ICs that have been received from all sources, indicating that progressive enforcement (in the form of multiple enforcement actions per incident) is occurring when appropriate. To date, no criminal enforcement has occurred.[3]

[3] The values depicted in the associated figure do not represent a decline in enforcement; rather, they reflect the fact that data sources for tracking enforcement actions have varied in the past. In the future, the City will be clear on what is and is not to be included in these data to avoid any issues such as duplication.

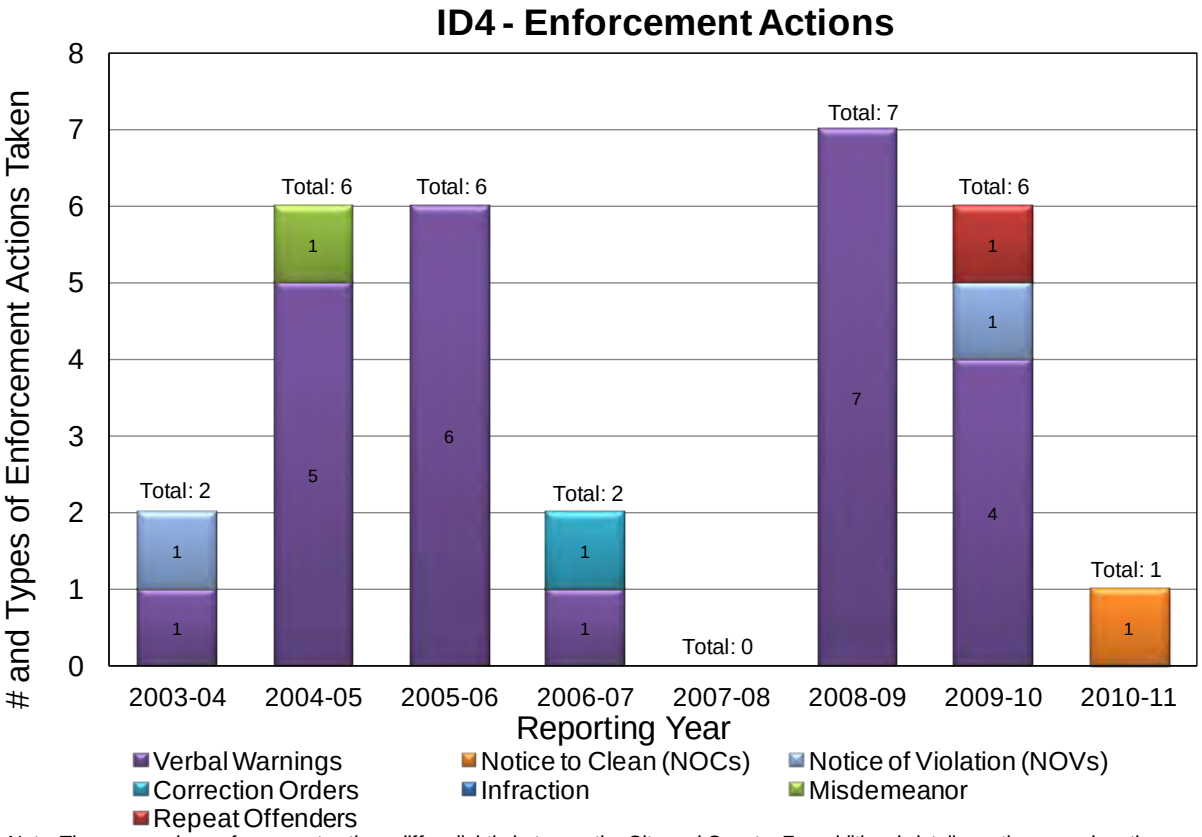


Note: The progressive enforcement actions differ slightly between the City and County. For additional details on the procedure the City follows regarding its enforcement actions, please refer to the Municipal Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System.

County of San Joaquin

The County has developed and is currently implementing an ECG that establishes general guidelines and procedures for obtaining defensible information during investigations. The ECG also allows for countywide consistency in the enforcement of local ordinances and provides guidelines and protocols for identifying, documenting, responding to, and enforcing violations. **(L1)**

The County has been tracking and enforcing against ID/ICs and utilized progressive enforcement. Since 2003, the County has pursued 30 enforcement actions. Of those 30 enforcement actions, 24 (80%) were verbal warnings. Most of the enforcement actions are verbal warnings since compliance was achieved after the verbal warning, and no further enforcement was needed. The remaining 6 enforcement actions were progressively more severe (e.g., Notices of Violation [NOVs], Misdemeanors), demonstrating an adherence to the ECG and the County's progressive enforcement policy. **(L1)**



Note: The progressive enforcement actions differ slightly between the City and County. For additional details on the procedure the County follows regarding its enforcement actions, please refer to the Enforcement Consistency Guide (ECG).

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for the upcoming Permit term for this Control Measure.

The objective of this Control Measure is to:

- Implement a progressive enforcement policy to ensure that adequate enforcement is conducted.

This objective will be met through implementation of specific performance standards, as detailed below.

Implement Progressive Enforcement Policy

The Permittees each implement a progressive enforcement policy so that the enforcement actions taken match the severity of the violation and include distinct, progressive steps.[4] Options are available for progressive, corrective actions for repeat offenders. In general, the progressively severe corrective actions involve verbal warnings followed by written warnings and legal action, if necessary. Illicit discharges by businesses are addressed in a more formal manner, depending upon the compliance history of the facility. Enforcement actions are taken when a responsible party is identified.

Track Enforcement Actions Using Illicit Discharges Database

To ensure enforcement actions are adequately tracked, all information is entered into the Illicit Discharge Database. This information will aid in future enforcement actions and will also be used to demonstrate compliance with NPDES regulations for adequately enforcing violations.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

- Implement the progressive enforcement policy.
- Track enforcement actions using the Illicit Discharges Database.

[4] City: *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* (MUD Directive, Appendix B-8 of the 2009-2010 Annual Report); County: *Enforcement Consistency Guide* (ECG), within the *Investigative Guidance Manual for Illegal Discharges and Illegal Connections Program* (Appendix B-1 of the 2009-2010 Annual Report)

ID5 – Training

2007-2012 IMPLEMENTATION

Training is important to the successful implementation of the Illicit Discharges Program Element. Effective training is one of the best pollution prevention BMPs that can be implemented because it prompts behavioral changes that are fundamentally necessary to protect water quality.

The objectives of the training are to:

- Increase the general awareness about the SWMP and Illicit Discharges program;
- Increase the awareness of the Illicit Discharges Control Measures and procedures; and
- Prompt the behavioral changes needed to protect and improve water quality.

ASSESSMENT

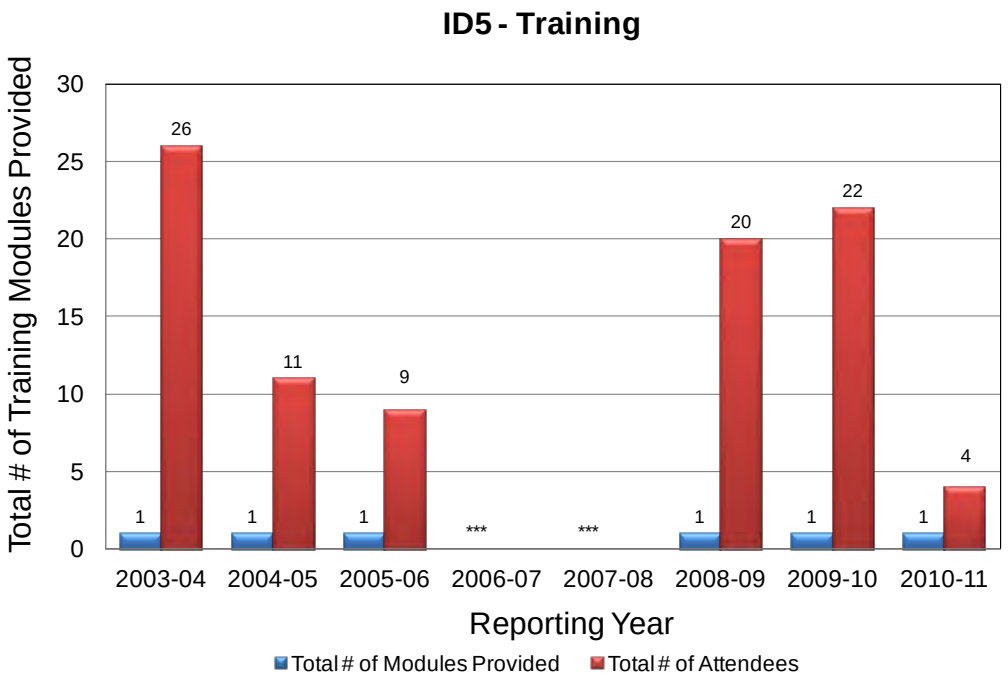
In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is also identified (e.g., L1 = Outcome Level 1).

City of Stockton

During the Permit term, key staff involved with the Illicit Discharges Program attended external training pertaining to stormwater topics (e.g., regulations, response to IDs) and/or to maintain certifications. **(L1)**

County of San Joaquin

During the Permit term, the County developed and provided an Illicit Discharge and Illegal Connection (Module 1) Training for key staff involved with the Illicit Discharges Program. Since 2008, a total of 43 staff has received this training. **(L1)**



***Training was delayed during this time due to high turnover in the Division and loss of key personnel. Training resumed again in the fall of 2008.

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for the upcoming Permit term for this Control Measure.

The objective of this Control Measure is to:

- Conduct/identify training for employees who are responsible for identification, investigation, termination, cleanup, reporting, and enforcement of IDs and ICs.

This objective will be met through implementation of specific performance standards, as detailed below.

Review and Update Training Strategies

The Permittees will review and update their respective Training Approaches/Plans, as needed.

Conduct/Identify Illicit Discharges Program Training

The Permittees will conduct/identify Illicit Discharges Program training. Both internal and external training opportunities may be utilized to meet the intent of this performance standard.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for the proposed performance standards are included at the end of this section.

- Review and update Training Approaches/Plans
- Conduct/Identify Illicit Discharges Program training

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Illicit Discharges Program are summarized below.

OBJECTIVES

The objectives address the key components of the Illicit Discharges Program Element and identify that, in order to be effective, the program must:

- Proactively detect IDs and ICs through a variety of mechanisms, such as public reporting and field crew inspections.
- Upon identification of an IC, investigate and eliminate the connection through a variety of mechanisms including, but not limited to, permitting or plugging the connection.
- Upon identification of an ID, investigate the discharge and conduct any necessary follow up actions to mitigate the impacts of the discharge.
- Maintain a database for recording the information related to IDs and ICs and, to the extent possible, use a GIS map to assist in analyzing and reporting information including the identification of trends and priority areas.
- Implement a progressive enforcement policy to ensure that adequate enforcement is conducted.
- Conduct/identify training for employees who are responsible for identification, investigation, termination, cleanup, reporting, and enforcement of IDs and ICs.

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
ID1 – Detection of Illicit Discharges and Illegal Connections																			
Maintain and advertise Hotline/ Ask Stockton	C																	X	
Continue field observations for ID/IC and document/ report evidence of non-stormwater discharges/ connections or illegal dumping	C						X	X	X	X					X		X		X
ID2 – Illegal Connection Identification and Elimination																			
Investigate and eliminate ICs	C						X	X	X	X					X	X	X		
Coordinate with Planning and Land Development program	C															X		X	
Coordinate with Construction program	C															X		X	
ID3 – Investigation/ Inspection and Follow Up																			
Respond to IDs	C						X	X	X	X							X	X	
Implement Investigative Guidance Manual	C																X	X	
Maintain contractual services for cleanup and removal of HAZMAT	C																X		
Maintain the Illicit Discharges Database	C																X	X	
Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response	E						X	X	X	X							X	X	
Map reported ID incidents and locations	C						X	X	X	X						X			

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
ID4 – Enforcement																			
Implement the progressive enforcement policy	C																X	X	
Track enforcement actions using the Illicit Discharges Database	C																X	X	
ID5 – Training																			
Review and update Training Approach/ Plan	C		X												X		X	X	
Conduct/identify Illicit Discharges training	C			X														X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Performance Standards and Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
ID1 – Detection of Illicit Discharges and Illegal Connections																			
Maintain and advertise Hotline/ Ask Stockton	C																		X
Continue field observations for ID/IC and document/ report evidence of non-stormwater discharges/ connections or illegal dumping	C						X	X	X	X	X		X				X	X	X
ID2 – Illegal Connection Identification and Elimination																			
Investigate and eliminate ICs	C						X	X	X	X	X		X				X	X	X
Coordinate with Planning and Land Development program	C										X		X				X		X
Coordinate with Construction program	C										X						X		X
ID3 – Investigation/ Inspection and Follow Up																			
Respond to IDs	C						X	X	X	X			X		X			X	X
Implement Investigative Guidance Manual	C												X				X	X	X
Maintain contractual services for cleanup and removal of HAZMAT	C														X			X	X
Maintain the Illicit Discharges Database	C												X						X
Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response	E						X	X	X	X			X						X
Map reported ID incidents and locations	C						X	X	X	X							X		X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
ID4 – Enforcement																			
Implement the progressive enforcement policy	C																		X
Track enforcement actions using the Illicit Discharges Database	C																		X
ID5 – Training																			
Review and update Training Approach/ Plan	C		X																X
Conduct/identify Illicit Discharges training	C			X															X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 4
Public Outreach (PO)

OVERVIEW

The purpose of the Public Outreach Program Element is to inform the public (increase knowledge) regarding the impacts of urban stormwater runoff and introduce steps the public can take (change behavior) to reduce pollutants from everyday activities. In addition, helping the public understand the problems associated with urban stormwater runoff can help build support for the stormwater program.

The Public Outreach Program Element is designed to implement and evaluate short- and/or long-term public education campaigns that will inform members of the community about how their actions may adversely impact urban stormwater discharges and what they can do to protect the local waterbodies.

This Program Element is designed to maximize the use of limited resources and to develop partnerships among all stakeholders in the SUA. Local stewardship and partnerships among governmental agencies, schools, universities and private interests are vital components of the types of involvement envisioned in this Program Element.

CONTROL MEASURES

The Control Measures outlined in **Table 4-1** and discussed in more depth within this section form the basis of the Public Outreach Program Element.

Table 4-1. Control Measures for the Public Outreach Program Element

PO	Control Measure
PO1	Public Participation
PO2	Hotline
PO3	Public Outreach Implementation
PO4	Outreach to School-Age Children
PO5	Business Outreach (see IC3, Industrial/Commercial Outreach)

PO1 – Public Participation

2007-2012 IMPLEMENTATION

The participation of the public in the implementation of the Permittees' Stormwater Management Programs is critical to a successful effort to protect the water resources. Therefore, active public participation is encouraged and supported by the Permittees.

A number of public education, outreach, and participation activities have been conducted by the Permittees, as outlined below.

- **Stream Cleanup Events:** The Permittees' stormwater outreach effort has also included partnering with several groups for community stream cleanup events. To date the events have included participation in the California Coastal Cleanup as well as other local cleanup efforts within the Calaveras River, Duck Creek, Five Mile Slough, Mormon Slough, Mosher Slough, Pixley Slough, San Joaquin River, Smith Canal, Walker Slough, and Yosemite Lake.
- **Used Oil and HHW Programs:** As part of the Water Quality Based Plans, the Permittees coordinate with the HHW Program to ensure that pesticides and mercury are safely and properly disposed. In addition, the Permittees promote the Used Oil and HHW Programs through a variety of mechanisms and direct their residents to the permanent HHW collection center operated by the County.
- **Storm Drain Marker Program:** For the storm drain marker program, the Permittees loan the supplies to volunteers and coordinate the stenciling and/or marking activities. By working with citizen volunteers, the Permittees have been able to stencil or permanently mark storm drain catch basins throughout the SUA.
- **Update Websites:** As a component of the Pesticide Water Quality Based Program, the Permittees maintain and update pesticide disposal information on their websites to inform the public of proper pesticide handling and disposal procedures, IPM, and information regarding irrigation runoff.

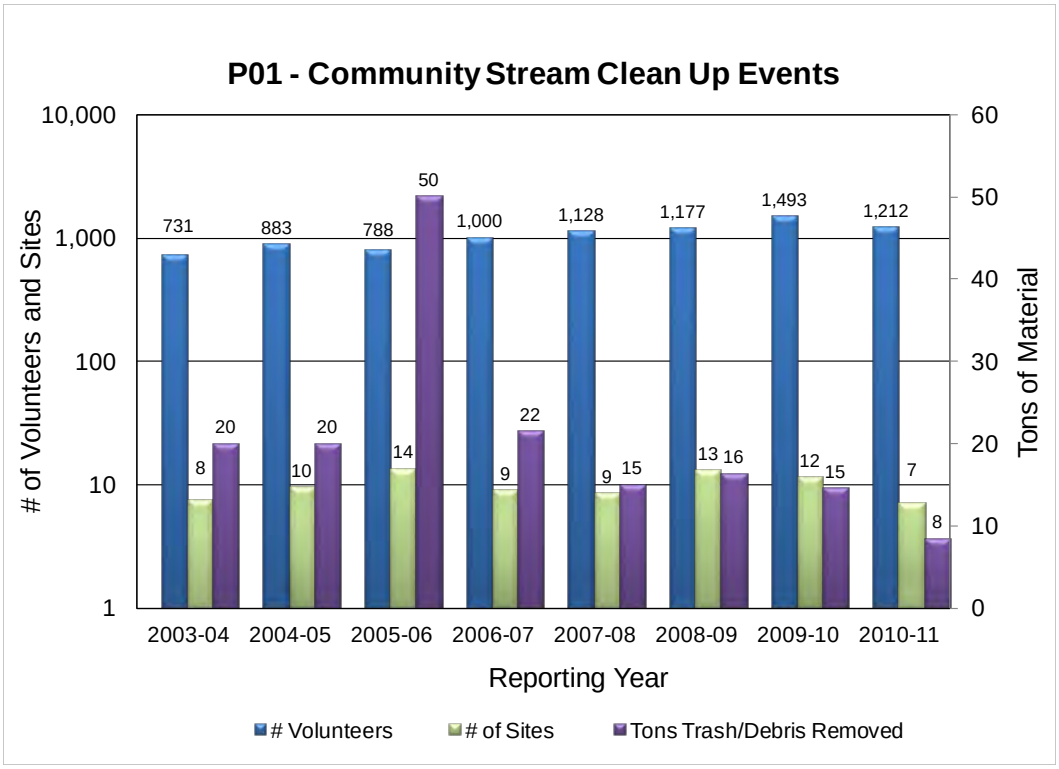
ASSESSMENT

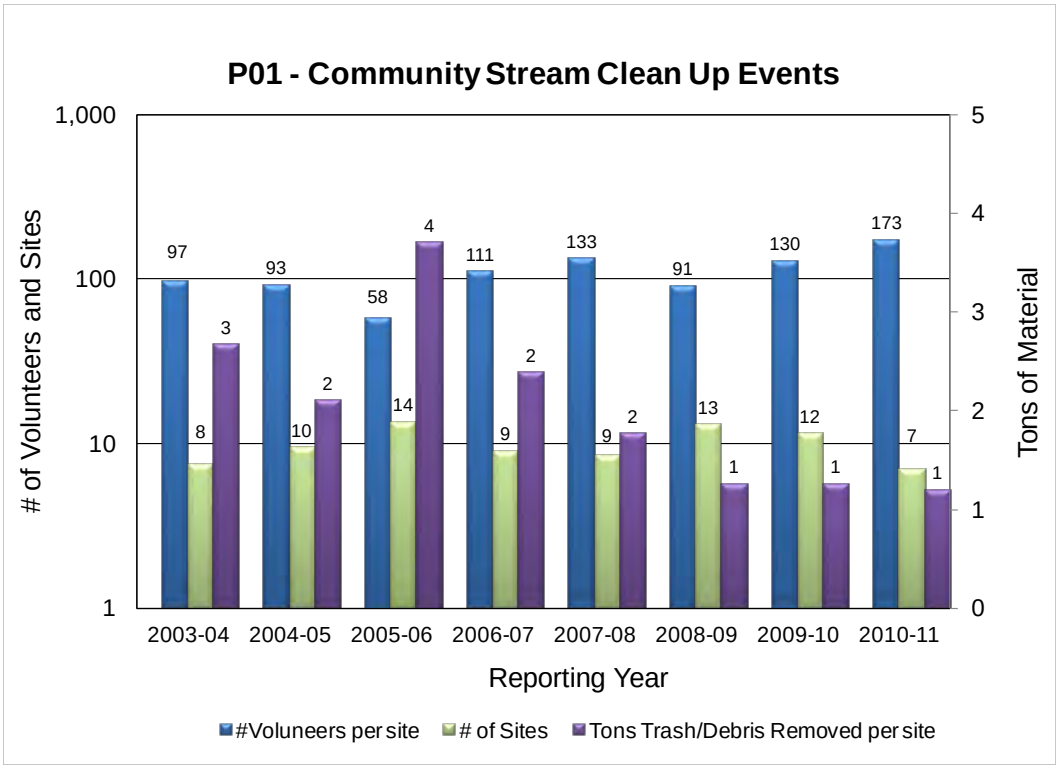
In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

The public is aware of the education campaign and community events and is involved in the program. Materials are being removed from the local creeks and streams, thus reducing the amount of materials that may adversely impact the local waterways. (**L2, L3, L4**)

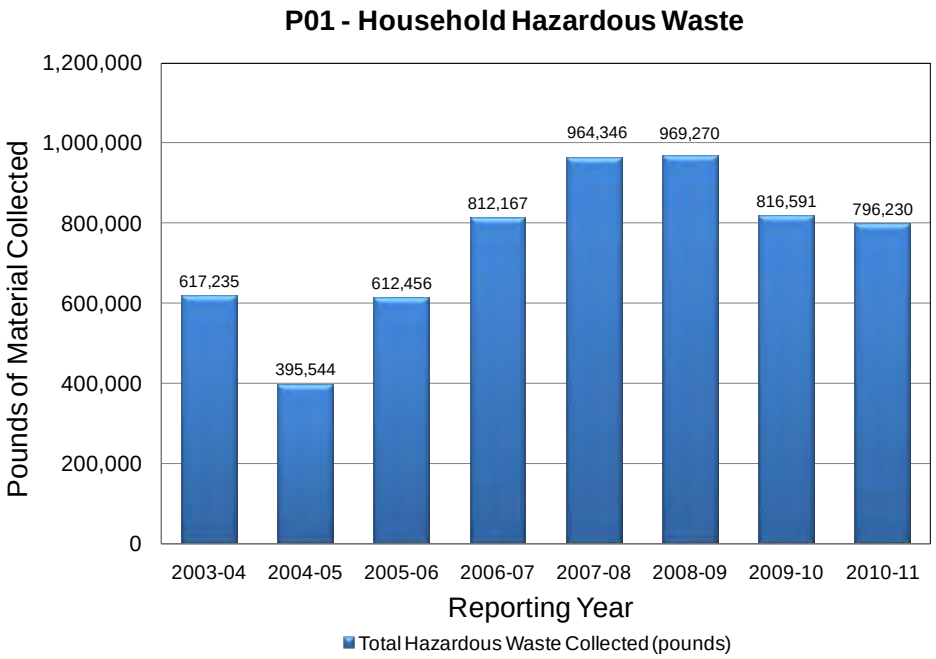
- <u>Stream Clean Up Events</u> - Since 2003, approximately 8,400 volunteers have participated in local stream clean up events. As a result, approximately 166 tons of trash and debris have been removed. Since 2003-2004, an overall increasing trend in the number of volunteers has been apparent. The number of volunteers has been consistently high since 2006-2007. As a result of each cleanup event, a consistent amount of trash and debris has been removed annually from local streams and tributaries. The values used in the figure for volunteers, number of sites, and tons of trash/debris removed are averages of the City- and County-reported values.


P01 - Community Stream Clean Up Events
# of Volunteers and Sites
Tons of Material
10,000
1,000
100
10
1
60
50
40
30
20
10
0
731
883
788
1,000
1,128
1,177
1,493
1,212
50
8
20
10
20
14
9
22
9
15
13
16
12
15
7
8
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Volunteers
of Sites
Tons Trash/Debris Removed


P01 - Community Stream Clean Up Events
# of Volunteers and Sites
Tons of Material
1,000
100
10
1
5
4
3
2
1
0
97
93
58
111
133
91
130
173
3
8
2
10
4
14
2
9
9
2
13
1
12
1
7
1
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
#Voluneers per site
# of Sites
Tons Trash/Debris Removed per site

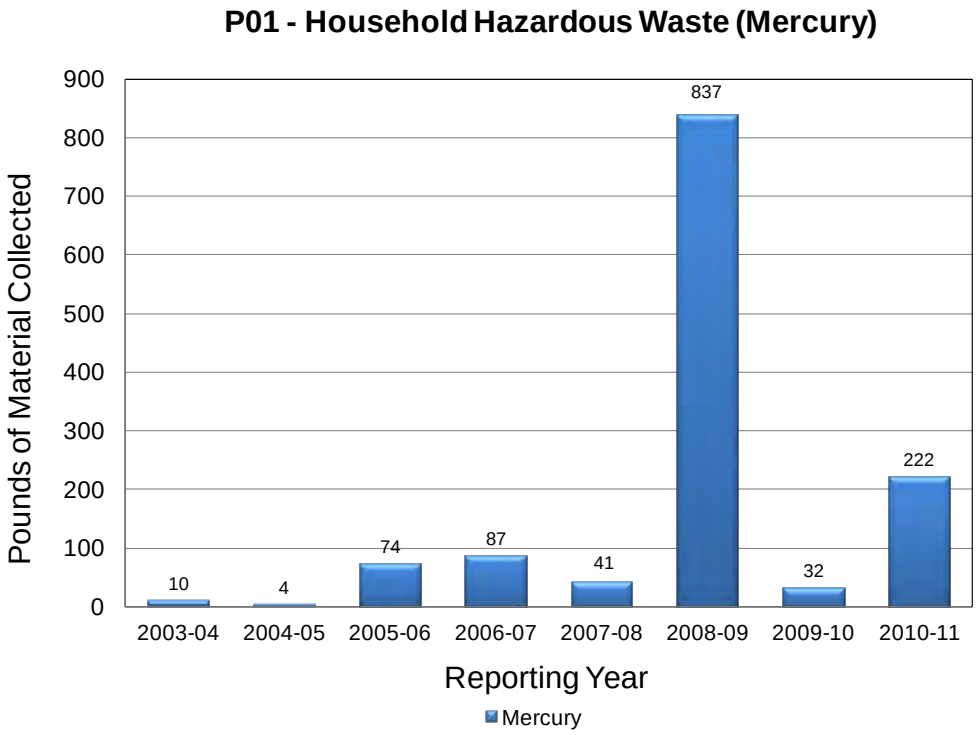
The Permittees are raising awareness about HHW collection services and are increasing the amount of HHW that is being disposed of properly, thus reducing the potential load of pollutants that could enter the storm drain system. **(L2, L3, L4)**

- Residents have properly disposed of HHW through the permanent collection facility. Since 2003, these efforts have resulted in approximately 9 million pounds of hazardous waste being collected and disposed of properly. From 2003-2004 to 2006-2007, an average of 541,745 pounds per year of HHW was collected, and from 2007-2008 to 2010-2011, an average of 871,721 pounds per year of HHW was collected. Comparing the average of data available from the previous permit term to that available for this Permit term, a 60% increase in the amount of HHW collected is demonstrated. This proper disposal of HHW ensures that potential impacts to the storm drain or receiving waters are prevented.

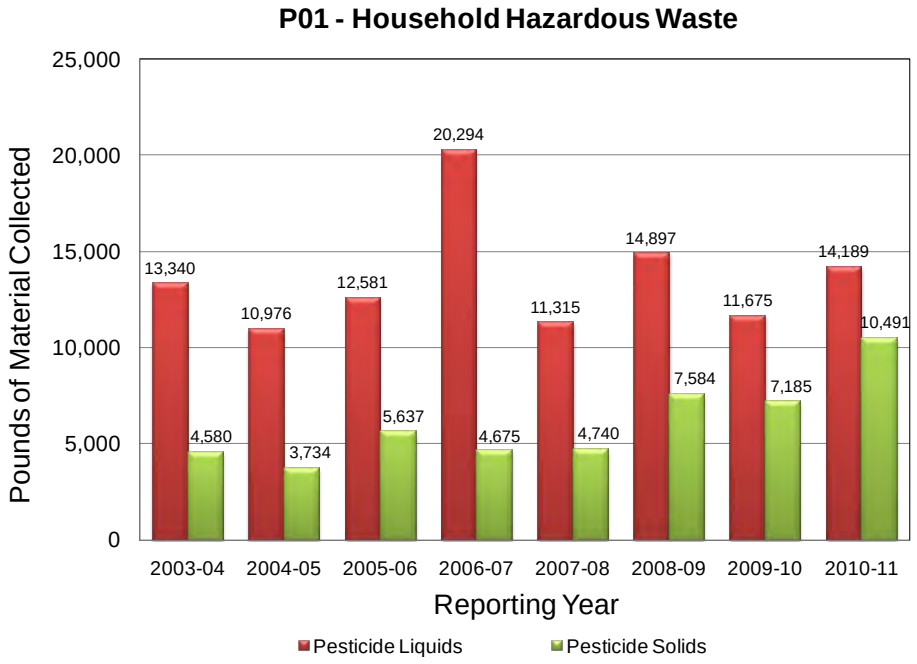


The Permittees are coordinating the HHW program with the Pesticide and Mercury Plans to ensure that these materials are safely and properly disposed of. The key messages are provided through printed materials as well as the website. (**L2, L3, L4**)

- Since 2003, over 1,307 pounds of mercury have been collected at the HHW centers; most of this was collected in 2008-2009.



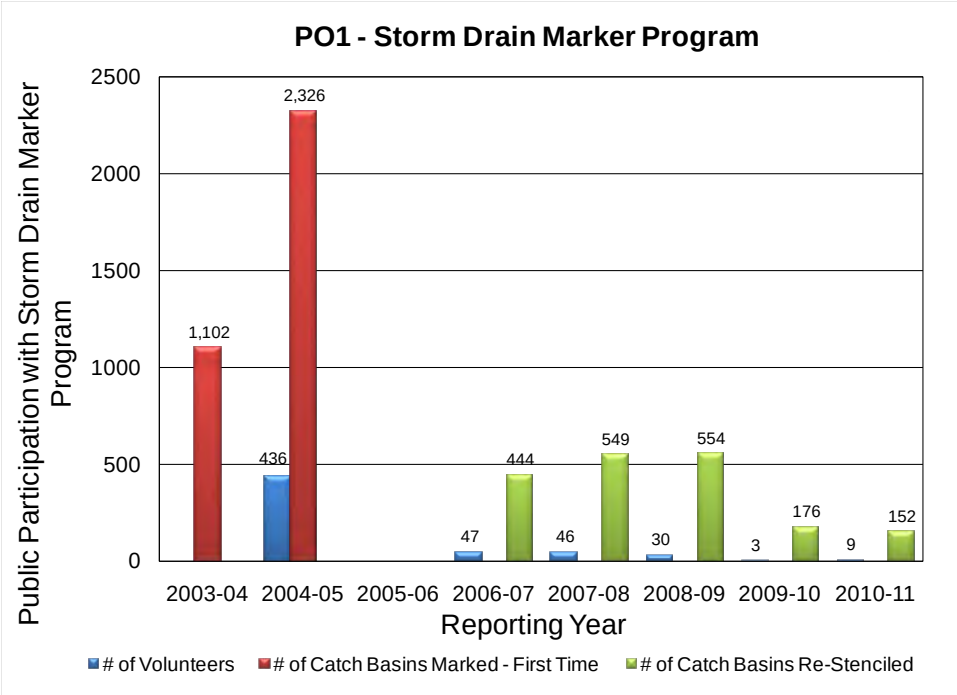
- Since 2003, over 109,267 pounds of pesticide liquids and over 48,626 pounds of pesticide solids have been collected at the HHW centers. Since 2003, there has been a general increase in the amount of pesticide solids collected at the HHW, while the amount of pesticide liquids has been more variable.



City of Stockton

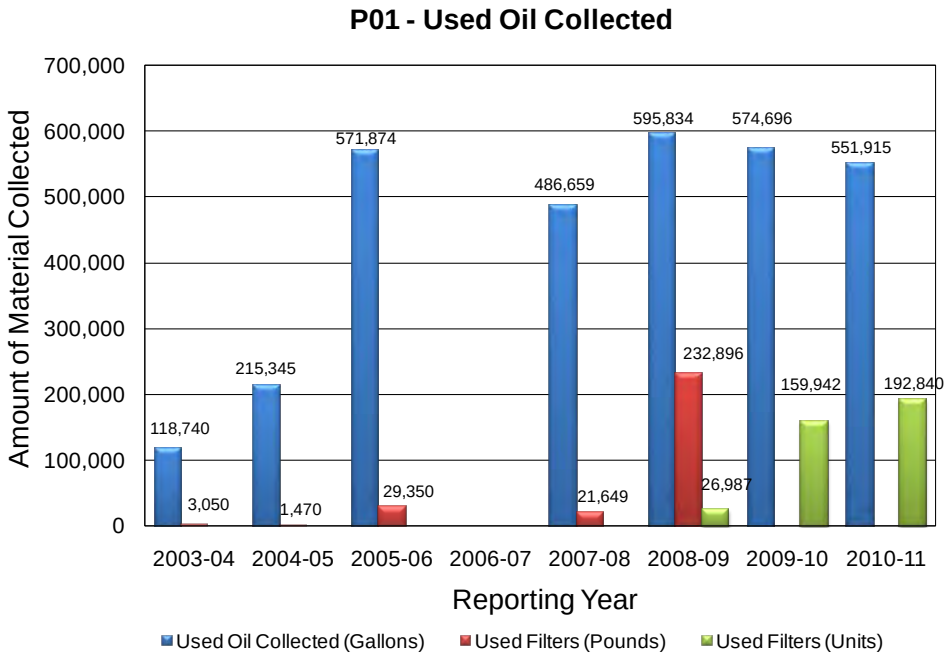
The City is outreaching to and involving the public in the implementation of the Public Outreach program. They are soliciting involvement in the program by advertising in the materials that are distributed, the website, newsletters, at community events, and distributing information at public counters. The public is aware of the public education campaign and community events and are involved in the implementation of the program. **(L2, L3)**

- Storm Drain Marker Program - The City has 16,217 catch basins, all of which are stenciled or permanently imprinted with the storm drain message. Since 2003, 5,303 catch basins have been stenciled or permanently imprinted by volunteers. (Note: No catch basins were stenciled in 2005-2006.) This effort has been completed in part by more than 571 volunteers.



The City has collected used oil for proper disposal, thus reducing the potential load of pollutants that could enter the storm drain system. **(L4)**

- Used Oil Collection Program – Since 2003, 3,115,063 gallons of used motor oil or motor oil products and 288,415 pounds (tracked between 2003-2009) and 379,369 units (tracked between 2008-present) of used oil filters have been collected at the permanent collection facility, the certified used oil collection centers, or via the City's recently implemented curbside oil collection program. The amount of used oil collected increased substantially between 2003-2004 and 2005-2006; since that time, the amount of used oil collected has remained consistently high.

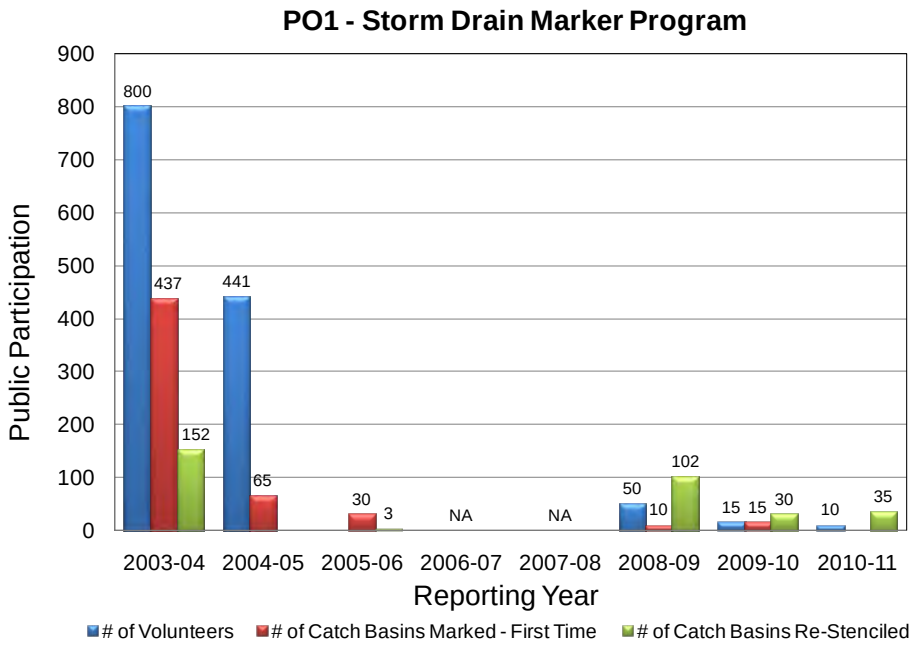


The City has supported active public participation by periodically updating the City's website, which includes general stormwater information, links to pesticide disposal information, and stormwater information specific to summer activities and the rainy season. **(L1)**

County of San Joaquin

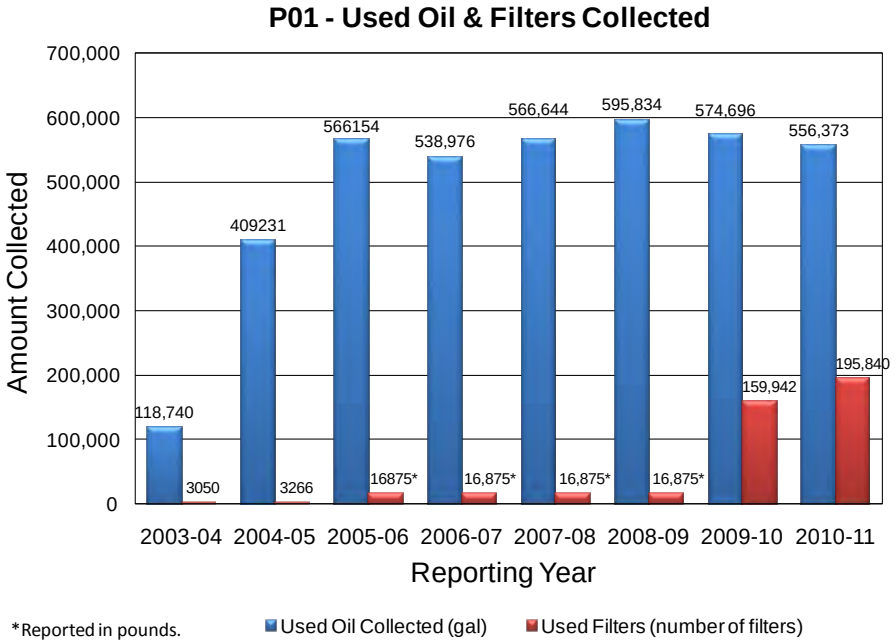
The County is outreaching to and involving the public in the implementation of the stormwater program. They are soliciting involvement in the program by advertising in the materials that are distributed, the website, newsletters, at community events, and distributing information at public counters. The public is aware of the public education campaign and community events and are involved in the implementation of the program. **(L2, L3)**

- Storm Drain Marker Program - Since 2003, 557 catch basins have been stenciled for the first time and 322 were re-stenciled by volunteer organizations. Approximately 265 catch basins remain to be stenciled. This effort has been assisted by 1,306 volunteers.



The County is increasing the amount of used oil that is being disposed of properly, thus reducing the potential load of pollutants that could enter the storm drain system. **(L4)**

- Used Oil Grant Program – Since 2003, almost 4 million gallons of used motor oil or motor oil products has been collected. Since 2003, the County has noticed a steady increase in the amount of motor oil and filters that are received and processed.



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- To omit redundancy, performance standards involving Permittee website updates will be addressed only in Control Measure PO3.

The objective of this Control Measure is to:

- Encourage the public to actively participate in the implementation of the stormwater program as well as various outreach events.

This objective will be met through implementation of specific performance standards, as detailed below.

Storm Drain Marker Program

- The Permittees will continue to loan the needed supplies to volunteers and coordinate the stenciling and/or marking activities. The Permittees will continue to support volunteers who wish to take part in this effort.

Stream Cleanup Events

- The Permittees will continue to organize, support, and/or participate in stream cleanup events once annually, at a minimum.

Used Oil and HHW Programs

- The Permittees will continue to promote the Used Oil and HHW Programs through a variety of mechanisms and direct their residents to the permanent HHW collection center operated by the County.
- In addition, in support of the Pesticide and Mercury Plans, the Permittees will continue to coordinate with the HHW Program to ensure that pesticides and mercury-containing products are safely and properly disposed.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Continue implementation of the Storm Drain Marker Program
- Organize, support, and/or participate in stream cleanup events once annually, at a minimum
- Promote Used Oil and HHW Programs through a variety of mechanisms
- Coordinate with HHW Program for pesticide and mercury disposal

PO2 – Hotline

2007-2012 IMPLEMENTATION

The purpose of this Control Measure is to operate and advertise a public hotline number to facilitate public reporting of IDs, illegal dumping, and other observed pollution problems. This Control Measure also ensures that through the hotline, complaint information is forwarded to the appropriate contacts for follow-up and/or investigation.

The primary activity conducted by the Permittees is outlined below.

- **Hotline:** The Permittees have established, maintained, and advertised 24-hour Hotlines to encourage the public to report water pollution problems.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City has established and advertises the 24-hour hotline, the used oil program, and the HHW consolidation facility numbers. The City is advertising the program through the website, the media (e.g., PSAs), and the utility bill newsletter. **(L1)**

County of San Joaquin

The County is maintaining and advertising the: 24-hour hotline, the used oil program, and the HHW consolidation facility numbers. The County is advertising the program through the website, the media, telephone book, and community events. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Promote the use of the 24-hour public reporting hotline.

This objective will be met through implementation of specific performance standards, as detailed below.

Maintain 24-Hour Hotline

The Permittees have each established and will continue to maintain the 24-hour Hotlines[1] to encourage the public to report water pollution problems.

[1] **City:** 209-937-8341; **County:** 209-468-3055 and 866-755-4955

Promote/Publicize 24-Hour Hotline

The Permittees have facilitated the reporting of IDs by advertising the hotline numbers internally, as well as externally. The Permittees will continue to advertise the hotline numbers through various mechanisms.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Continue to maintain the 24-hour hotline number
- Promote/publicize the 24-hour hotline number via various mechanisms

PO3 – Public Outreach Implementation

2007-2012 IMPLEMENTATION

This Control Measure identifies the outreach that is targeted for the residential community and general public within the SUA to inform these audiences of the impacts of urban stormwater runoff and identify steps they can take to protect the receiving waters. Such outreach communicates to the City's residents and visitors the importance of storm water quality protection and pollution prevention as it relates to the protection of the local water bodies.

A number of public education and outreach activities have been conducted by the Permittees, as outlined below.

- The Permittees have implemented an extensive public outreach program through a variety of means including newsletters; newspaper, radio, and television articles/messages; participation in City- and County-wide public events where promotional and education brochures are distributed; and making presentations to various community groups. Public outreach efforts have included the following:
    - Attended and participated in community events and distributed outreach materials. Collectively, events have included (but were not limited to) the following:
        - Agriculture Day at the San Joaquin County Fair
        - America Recycles Day
        - Black Family Day
        - California Coastal Boating Network Meeting
        - Cinco de Mayo
        - Delta Safety Network
        - Earth Day Festival
        - Family Literacy Day in the Park
        - "Keep the Delta Clean" Major League Monday
        - Mayor's Kids Day
        - Orchard Supply Hardware – No Sales Tax Weekend
        - Orchard Supply Hardware – OWOW
        - San Joaquin County Boat and RV Show
        - San Joaquin County Home and Garden Show
        - State of the City
        - University of the Pacific Freshman Projects
    - Provided general stormwater outreach materials on the Permittees' websites, at civic locations, at community events, and in utility bill inserts, and provided stormwater-related articles or messages through the local media, the government access cable station, and movie theatres.
    - Held briefing sessions and/or made presentations for community leaders, public employees, and local community and environmental organizations.
    - Formed active partnerships by participating in the Phase II Cities group and partnering with other City and County departments and agencies so that resources and efforts could be shared.
    - Participated in the Bay Area Stormwater Management Agencies Association OWOW campaign with Orchard Supply Hardware (OSH) to encourage the use of less toxic products and proper disposal of pesticides. The OWOW program is now supported in all

82 California OSH stores (including OSH at 1015 West Hammer Lane, Stockton). The Permittees' focus is specifically at the Stockton store. The OWOW program provides over 20 different fact sheets on less-toxic pest management strategies to retail outlets that sell pesticides; holds community outreach events in stores to promote less toxic methods and products; and trains store personnel in IPM principles. The OWOW program is also part of the outreach efforts at community events. During the Permit term, on behalf of the Permittees, the County distributed OWOW Fact Sheets in English and Spanish which target the general public. The County maintained aisle displays, product markers and OWOW fact sheets. OWOW program materials were also made available during public outreach events.

  - Promoted educational materials through their websites to encourage IPM practices. In addition, the City installed and maintained an electronic IPM kiosk. The kiosk is located in City Hall and provides residents with information on IPM, proper use and disposal of pesticides, pest identification, runoff, and water conservation. The kiosk also holds literature racks with additional fact sheets from the OWOW Program. The IPM Kiosk located in City Hall was regularly stocked with IPM brochures.

- The County's Solid Waste Division supported the San Joaquin University of California (UC) Master Gardeners Program during the Permit term. Home Gardening Sessions were hosted by the Master Gardeners of San Joaquin UC Cooperative Extension (UCCE). The Home Gardening Sessions are held monthly highlighting particular topics in the garden. The IPM session continues to run annually. The County continues to investigate the feasibility of expanding the IPM session to promote safer pest control as a means to protecting water quality and widely advertise to the general public. Currently, after completing Master Gardener training, each UCCE Master Gardener is required to achieve a total of 50 volunteer hours in the first year and 25 hours each year thereafter. Local volunteerism is a program highlight. During the 2010-2011 reporting year the Solid Waste Department and the UCCE Master Gardner Program designed the 1st Annual Smart Gardening Conference to be held September 24, 2011. Municipal staff and/or consultants and Master Gardeners will provide training on Lawn Alternatives, Responsible Pest Control, Waste Reduction, Attracting Beneficial Insects and Water Wise Tips. Safer pesticide use, less-toxic pesticide alternatives, and the use of native plants to minimize the need for pesticides and reduce water use continue to be program guidelines

ASSESSMENT

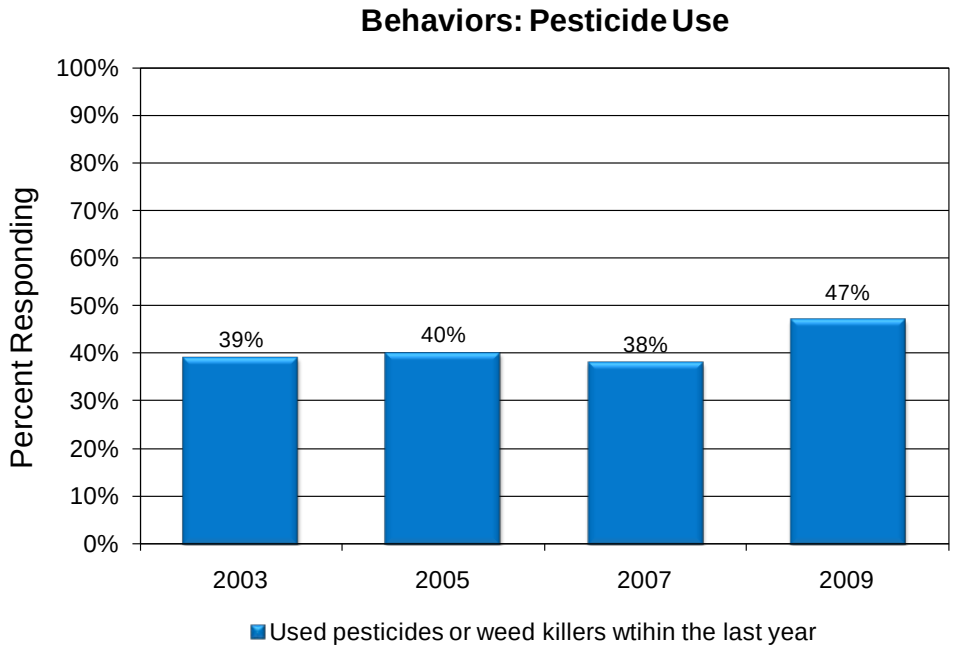
In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

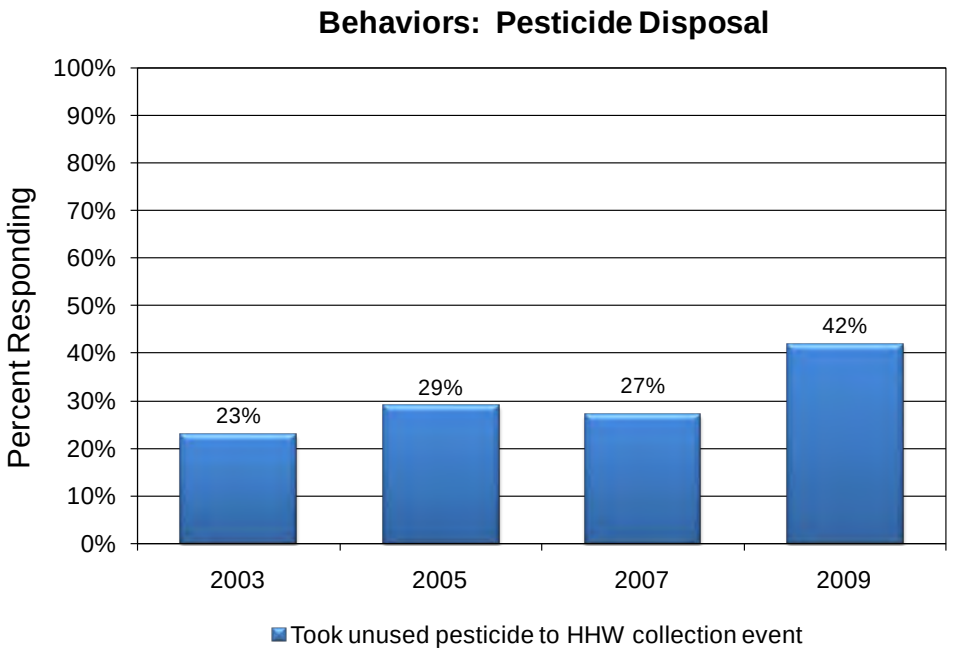
Public surveys are used to evaluate the effectiveness of the Permittees' public outreach efforts. The Permittees conducted a follow-up public opinion survey in December 2009 (Appendix C-2 of the 2009-2010 Annual Report) to assess changes in public perceptions and behaviors related to stormwater quality management as compared to the survey data from the spring of 2007, 2005, and 2003. This study was implemented through a telephone survey of 400 heads of household in the SUA to quantitatively evaluate how residents perceive and relate to environmental issues associated with stormwater. During 2011-2012, the Permittees continued to provide public outreach regarding key stormwater messages via the websites. It is recommended that the public surveys occur once per permit term in order to gauge the long-term awareness and behavior changes within the SUA community. The results of each of the surveys will be compiled and reported on once during each permit term to assess the changes within the SUA community.

The results of the survey showed that the Permittees are effectively outreaching to the public with regard to proper pesticide use and disposal. Compared to previous survey data, the following conclusions were drawn from the 2009 public opinion survey:

- There was an increase in the number who reported using pesticides within the last year; and



- There was an increase in the number who reported taking the leftover pesticides to a HHW collection event.



City of Stockton

The City has developed and is implementing the public education and outreach program that provides key stormwater messages. **(L1)**

- General Outreach Efforts – The City has developed and is providing a variety of outreach pieces such as brochures and fact sheets, some of which are multi-lingual. The materials are provided at a number of venues including the City's website, civic locations, community events, and billing inserts. Through these efforts, more than 1.3 million pieces of outreach material have been distributed since 2003 (1,388,895 total pieces of outreach material).

  The City has continued to work with the local media, the government access cable station, movie theatres, and utility bill newsletters to provide the public with more than 135 different stormwater-related articles or messages since 2003. Between 2007 and 2011, it is estimated that these mixed media campaigns have resulted in more than 16 million (16,063,727) impressions.

- Water Quality Based Plan Outreach – The City has implemented specific efforts in order to implement the Pesticide, Pathogen, and Mercury Plans. Efforts have included the development and distribution of materials addressing the disposal of pet waste as well as methods for the proper disposal of household items that contain mercury.

  - The City is implementing a pet waste outreach program in coordination with the Pathogen Plan to ensure that pet waste is properly disposed of. Since 2008-2009, the key messages have been provided through printed materials, the *Stockton Water News* utility billing insert, signage at the Barkleyville Dog Park and ten (10) City parks, and radio ads. The City has also provided pet waste outreach to/at businesses, pet-related events, and pet organizations.

  - During 2008-2009, the City installed a total of 10 pet waste bag dispensing stations at various parks through the Keep the Delta Clean program, as well as an additional 16 pet waste bag dispensing stations at five other parks.

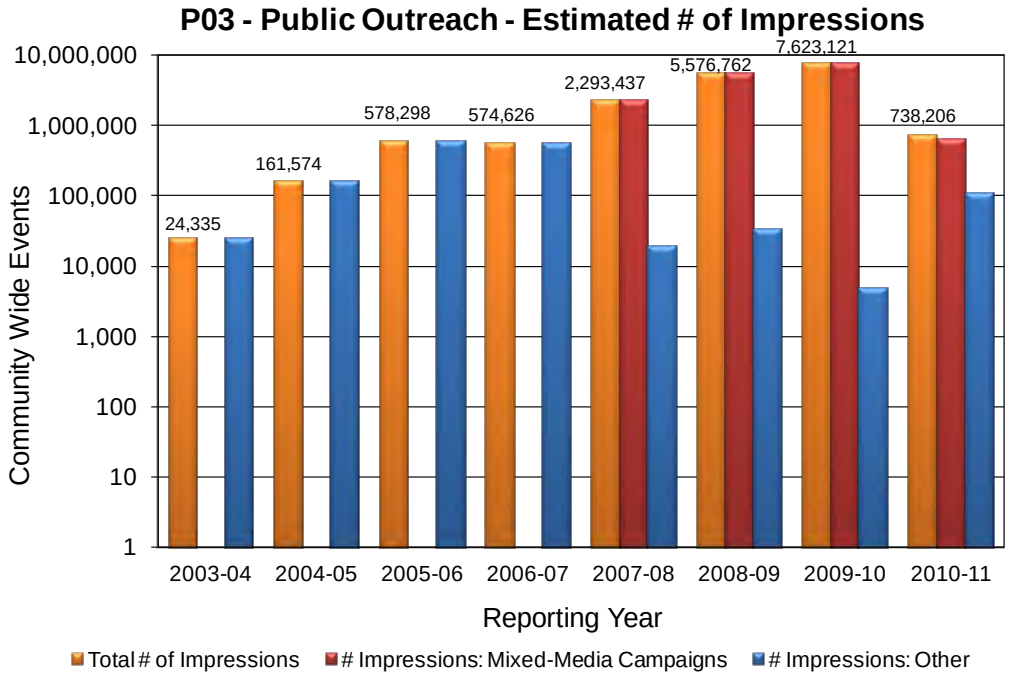
- Mass Mailings – Since 2003, outreach has been provided to approximately 100% of the City residential units by conducting mass mailings of various outreach materials. In addition, in 2005-2006, quarterly waste management newsletters were mailed to all residents. In 2006 and 2008, AT&T phone books with a recycling guide and stormwater and hotline information insert were mailed to all residents. In 2010-2011, two newsletters, a Clean Water Fee newsletter and the *Stockton Water News*, were provided to all residents via utility billing inserts.

- Community-Wide Events – The City has regularly attended community-wide events since 2003-2004. During that time, the City has outreached to the general public by sponsoring, organizing, and/or exhibiting at these events and providing information to an estimated 113,678 event attendees.

- Community Relations – Since 2007-2008, the City has provided community relations in the form of briefing sessions to more than 991 attendees. The City also has outreached to and/or coordinated with local community and environmental organizations.

- Partnerships – The City continues to partner with other City departments and agencies and form additional partnerships, such as that with the Stockton Area Water Suppliers (SAWS), so that resources and efforts can be shared.

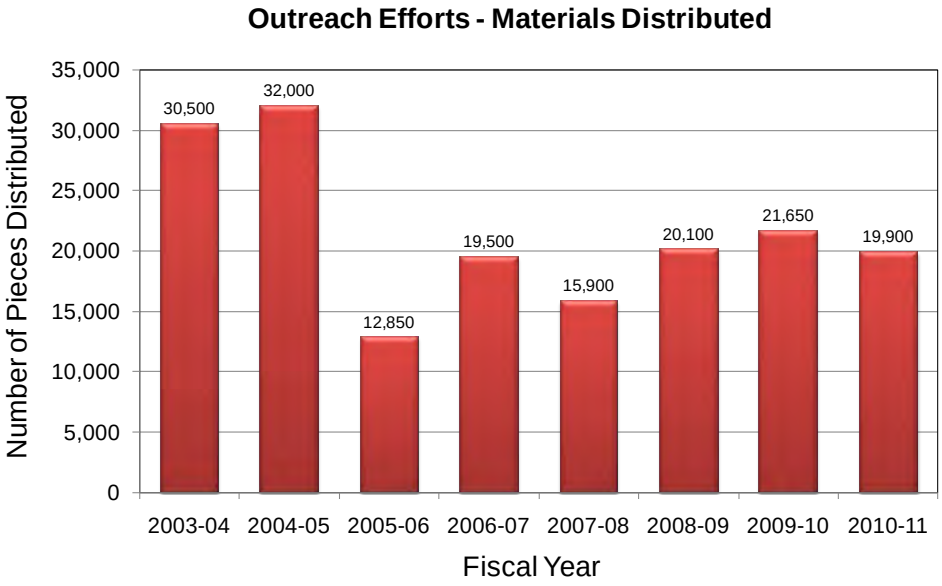
As a result of all of these efforts, more than 16 million impressions (16,231,526) have been made so far this Permit term, including 738,206 in 2010-2011. Overall, the number of impressions being made annually has increased significantly since 2003-2004.



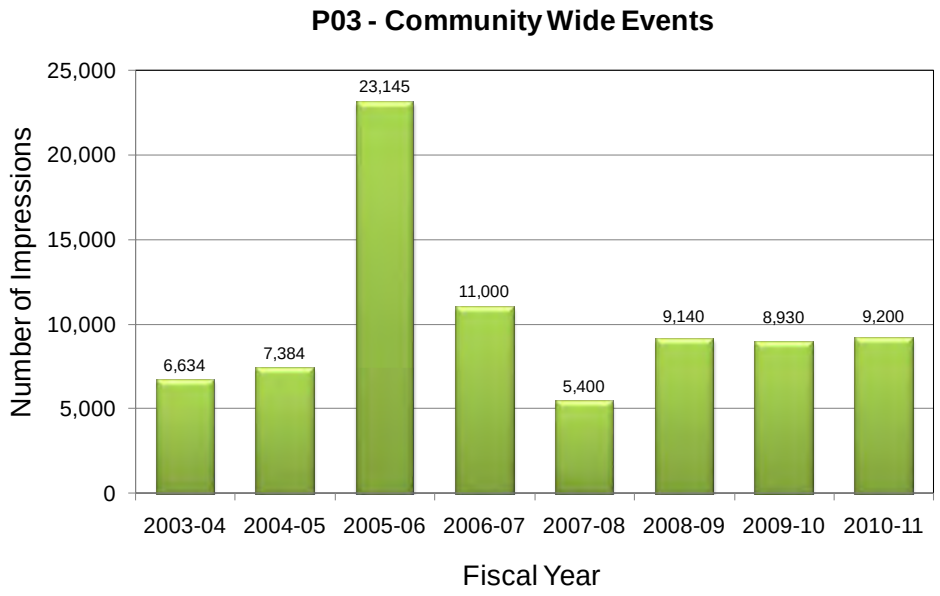
County of San Joaquin

The County has developed, and is implementing, a public education and outreach program and is providing key stormwater messages. **(L1)**

- General Outreach Efforts – The County has developed and is providing a variety of outreach pieces (some of which are multi-lingual) such as brochures, posters, videos, and fact sheets. The materials are provided at a number of venues including the County's website, civic locations, community events, and bill inserts. In addition, the materials address critical issues such as the proper disposal of pet waste. Through these consistent efforts, over 192,822 pieces have been distributed since 2003.



- Water Quality Based Plan Outreach – The County has implemented specific efforts in order to implement the Pesticide, Pathogen, and Mercury Plans. Efforts have included the development and distribution of materials addressing the disposal of pet waste as well as methods for the proper disposal of household items that contain mercury.
- Update of Materials and Website – The County has updated the outreach materials and website as needed to ensure that the materials and user interface is up to date and relevant for the target audiences.
- Mixed Media Campaign – The County has worked with the City to implement a mixed media campaign that consists of radio and government access cable channel PSA, movie theater slides, print ads, and signage.
- Community Wide Events – Since 2003, the County has outreached to the general public by sponsoring, organizing and/or exhibiting at about 127 community events (about 15 a year). As a result, an estimated 80,833 attendees have received information.



- Partnerships and Community Relations – Since 2003, the County has initiated and/or continued partnerships with other departments and agencies, as well as Phase II cities, so that resources can be shared and stormwater pollution prevention messages are consistent and are broadcast County-wide.

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- During the previous Permit term, the County committed to a partnership with the Center for Land Based Learning (Center). The Center maintains a farming program, operating in two schools in the SUA. In the past, the Center served as a vehicle for direct access for school outreach. During the 2009-2010 reporting period, the County determined that the Center's farming program was an agricultural-based program, and the Stormwater Program messaging did not fit their curriculum. In light of the incompatibility between the two programs, the County will reach a larger target audience through other programs elsewhere in the outreach program.

The objectives of this Control Measure are to:

- Implement a public education strategy for the overall program that includes the following efforts:
    - Develop and distribute materials (BMP fact sheets, brochures, etc.)
    - Conduct mixed media campaigns (radio, print ads, signage, etc.)
    - Participate in community outreach events
    - Conduct public opinion surveys to gauge the level of awareness and behavior change within a community and/or target audience

This objective will be met through implementation of specific performance standards, as detailed below.

Conduct Public Opinion Surveys

The Permittees will conduct follow-up Public Opinion Surveys during the permit term. These surveys will be conducted at appropriate venues to reach a representative cross-section of the target audience. In addition, multiple, smaller surveys may be conducted that focus on the POCs. The existing survey questions will be evaluated to determine if POC-specific questions should be incorporated (e.g., are houseboat owners aware of the need to properly dispose of sump waste, and are they doing so?).

Conduct Pest Control Product Survey

The Permittees will conduct one Pest Control Product Survey regarding sales and use of residential and commercial pest control products.

Identify and/or Create, Revise, and Distribute Educational Materials

The Permittees will identify and/or create, revise, and distribute educational materials with information on the POCs, as needed. The Permittees will continue to implement pet waste outreach program at kennels and other pet-related businesses, events, or organizations. The City will coordinate with the City Animal Control and Pet Licensing to provide outreach and literature on the proper disposal of pet waste to pet owners and animal adoption agencies.

Update Website as Needed

The Permittees will update their websites with information on the POCs, as needed. This will ensure that information regarding stormwater issues and POCs is available to the public.

Conduct Mixed Media Campaigns

The Permittees will continue to conduct mixed media campaigns with information on the POCs, as needed.

Participate in Community-Wide Events

The Permittees will either individually or jointly participate in three (3) community-wide events each year.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Conduct a follow-up Public Opinion Survey once during the permit term and re-evaluate the questions as needed to address the POCs.
- Conduct a follow-up Pest Control Product Survey regarding sales and use of residential and commercial pest control products
- Identify and/or create, revise, and distribute educational materials with information on the POCs, as needed.
- Implement pet waste outreach program at kennels and other pet-related businesses, events, or organizations.
- Coordinate with the City Animal Control and Pet Licensing or County Agricultural Commissioner's Office for Pet Licensing to provide outreach and literature on the proper disposal of pet waste to pet owners and animal adoption agencies
- Update the websites with information on the POCs, as needed
- Conduct Mixed Media Campaigns focused on the POCs
- Participate in three (3) community-wide events throughout the year

PO4 – Outreach to School-Age Children

2007-2012 IMPLEMENTATION

Presentations and general outreach to school-age children are an effective outreach method. School-age children who are exposed to stormwater-related messages early in their lives pass these messages and pollution prevention information on to their families. Thus, they effectively educate those around them and become advocates for the protection of receiving waters. This Control Measure provides outreach to school-age children to educate them about stormwater pollution.

A number of public school education activities have been conducted by the Permittees, as outlined below.

- A 45-minute interactive classroom presentation has been developed which includes a seven-minute video that discusses the water cycle, wastewater, and water conservation. The program was developed to help teachers meet the science component of the California Content Standards for fifth and sixth grades. Each student receives an "Only Rain Down the Drain" activity booklet and sticker. Each teacher receives a packet of information from the Department of Water Resources regarding free water, wastewater, stormwater supplies and materials available to teachers.
- The Stormwater Outreach effort also partnered with the City's Parks and Recreation Department to make presentations as part of its After School Program. The presentations were shortened versions of the classroom presentation and included viewing the "Only Rain Down the Drain" video and demonstrations with the watershed model. Each student receives an "Only Rain Down the Drain" activity booklet and sticker.

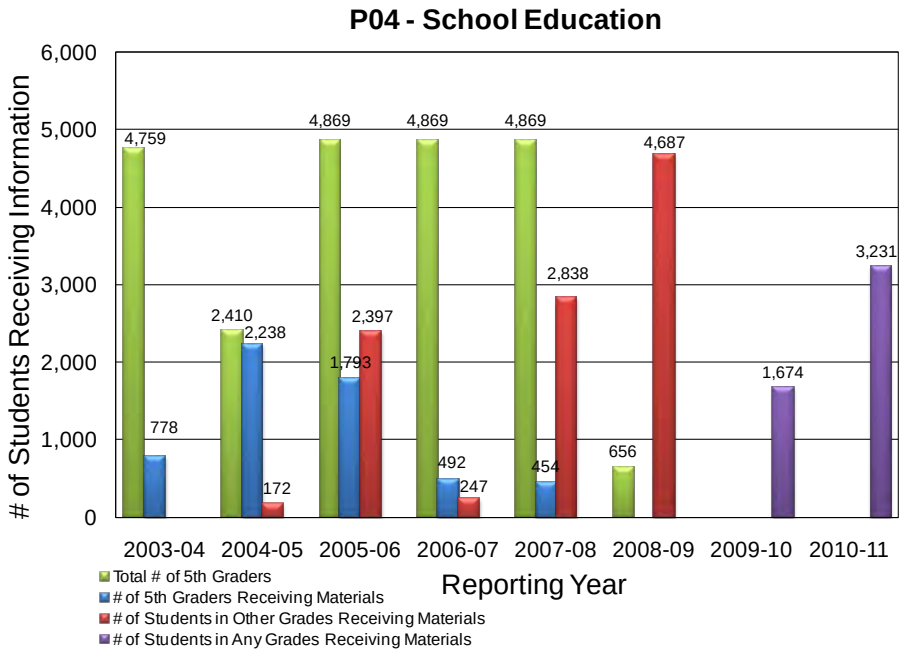
ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City is outreaching to the schools, educators, and school children and providing key stormwater messages. While past years' efforts (2003-2004 through 2007-2008) focused primarily on outreach to 5th graders, the focus of the program has shifted to school-age children in any grade. **(L1)**

- Since 2003, more than 19,000 students have received stormwater pollution prevention related materials. The City provided individual stormwater presentations to classrooms, after-school programs, and summer day camp programs. The City also continues to partner with SAWS, which provides structured Stormwater/Water Conservation assemblies for students throughout the City and County.
- During the Permit term, the City developed, implemented, and supported the interactive stormwater pollution exhibit that is displayed at the Children's Museum.



County of San Joaquin

The County evaluated the ability to interface with and coordinate school education programs on a regional or local level. Based on this evaluation, the County determined that the most consistent and guaranteed mechanism for reaching out to school-aged children was through after school and summer camp programs. This revised approach was implemented during 2008-2009. **(L1)**

- The County developed and distributed a specialized Stormwater Activity Booklet directly to students. Since 2003, more than 3,900 students have received stormwater pollution prevention related materials. The County also reached out to school-age children outside of school by partnering with the San Joaquin County Office of Education during community events to ensure stormwater messaging reached the targeted audience.
- During the Permit term, the County conducted periodic presentations on water, water uses, the water cycle, and stormwater during Day Camps. The County partnered with the SAWS program), which provides structured Stormwater/Water Conservation assemblies for students throughout the City and County. Since 2008-2009, the SAWS program has effectively provided outreach to over 13,000 students since 2008-2009 and has consistently provided an average of 15 presentations during each reporting period.

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- The focus of this Control Measure has shifted from “Public School Education” to “Outreach to School-Age Children” to reflect the shift to a broader target audience (i.e., all school-age children, not just those attending public schools).

The objective of this Control Measure is to:

- Evaluate, identify, and implement opportunities to provide focused stormwater outreach to school-age children throughout the SUA

This objective will be met through implementation of specific performance standards, as detailed below.

Evaluate Collaborative Opportunities with Non-Traditional Phase II Entities

The Permittees will work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children.

Identify Opportunities to Provide Outreach to School-Age Children

The Permittees will continue to identify opportunities, such as partnering with SAWS, to provide focused stormwater outreach to school-age children. The emphasis of such outreach will be to reach school-age children via appropriate venues, not necessarily in the context of a school setting. To the extent possible, the outreach will address the POCs.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Evaluate collaborative opportunities with non-traditional Phase II entities (i.e., schools) to provide POC-focused stormwater outreach to school-age children
- Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children

PO5 – Business Outreach

2007-2012 IMPLEMENTATION

Since commercial and industrial businesses can be sources of stormwater pollutants, this Control Measure ensures that business owners and operators are informed about stormwater quality and impacts on water resources. Efforts are primarily targeted at specific business types.

During the Permit term, the Permittees have also supported the Greater Stockton Chamber of Commerce's "Green Team San Joaquin," including an annual Recycling Exposition.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City is outreaching to the business community and providing key stormwater messages. Since 2003, the City has distributed approximately 5,552 pieces of educational materials to industrial and commercial businesses regarding stormwater pollution and BMPs. Materials are provided via the City's website, at community events, via utility billing inserts, and during industrial and commercial business inspections. During the Permit term, presentations were made to a total of 413 business organizations, resulting in approximately 1,301 impressions. **(L1)**

County of San Joaquin

The County is outreaching to community leaders, public employees, and local community and environmental groups and providing key stormwater messages. Since 2003, the County has distributed approximately 1,154 pieces of educational materials to industrial and commercial businesses regarding stormwater pollution and BMPs. Materials are provided via the County's website, at community events, and during industrial and commercial business inspections. Since 2003, presentations have been made to a total of 302 business organizations, resulting in approximately 1,542 impressions. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- This Control Measure will be incorporated into IC3, Industrial and Commercial Outreach (see **Section 6**, Industrial and Commercial Program), due to similarities in the purpose of these Control Measures. The majority of the outreach that is conducted for industrial and commercial businesses occurs during implementation of Industrial and Commercial Program Control Measures, such as inspections; thus, it is most efficient to streamline all business outreach efforts only under the Industrial and Commercial Program.

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Public Outreach Program are summarized below.

OBJECTIVES

The objectives address the key components of the Public Outreach Program Element and identify that, in order to be effective, the program must:

- Encourage the public to actively participate in the implementation of the stormwater program as well as various outreach events.
- Promote the use of the 24-hour public reporting hotline.
- Implement a public education strategy for the overall program that includes the following efforts:
    - Develop and distribute materials (BMP fact sheets, brochures, etc.)
    - Conduct mixed media campaigns (radio, print ads, signage, etc.)
    - Participate in community outreach events
    - Conduct public opinion surveys to gauge the level of awareness and behavior change within a community and/or target audience
- Evaluate, identify, and implement opportunities to provide focused stormwater outreach to school-age children throughout the SUA

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
PO1 – Public Participation																			
Implement Storm Drain Marker Program	C																	X	
Organize, support, and/or participate in stream cleanup events once annually, at a minimum	C							X		X								X	
Promote Used Oil and HHW Programs	C						X		X									X	
Coordinate with HHW program for pesticide and mercury disposal	C						X		X									X	
PO2 – Hotline																			
Maintain 24-hour hotline number	C												X	X					
Promote/publicize the 24-hour hotline number via various mechanisms	C												X	X					
PO3 – Public Outreach																			
Conduct follow-up Public Opinion Survey(s) during the permit term and re-evaluate the questions as needed to address the POCs	C			X			X	X	X	X								X	
Conduct one Pest Control Product Survey regarding sales and use of residential and commercial pest control products *(County has primary responsibility)*	C			X			X											X	
Identify and/or create, revise, and distribute educational materials with information on POCs, as needed	C						X	X	X	X								X	

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
Implement pet waste outreach program at kennels and other pet-related businesses, events, or organizations.	C							X										X	
Coordinate with the City Animal Control and Pet Licensing or County Agricultural Commissioner's Office for Pet Licensing to provide outreach and literature on the proper disposal of pet waste to pet owners and animal adoption agencies	C							X										X	
Update the websites with information on the POCs, as needed	E						X	X	X	X								X	
Conduct Mixed Media Campaigns focused on the POCs	E						X	X	X	X								X	
Participate in three (3) community-wide events throughout the year	C						X	X	X	X			X						
PO4 – Outreach to School-Age Children																			
Work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children	N						X	X	X	X								X	
Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children	C						X	X	X	X								X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Performance Standards and Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
PO1 – Public Participation																			
Implement Storm Drain Marker Program	C																		X
Organize, support, and/or participate in stream cleanup events once annually, at a minimum	C							X		X								X	X
Promote Used Oil and HHW Programs	C						X		X									X	X
Coordinate with HHW program for pesticide and mercury disposal	C						X		X									X	X
PO2 – Hotline																			
Maintain 24-hour hotline number	C																		X
Promote/publicize the 24-hour hotline number via various mechanisms	C																		X
PO3 – Public Outreach																			
Conduct follow-up Public Opinion Survey(s) during the permit term and re-evaluate the questions as needed to address the POCs	C			X			X	X	X	X									X
Conduct one Pest Control Product Survey regarding sales and use of residential and commercial pest control products *(County has primary responsibility)*	C			X			X												X
Identify and/or create, revise, and distribute educational materials with information on POCs, as needed	C						X	X	X	X									X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
Implement pet waste outreach program at kennels and other pet-related businesses, events, or organizations.	C							X											X
Coordinate with the City Animal Control and Pet Licensing or County Agricultural Commissioner's Office for Pet Licensing to provide outreach and literature on the proper disposal of pet waste to pet owners and animal adoption agencies	C							X											X
Update the websites with information on the POCs, as needed	E						X	X	X	X									X
Conduct Mixed Media Campaigns focused on the POCs	E						X	X	X	X									X
Participate in three (3) community-wide events throughout the year	C						X	X	X	X								X	X
PO4 – Outreach to School-Age Children																			
Work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children	N						X	X	X	X								X	X
Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children	C						X	X	X	X								X	X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 5
Municipal Operations (MO)

OVERVIEW

The Permittees, as part of their normal operations, conduct a number of activities (e.g., catch basin cleaning, street sweeping) that may generate or mobilize pollutants. The Municipal Operations Program Element comprises Control Measures designed to ensure that these operations and maintenance activities are performed in such a way as to minimize the pollutants generated, as well as the potential for pollutants to enter the storm drain system.

CONTROL MEASURES

The Control Measures outlined in **Table 5-1** and discussed in more depth within this section form the basis of the Municipal Operations Program Element.

Table 5-1. Control Measures for the Municipal Operations Program Element

MO	Control Measure
MO1	Sanitary Sewer Overflow and Spill Response
MO2	New Development and Construction Requirements for Municipal Capital Improvement Projects
MO3	Pollution Prevention at Permittee Facilities
MO4	Landscape and Pest Management
MO5	Storm Drain System Maintenance
MO6	Street Cleaning and Maintenance
MO7	Parking Lots Maintenance
MO8	Training

MO1 – Sanitary Sewer Overflow and Spill Response

2007-2012 IMPLEMENTATION

The Sanitary Sewer Overflow Emergency Response Plans (SSOERPs) identify procedures for the Permittees to take to minimize potential impacts to the receiving water from sanitary sewer overflows (SSOs). Sanitary overflow and spill response comprises four steps: investigation of complaints, containment, notification to appropriate agencies, and clean-up / mitigation. Follow-up to an SSO includes procedures for containing and cleaning spills that enter the storm drain system.

The Permittees conduct a number of activities that facilitate the proactive detection and elimination of SSOs, as outlined below.

- **Implement Sanitary Sewer Overflow Emergency Response Plans:** The Permittees developed and implemented the SSOERPs. The Permittees each maintain a complaint hotline and respond to SSO complaints and/or notifications in a timely manner.
- **Review/Revise Sanitary Sewer Overflow Emergency Response Plans:** On June 16, 2009, the City and the California Sportfishing Protection Alliance agreed to incorporate several procedures into the City's SSOERP. In November 2009, the County's Sanitary Sewer Overflow Response Plan (SSORP) was revised to reflect the notification from the City of the settlement, and to reflect a combined effort of communication and cooperation between the City and County with respect to sanitary sewer spills emanating from the City's collection system that threaten to discharge, or discharge, to the County's storm system (see Appendix D-1 of the County's 2009-2010 Annual Report).

  The specific procedures that were addressed within the County's revised SSORP include the following:

  1. The County will ensure that the County's Emergency Dispatch personnel are prepared to field any call from the City related to any SSO occurring within the County's jurisdictional area of the SUA MS4 ("County's MS4 Jurisdiction") that has discharged to, or threatens to discharge to, the County MS4.
  2. For any SSO from the City's collection system that discharges, or threatens to discharge, to the County's MS4 Jurisdiction of which the County is aware, the County will work cooperatively with the City to take all feasible steps to prevent the SSO from reaching the County's MS4 Jurisdiction and/or waters of the U.S., including by:
     a. Controlling County owned and/or operated storm water pump stations at the request of the City, as necessary;
     b. Allowing the City to obtain access to the County's MS4, as necessary; and
     c. Using reasonable best efforts to facilitate the City's response to its SSOs to the County's MS4 in a cooperative manner.

  During the 2010-2011 reporting period, the County's Utilities Maintenance Division revised the SSORP into an SSOERP to incorporate and implement these new procedures. The SSOERP will be included in the County's Sewer System Management Plan (SSMP) and is reflected as Element 6 of the plan.

  The City's March 2009 SSOERP was included as Appendix B-1 to the 2009 SWMP. The SSOERP is reviewed and revised as needed. The SSOERP was developed to address sewage spills and ensure that every report of an SSO is addressed by the appropriate personnel so that the

impacts of the overflow on the storm drain system can be minimized. Although the SSOERP identifies and outlines the necessary actions and BMPs that should be employed to address SSOs, it is recognized that best professional judgment always needs to be used in the field to address unique issues that arise with every spill. For SSOs, MUD has primary responsibility for responding to, cleaning up, and reporting the spills. The SSOERP includes reporting information so that the responsible agencies are notified when these spills occur. In addition, the City's current program to limit infiltration of seepage from sanitary sewers uses a combination of inspecting sanitary systems to ensure proper construction, televising existing storm drain lines, and reporting by experienced maintenance personnel. During the construction phase, regular inspections ensures the verification of leak testing, no cross connections, and televised final checks of construction quality when necessary.

In addition, in 2010-2011, the City finalized the *Sanitary Sewer Overflow and Backup Field Procedures Manual* (December 2010) (see Appendix D-2 of the City's 2010-2011 Annual Report).

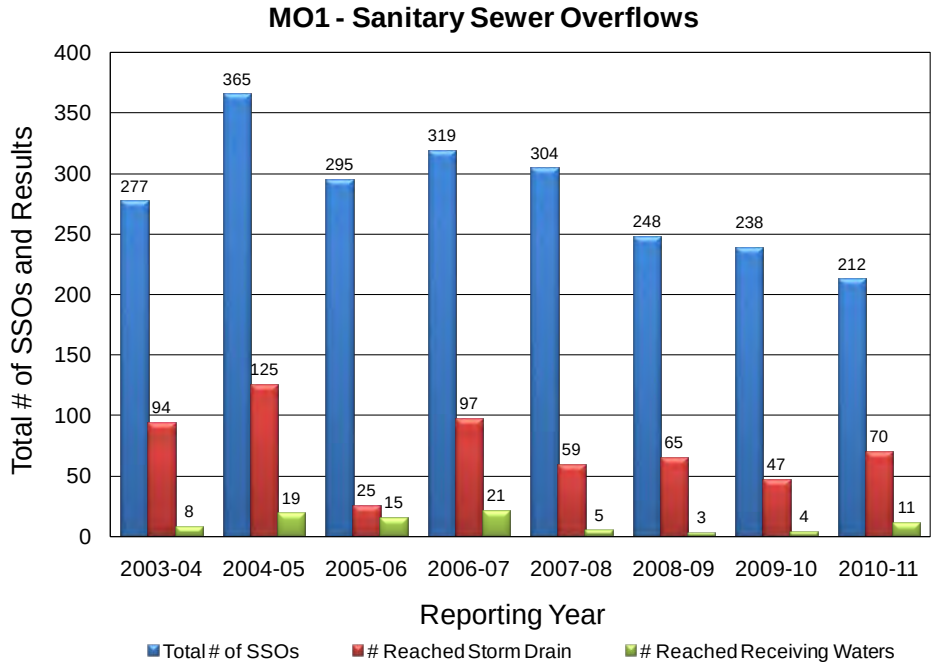
ASSESSMENT

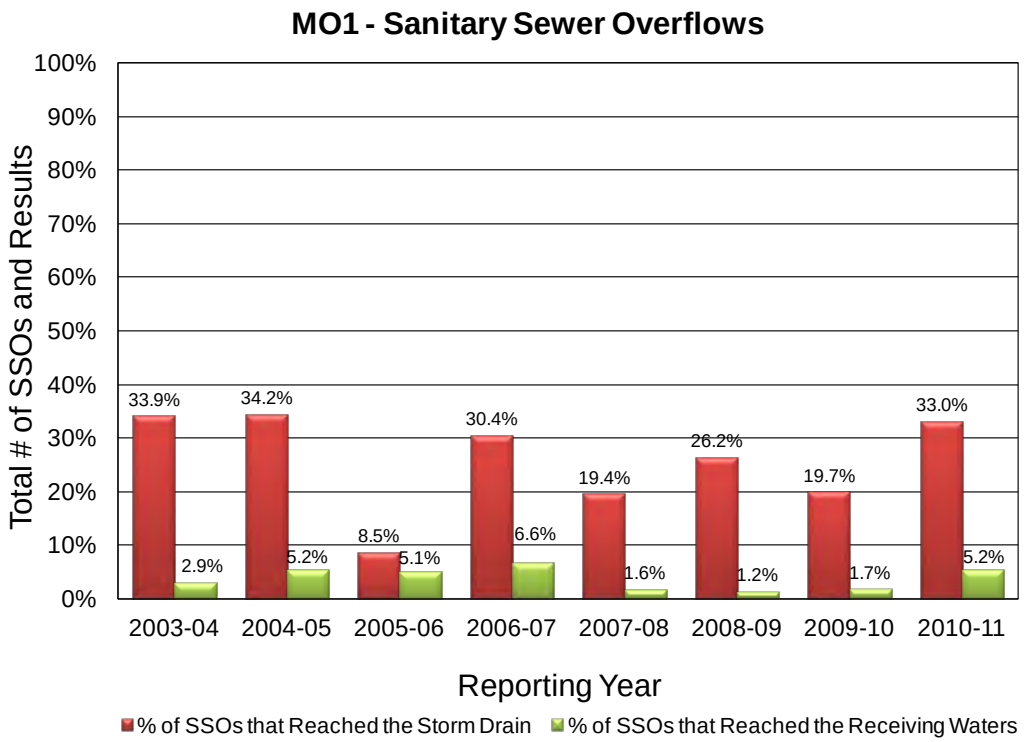
In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City developed and continues to implement the SSORP, respond to SSOs and, when possible, prevent the SSOs from entering the storm drain system and/or the receiving waters. The City also reviews and revises the SSOERP as needed. **(L1)**

- Since 2003, 2,258 SSOs have occurred and were responded to by the City. Of the 2,258 spills, 582 reached the storm drain system and 86 of them reached a receiving water. In general, a downward trend has been observed in the total annual number of SSOs.

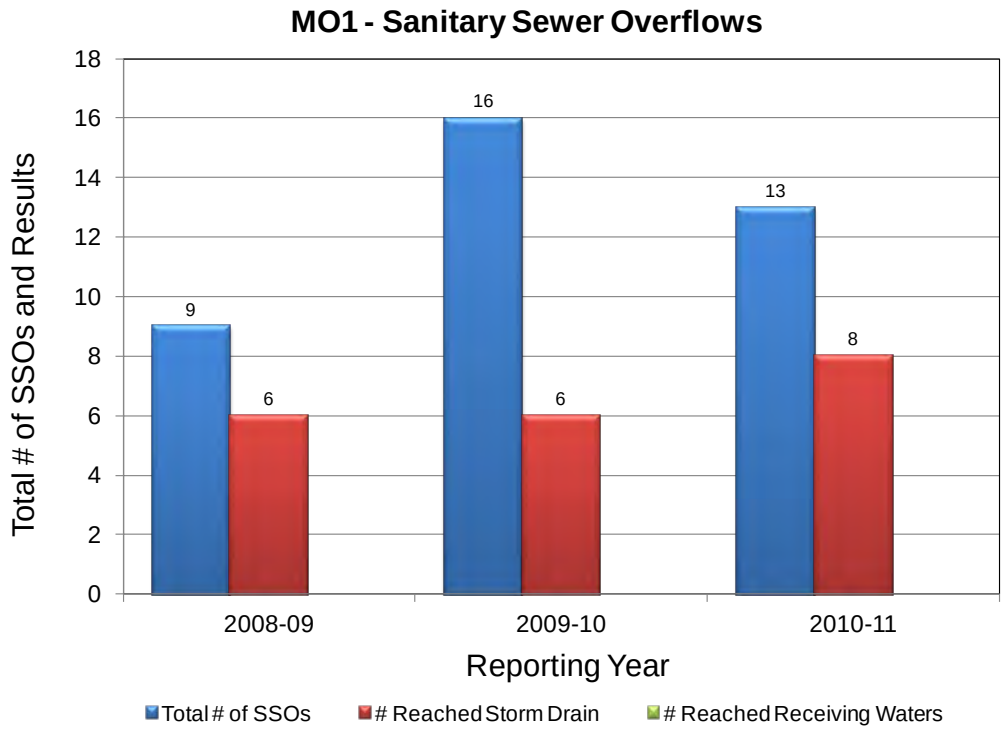




County of San Joaquin

The County developed and continues to implement the SSORP, responding to SSOs and, when possible, preventing the spills from entering the storm drain system and/or the receiving waters. The plan will continue to be reviewed and revised as necessary. **(L1)**

- Since 2008-2009, 38 SSOs have occurred and were responded to by the County. Of the spills, 20 reached the storm drain system, and none of these reached the receiving water.



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Prevent SSOs or spills from entering the storm drain system and respond quickly and appropriately if an SSO or spill does enter the storm drain system.

This objective will be met through implementation of specific performance standards, as detailed below.

Implement the SSOERP

The Permittees will continue to implement their respective SSOERPs, which identify procedures for the Permittees to take to minimize potential impacts to the receiving water from SSOs and spills.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement the SSOERP

MO2 – New Development and Construction Requirements for Municipal Capital Improvement Projects

2007-2012 IMPLEMENTATION

The New Development and Construction Requirements for Municipal Capital Improvement Projects Control Measure incorporates protocols that are to be followed during the design and construction phases of the capital projects undertaken by the Permittees. In essence, the Permittees will follow the Development Standards and Construction Program Element requirements for all capital improvement projects (CIPs), and obtain coverage under the General Construction Permit for projects greater than or equal to one acre in size.

The Permittees conduct a number of activities that ensure CIPs meet these requirements, as outlined below.

- **Review CIP Designs to Ensure Specifications and Notes are Included:** The Permittees require that all CIPs be reviewed by stormwater staff to ensure that the Construction BMPs and Stormwater Quality Control and Criteria Plan (SWQCCP) standards are incorporated during the pre-design stage, including environmental reviews.
- **Require Submission of NOI for CIP Projects Greater than or Equal to One Acre:** The Permittees require that CIP projects 1 acre or greater obtain coverage under the Construction General Permit.

  Ensure CIP Priority Projects are Developed in Conformance with the SWQCCP: If a CIP meets the criteria as a priority project as defined within the SWQCCP, the CIP is developed so that it conforms to the new development standards.
- **Improve Interdepartmental Communication to Facilitate Accurate Recordkeeping and Reporting:** The City improved interdepartmental communication to facilitate accurate recordkeeping and reporting of data. During the reporting period, the Stormwater Program Manager held routine meetings with City staff responsible for management of CIPs.

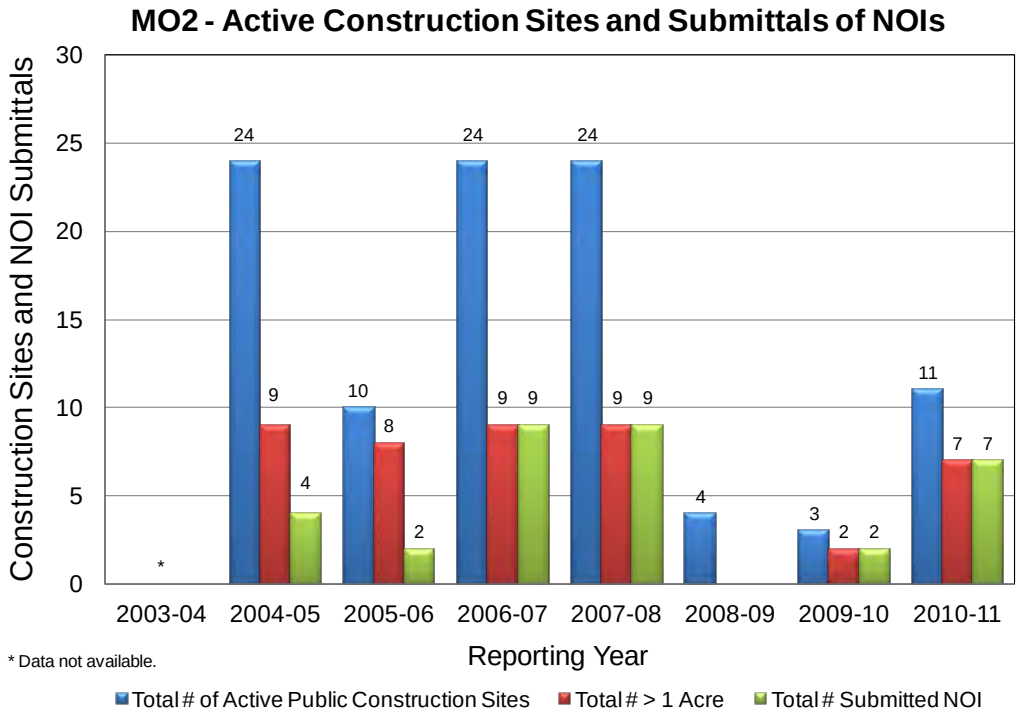
ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

City staff has reviewed the CIPs to ensure that the construction BMPs and new development standards have been incorporated during the design stage. The City has also improved interdepartmental communication to facilitate the reporting process for municipal operations. **(L1)**

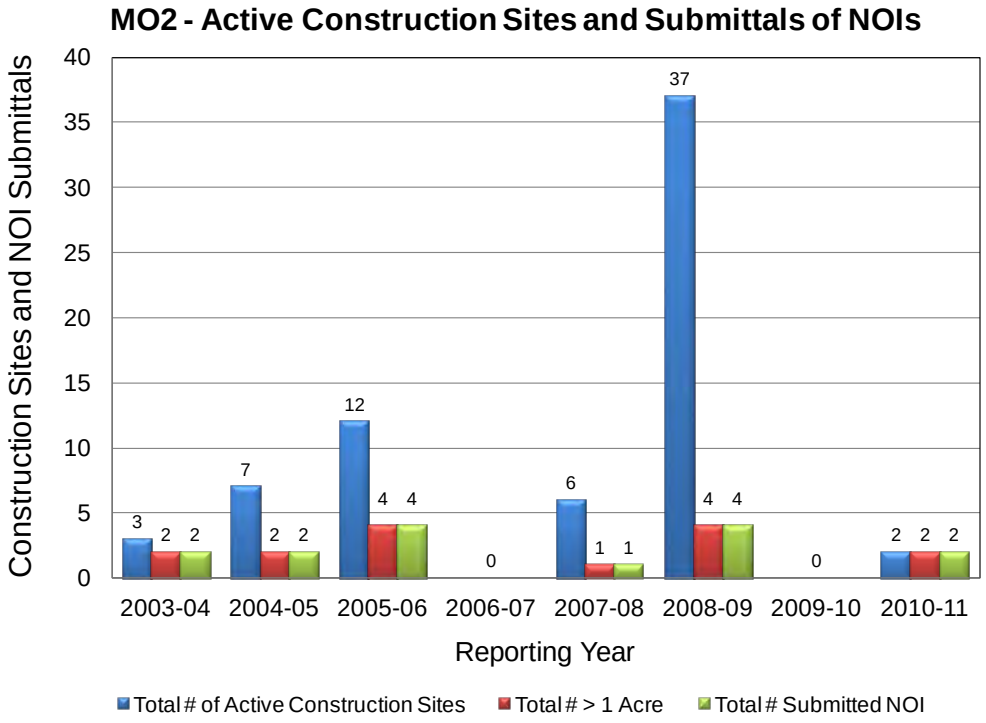
The City also requires that CIP projects greater than or equal to one acre obtain coverage under the General Construction Permit. Staff are aware of this requirement and have, over time, obtained coverage for the projects as needed. Since 2006-2007, 100% of CIP projects have submitted the required NOIs, an increase from 2004-2005 (44%) and 2005-2006 (25%). **(L3)**



County of San Joaquin

The County reviewed CIP designs to ensure that the specifications and notes were included and developed protocols to streamline the review of CIPs between the Facilities Management and Stormwater Management Departments. The CIPs include specifications so that they are in conformance with the new development and construction requirements. **(L1)**

- County staff is aware of the construction related requirements for CIPs. Since 2003, the staff identified 100% of the CIPs that required NOIs. **(L3)**



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Implement Development Standards that require source and treatment control BMPs to reduce pollutants from City- and County-owned construction projects.

This objective will be met through implementation of specific performance standards, as detailed below.

Review CIP designs

The Permittees will continue to review CIP designs to ensure specifications and notes are included.

Require submission of NOI for CIP ≥ One Acre

The Permittees will continue to require submission of NOI for CIP greater than or equal to one acre.

Develop Priority Projects in Conformance with the SWQCCP

The Permittees will continue to develop priority projects in conformance with the SWQCCP.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review CIP designs to ensure specifications and notes are included
- Require submission of Notice of Intent (NOI) for CIP greater than or equal to one acre
- Develop priority projects in conformance with the SWQCCP

MO3 – Pollution Prevention at Permittee Facilities

2007-2012 IMPLEMENTATION

The Pollution Prevention at Permittee Facilities Control Measure addresses the potential for pollutants to enter the storm drain system from municipally owned facilities (e.g., corporation yard). To further the framework provided by this Control Measure, Stormwater Pollution Prevention Plans (SWPPPs) and/or Facility Pollution Prevention Plans (FPPPs) have been developed and implemented for the Permittees' facilities. The SWPPPs/FPPPs include a site description and identify BMPs that address potential sources of pollutants to the storm drain system, as well as procedures for addressing spills that may occur onsite.

The Permittees conduct a number of activities that facilitate pollution prevention at their facilities, as outlined below.

- **Assess Facilities to Determine if They Require Coverage under the General Industrial Permit:** The Permittees evaluated their facilities to determine if they required coverage under the General Industrial Permit.
    - The City's Corporation Yard and the County's Maintenance Yard were previously covered under the General Industrial Permit.
    - In June 2007, the City's Corporation Yard submitted a Notice of Termination (NOT) to the Regional Board. The Corporation Yard was released from this requirement by the RWQCB at the end of 2006-2007. As stated in the NOT, the Corporation Yard is already covered by the MS4 Permit requirements.
    - The County continues to operate six sites (two within the Phase I permit area and four outside of the Phase I permit area) that have coverage under the Industrial General Permit (IGP) based on the nature of their operations and exposure risk they represent. Two additional sites are pending coverage.
- **Implement SWPPP/FPPP for Corporation/Maintenance Yard and other Facilities:**
    - The City developed and has been implementing BMPs to address spill control and IDs for a wide variety of activities at the Corporation Yard, including materials storage, equipment washing, and vehicle maintenance. The BMPs. Corporation Yard staff continues to monitor storm events and implement BMPs onsite. No formal submittal of monitoring data is required for the facility; however, this information is kept onsite and is used to verify effectiveness of the BMPs implemented. The City's Corporation Yard follows written storm drain maintenance procedures (Storm Drain, Catch Basin, and Filter Insert Maintenance Procedures, included as Appendix D-2 of the 2008-2009 Annual Report).
    - Based on an evaluation of the County owned/operated facilities, the County has determined that it is unnecessary to develop an FPPP since the facilities in question are either covered by the IGP or are implementing site-specific SWPPPs and appropriate stormwater BMPs. The County's Solid Waste and Fleet Services Divisions are currently operating under the State IGP, and have in place site-specific SWPPPs. The Maintenance Yard, although no longer requiring coverage under the IGP, is still operating under its most recent SWPPP. The County determined that the remaining facilities not covered under a SWPPP in the Phase I area do not conduct activities that have the potential to discharge pollutants to the storm sewer system, and thus would not require an FPPP.

- **Review CIP Projects for Compliance with General Stormwater Requirements:** The Permittees review CIP project lists to identify those projects for new or existing municipal facilities that have vehicle or equipment wash areas. The wash areas are required to be either self-contained (through the implementation of BMPs) or connected to a clarifier or alternative pre-treatment device and plumbed to the sanitary sewer.
- **Develop and Distribute BMP Fact Sheets for Non-Emergency Firefighting Flows:**
    - During the 2008-2009 reporting period, the City developed procedures and BMPs addressing emergency and non-emergency firefighting flows that were encapsulated in a BMP Fact Sheet entitled, "Emergency and Non-Emergency Fire Department Procedures" (see Appendix D-4 of the 2009 SWMP). The City's Fire Department routinely updates Standard Operating Procedures (SOPs) for training and proper handling of non-emergency firefighting flows. In 2009-2010, the Stormwater Program worked collaboratively with training staff from the Fire Department as part of a work group to update the SOPs, and the updated SOPs are included as part of the Fire Department's routine training program.
    - During 2010-2011, the County created and distributed a handout regarding Non-Emergency Firefighting Flows in the San Joaquin County jurisdiction. The handout provided was titled "Non-Emergency Firefighting Flows, San Joaquin County Stormwater Program (March 2011)" (see Appendix D-2 of the 2010-2011 Annual Report).
- **Develop Procedures to Address Emergency Events**
    - During 2009-2010, the City developed procedures to address emergency events and included them within the *City of Stockton Spill Response Procedures* (see Appendix B-1 of the 2009-2010 Annual Report). In the case of an emergency event, issues related to human health and safety will be prioritized. Once these issues have been addressed, the Stockton Fire Department will notify and coordinate with MUD to address any spills or runoff that are related to the emergency event and ensure the protection of water quality.
    - During a Toxic Task Force meeting, the County's Water Resource Division and OES discussed emergency events and agreed that OES had the expertise and responsibility to carry out emergency responses. In the case of an emergency event that threatens to pollute the waterways, OES will immediately respond and consult with the Water Resource Division as a resource. In addition, the *Investigative Guidance Manual* (see Appendix B-1 of the 2009-2010 Annual Report) includes language to address emergency events.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City routinely assesses their facilities to determine if they require coverage under the state General Industrial Permit. For the City owned and operated facilities that do not require coverage under a State General Permit, but have potential stormwater-related issues, the City implements a SWPPP. Currently, the only facility required to implement stormwater BMPs is the Corporation Yard. **(L1)**

The City developed and distributed procedures and BMPs addressing emergency and non-emergency firefighting flows**.** The City also developed and distributed procedures to address emergency events. **(L1)**

County of San Joaquin

The County-owned and operated facilities were evaluated during the 2008-2009 reporting period. It was determined that two additional facilities required coverage under the General Industrial Permit (San Joaquin County's Household Hazardous Waste Facility and the Lovelace Transfer Facility) **(L1)**

County staff reviewed CIPs for vehicle or equipment wash areas. **(L1)**

County staff has continued to raise awareness among other departments and coordinate with the fire captains to discuss how the Department should manage the emergency and non-emergency flows. The County developed a "Non-Emergency Firefighting Flow" procedure and presented it during a Fire Captain's Meeting. The County will participate in the meeting annually to ensure that pollutants generated by non-emergency firefighting activities are reduced or eliminated. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Implement pollution prevention BMPs for public facilities (e.g., corporation yards) and FPPPs for public facilities to minimize or eliminate flows to the storm drain system.

This objective will be met through implementation of specific performance standards, as detailed below.

Implement SWPPP/FPPP and Review Annually for Corporation/Maintenance Yards

The Permittees will continue to implement a SWPPP/FPPP for their Corporation/Maintenance Yards and other facilities, as needed, and will review them on an annual basis.

Review CIP Projects for Compliance with General Stormwater Requirements

The Permittees will continue to review CIP project lists to identify those projects for new or existing municipal facilities that have vehicle or equipment wash areas. The wash areas are required to be either self-contained (through the implementation of BMPs) or connected to a clarifier or alternative pre-treatment device and plumbed to the sanitary sewer.

Distribute BMP Fact Sheets for Non-Emergency Firefighting Flows

The Permittees will continue to distribute BMP Fact Sheets for Non-Emergency Firefighting Flows that identify the BMPs that must be implemented.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement a SWPPP/FPPP for Corporation/Maintenance Yards and other facilities, as needed, and review on an annual basis
- Review CIP projects for compliance with general stormwater requirements, including review for vehicle or equipment wash areas
- Distribute BMP Fact Sheet for Non-Emergency Firefighting Flows identifying the BMPs that must be implemented

MO4 – Landscape and Pest Management

2007-2012 IMPLEMENTATION

The Landscape and Pest Management Control Measure ensures that the discharge of pollutants from the Permittees' use and storage of fertilizers and pesticides is reduced to the MEP. Among other things, the BMPs promote the use of IPM and retention and planting of native plant species requiring less water and chemical augmentation to remain healthy. By choosing less toxic and non-chemical landscaping methods, the Permittees will serve as positive examples to citizens and prevent adverse impacts on the local water bodies.

The Permittees conduct a number of activities that minimize the discharge of pollutants associated with fertilizers and pesticides, as outlined below.

- **Implement Pesticide and Fertilizer Application Protocol:** The Permittees developed and implemented pesticide and fertilizer application protocols for routine and non-routine use of pesticides and fertilizers.[1]
- **Implement IPM Program:** The Permittees have developed and implemented an IPM program that requires the use of less toxic or non-toxic approaches to pest management. These efforts support the Pesticide Plan, which focuses on public outreach and IPM to protect water quality and promote safe, and minimal, pesticide use.
- **Develop Formal Document Describing IPM-Related Policies and Procedures**
    - The *City Manager Administrative Directive P&R-03, Pesticides, Herbicides and Fertilizers* (P&R-03) establishes standard procedures for the administration and use of pesticides, herbicides and fertilizers on City rights-of-way and at City-owned facilities. During 2009-2010, a draft update to *P&R-03* was prepared to specify that each department using regulated pesticides, herbicides and/or fertilizers will ensure that employees and/or contractors utilize IPM and alternatives to pesticides whenever applicable. A supplementary IPM Guide refers to IPM policies in greater detail. Contract language was developed to specify that contracted pesticide applicators will utilize IPM. The draft administrative directive and IPM Guide was included as Appendix I-2 of the 2009-2010 Annual Report. At this time, the draft administrative directive has not been formally adopted. Maintenance contracts that started on January 1, 2010, and all future contracts/contract specifications require that the contractor use IPM techniques and practices and least toxic methods of pest control to achieve the expected/specified results. Contractors are encouraged to consult the University of California Agricultural and Natural Resources State Wide Integrated Pest Management Program[2] to determine the most effective and least toxic methods of pest control. As of October 2010, the following language is included in all contracts:

> INTEGRATED PEST MANAGEMENT. To the greatest extent practicable, the City expects the Contractor to use Integrated Pest Management practices, principles, and concepts and least toxic methods of pest control to achieve the expected/specified results. Contractor is

[1] **City:** Parks and Recreation Department Landscape Management Procedures, Landscape Maintenance BMP MO-1; **County:** *IPM Policies and Practices Guide* (Appendix I-3 of the 2009-2010 Annual Report)

[2] www.ipm.ucdavis.edu

encouraged to consult the University of California Agriculture and Natural Resources State Wide Integrated Pest Management Program at www.ipm.ucdavis.edu to determine the most effective and least toxic methods of pest control. By July 15 of each year, Contractor shall provide a written report of Integrated Pest Management practices, principles, and concepts and least toxic methods of pest control used during the previous year.

  - The County developed an *IPM Policies and Practices Guide* (Appendix I-3 of the 2009-2010 Annual Report) describing IPM-related policies and procedures carried out by the Channel Maintenance Division. Specific components of IPM practices included in the document are IPM protocols, which include the proper handling, application, and disposal of pesticides and training requirements for municipal staff and pest control operators (PCOs).

- **Maintain and Expand Internal Inventory on Pesticide Use:** To evaluate its municipal pesticide use over time, the Permittees each maintain an internal inventory on pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land.
- **Implement Landscaping Standards:** In 2003-2004, the City reviewed and modified the landscaping standards to promote planting and retention of native species and minimization of water use, pesticides, fertilizers, and herbicides. The City continues to implement the Landscaping Standards (Stockton Municipal Code Sections 16.56.040 and 16.72.240). The Landscaping Standards contain language that addresses water conservation and reduction of herbicide and pesticide use by means of appropriate plant selection and usage.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

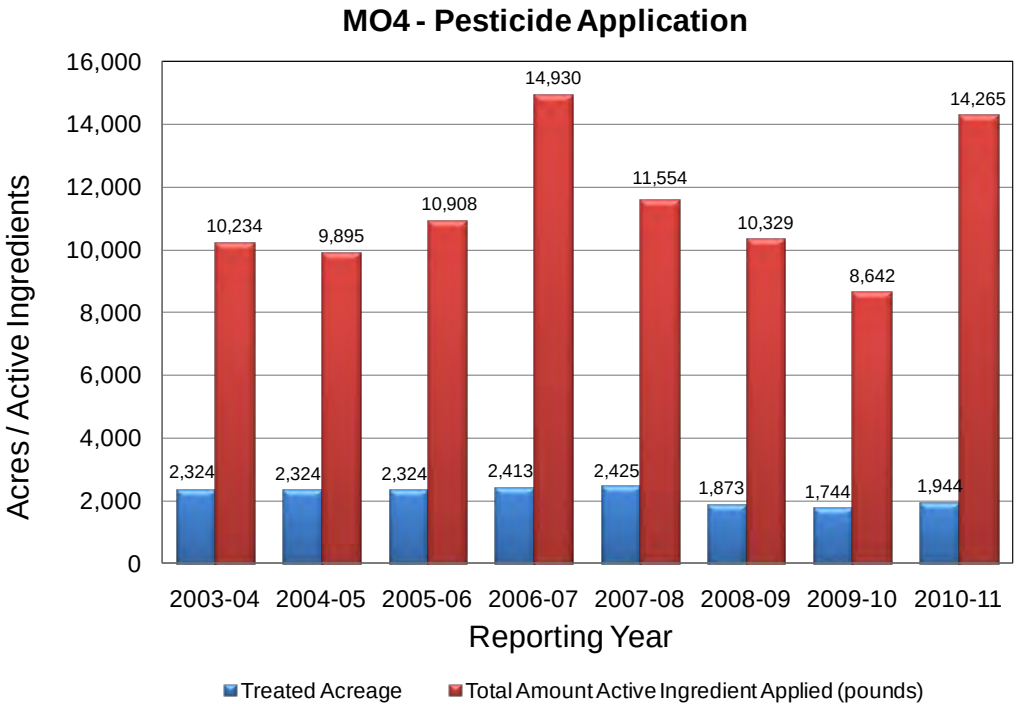
The City staff involved in landscape and pest management are responsive to the stormwater program requirements and have developed and are implementing standard protocols for the application of fertilizers and pesticides. **(L1)**

- The City continues to require that contractors abide by standardized fertilizer and pesticide applicator protocols and IPM practices.
- In 2003-2004, the City reviewed and revised the landscape standards to promote the planting and retention of drought-tolerant and native species and to minimize the use of water, fertilizers, pesticides, and herbicides. The City continues to implement the landscape standards.

County of San Joaquin

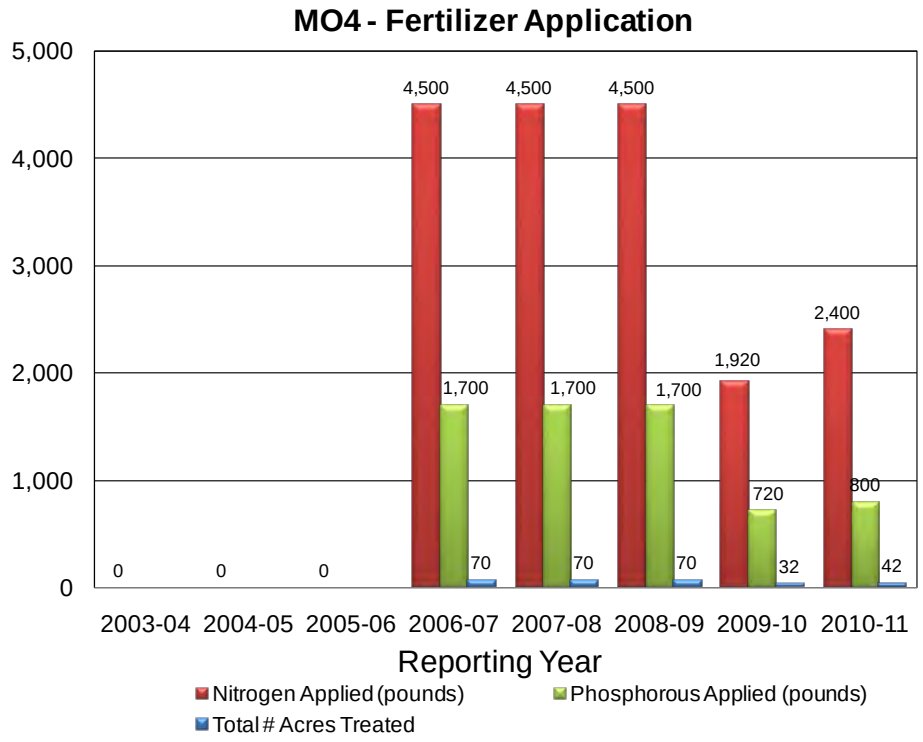
The County staff involved in landscape and pest management is responsive to the stormwater program requirements and has developed and is implementing standard protocols for the application of fertilizers and pesticides. **(L1)**

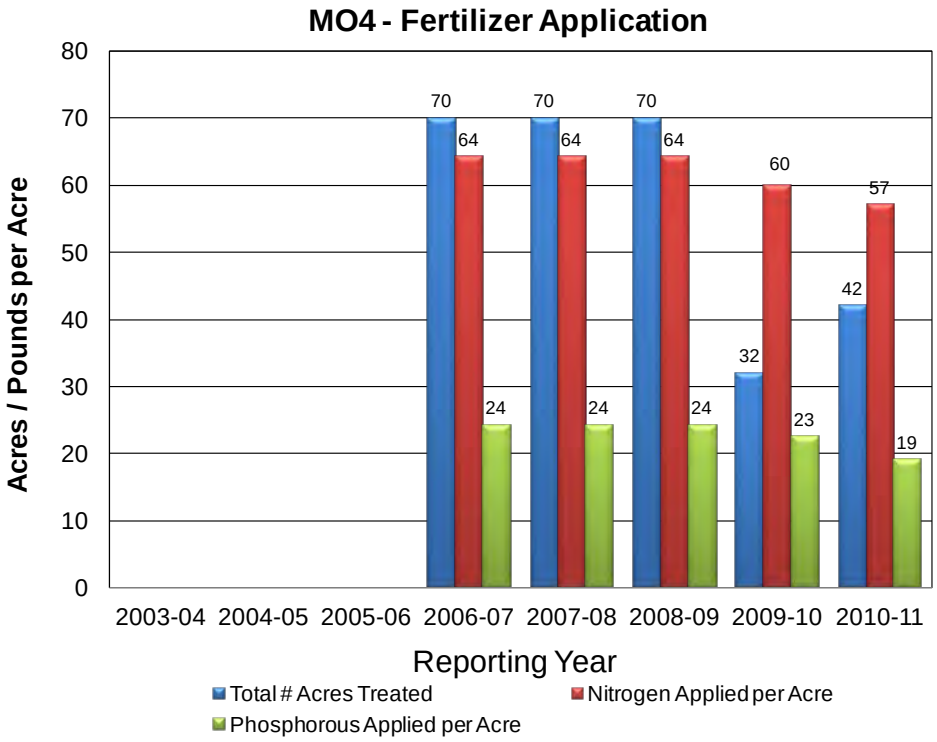
To better account for the volume and type of pesticide used, the County staff maintained an internal inventory on pesticide use and tracked Department of Parks and Recreation reported pesticide use. After the 2006-2007 fiscal year, the County began to significantly reduce its application of pesticides, with the exception of 2010-2011. In 2010-2011, there was an increase in pesticide use due to one-time levee maintenance activities that required immediate attention to correct findings by state and federal levee inspectors. During the Permit term, the County reduced its pesticide use by 42%, from a high of 14,930 pounds in 2006-2007 to a low of 8,642 pounds in 2009-2010. **(L1)**



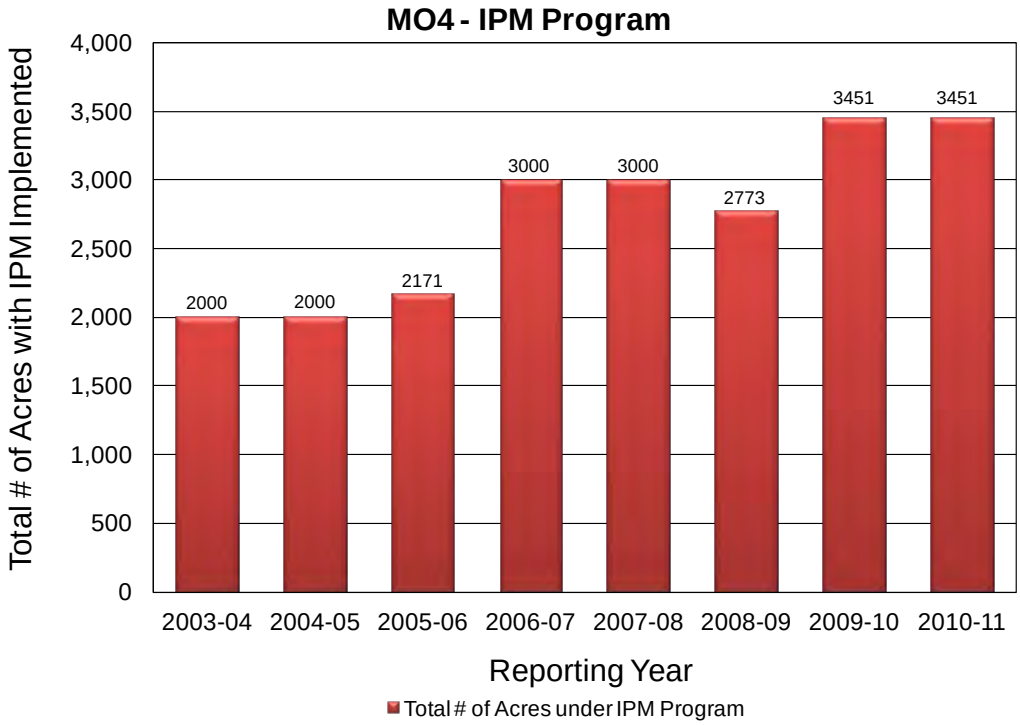
The County's Parks and Recreation Department has been generally reducing the amount of fertilizers used within its SUA. **(L1)**

- The County has reduced the total amount of nitrogen and phosphorous applied per acre by approximately 11% and 21%, respectively.




MO4 - Fertilizer Application
Acres / Pounds per Acre
80
70
60
50
40
30
20
10
0
70
64
24
70
64
24
70
64
24
32
60
23
42
57
19
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Total # Acres Treated
Nitrogen Applied per Acre
Phosphorous Applied per Acre

The County continues to implement an IPM program that requires the use of less toxic or non-toxic approaches to pest management. Some of the IPM alternatives that are being employed include hand weeding, mulching, pruning, plant selection, and landscape design. Since 2003, there has been a 72.5% increase in the acreage covered by the IPM program. (**L1**)



2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objectives of this Control Measure are to:

- Implement a standard protocol for storage, usage, and disposal of pesticides, herbicides, and fertilizers on City- and County-owned property.
- Promote the use of IPM methods and less toxic alternatives.

These objectives will be met through implementation of specific performance standards, as detailed below.

Implement Pesticide and Fertilizer Application Protocol

The Permittees will continue to implement their pesticide and fertilizer application protocols.

Implement IPM Program

The Permittees will implement the IPM Program, including the IPM-related policies and procedures.

Include Language in All New Contracts Requiring IPM Implementation

The Permittees will include language requiring implementation of IPM in all new contracts with contracted pest control applicators.

Maintain Internal Inventory on Reported Pesticide Use

The Permittees will maintain an internal inventory on reported pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement pesticide and fertilizer application protocol
- Implement IPM program
- Include language requiring IPM implementation in all new contracts
- Maintain internal inventory on reported pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land

MO5 – Storm Drain System Maintenance

2007-2012 IMPLEMENTATION

The Storm Drainage System Maintenance Control Measure provides for the long-term performance and integrity of the City's storm drain system. The City prioritizes catch basins for cleaning based on the required level of maintenance, and all catch basins are marked with a storm drain message, whether stenciled or permanently imprinted. This Control Measure includes special event requirements to prevent debris accumulation in catch basins and storm drains.

The Permittees conduct a number of related to storm drain system maintenance, as outlined below.

- **Implement Storm Drain System Mapping:**
  - The City began a storm drain mapping project using GIS during fiscal year 2007-2008. As of 2009-2010, all storm drain lines are indicated on the GIS mapping software (ArcMap by ESRI). The City has continued to map and document all storm facilities using this mapping software.
  - The County is continuing to implement its Capital Asset Management Program for the County's water, sewer, stormwater, and lighting infrastructure. Mapping of the stormwater system using GIS will be incorporated as a part of this process. The incorporation of the storm drain system to the Capital Asset Management Program is approximately 50% complete and is anticipated to be completed by the end of the 2012-2013 reporting period**.** The Stormwater Program continues to utilize the Public Works GIS Database and internal mapping methods as a primary data source.
- **Review/Revise Prioritization for Catch Basin Cleaning:**
  - The City maintains the storm drain system, including all catch basins, and has established maintenance procedures for catch basins and pumps. The maintenance procedures include protocols for the prioritization of catch basins, inspection and cleaning protocols, and general information on recordkeeping of the waste that is removed. The following table contains a summary of the City's prioritization, as implemented during the Permit term:

Priority	Relevant Conditions	Inspection & Cleaning Frequency	Number of Catch Basins/Pump Stations
A (High)	Catch basins that discharges directly to waters of the state (direct outfalls)	Inspect annually prior to rainy season and clean if >40% debris accumulation	3,193
B (Medium)	Pump stations	Inspect annually, clean every other year	77
C (Low)	Catch basins that discharge to a pump station	Inspect every five years; more routine inspection if incident, complaint, or local flooding occurs. Clean if >40% debris accumulation	13,024
		Total Number of Catch Basins	16,217

- The County has established prioritization criteria for cleaning catch basins and sumps and continued to review prioritization for cleaning as needed. Maintenance staff inspects all catch basins at least quarterly during the wet season and once during the dry-season and cleans them as needed. Maintenance staff also uses internal knowledge of problematic areas to prioritize cleaning of certain catch basins. Catch basins that are reported by constituents to be clogged or problematic are prioritized for inspection and cleaning. In addition, field staff is aware of which catch basins need to be cleaned on a regular basis.

- **Maintain and Annually Update Catch Basin Database:** The Permittees maintain and annually update their respective catch basin databases, which identifies catch basins and drainage areas.
- **Implement Catch Basin Maintenance Program:** The Permittees regularly clean a number of catch basins annually regardless of catch basin prioritization. All clogged and partially clogged catch basins are cleaned first and prior to the wet season.
- **Implement Pump Station Maintenance Program:** The Permittees developed maintenance procedures for pump stations. The procedures include protocols for pump station inspection and cleaning and general information on recordkeeping of the waste that is removed. The Permittees have implemented the pump station maintenance program. The Permittees inspect the pump stations annually and clean them as necessary or when a complaint has been filed (for the City, pump stations are cleaned a minimum of once every two years).
- **Develop Maintenance Procedures and Prioritization for Cleaning Detention Basins**
  - The City developed maintenance procedures and prioritization for cleaning detention basins as part of the Water Quality Based Plans. Odyssey Landscape Company, Incorporated, is contracted to carry out vector control, weed abatement, rodent control, slope dressing, erosion control, mowing, ripping, discing or grading basin bottom, trash and debris pick-up and removal, cleaning of basin structures, and sedimentation relocation. The contract specifies the use of less toxic pesticide alternatives in accordance with the IPM techniques and practices and requires advance notification and approval of the City prior to the application of any weed abatement and/or pest control substances.
  - The County's Channel Maintenance conducts two primary types of maintenance for the detention basins: (1) removing vegetation for inspection of levees; and (2) maintenance of mechanical pumps to ensure they are working properly. In order to address the removal of vegetation from the levees, the County developed an IPM Policies and Practices Guide (Appendix I-3 of the 2009-2010 Annual Report) describing the IPM-related policies and procedures carried out by the Channel Maintenance Division in relation to Detention Basin Maintenance.
- **Implement Detention Basin Maintenance Program**
  - The City maintains a total of five detention basins located in the industrial sectors of south Stockton. These basins were developed prior to the development and implementation of water quality control measures and are therefore designed for flood control. These basins are maintained by an outside contractor, Odyssey Landscape. The Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1 now maintains three additional basins that were developed to provide water quality control functions as well as flood control.
  - Maintenance of detention basins, including removal of vegetation and debris, is performed primarily in the summer and fall. Debris is removed and disposed of in accordance with regulatory requirements. The IPM Policies and Practices Guide

(Appendix I-3 of the 2009-2010 Annual Report) describes the County's IPM-related policies and procedures carried out by the Channel Maintenance Division. Chemical amounts applied for each detention basin are tracked by active ingredient. Chemicals are applied only to perimeter fencing, frontage roads, and around pump houses. Slopes and drainage areas are maintained using mechanical methods to promote vegetation growth, lessen erosion, and prevent discharge of chemicals into local waterways.

- **Implement Notification Procedures for ID/IC and Missing Catch Basin Markers or Illegible Stencils:** The Permittees have marked catch basins with a storm drain message that is either permanently imprinted or stenciled in the curb above the catch basin. Volunteers stencil catch basins through the Public Outreach Program Element (see PO1), and municipal staff are also responsible for stenciling and/or marking the catch basins with missing or faded stencils. Within 180 days, Permittee staff re-stencils illegible inlet stenciling or missing markers.
- **Include Special Event Use Provisions in Special Use Permits:** Periodically, special events occur at Permittee-owned and operated facilities (including parks).
    - The City requires large events (as well as large venues) to address trash and debris removal, including containerization and street sweeping as appropriate. This process occurs through the Public Works Solid Waste Department.
    - When the County issues Special Event Permits or Use Permits and related regulations for these events, it includes provisions for trash and debris removal including containerization and street sweeping as appropriate. In addition, the Environmental Health Department issues Temporary Event Permits to the entire San Joaquin County Area. All special events are required to apply for a Temporary Use Permit through the Environmental Health Department. When the application for the permit is submitted, the Environmental Health Department determines whether provisions for trash/debris will be required. The County has a program through the Environmental Health Department (EHD) that ensures that waste water is segregated from the storm drains during temporary events. Temporary event applicants are required to provide bathrooms and hand washing areas where the waste water is collected in a separate container.
- **Treatment Feasibility Study:** The Permittees evaluated the feasibility of diverting the dry weather discharges from the storm drain system to the City's Regional Wastewater Control Facility or to provide treatment of the dry weather flows using BMP treatment controls. The four preliminary outfalls that were identified to be feasible were thoroughly reviewed again by an outside consulting agency to determine if the project could move forward. It was determined that they would be cost-prohibitive, due to the length of the installed pipe.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

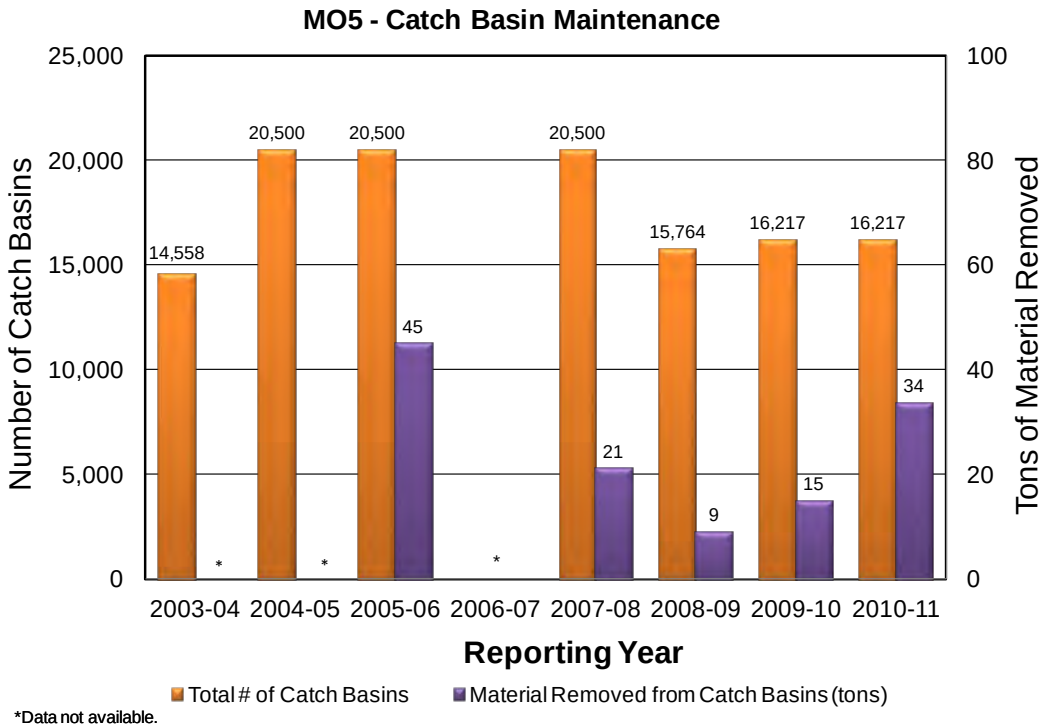
Treatment Feasibility Study: The Permittees evaluated the feasibility of diverting the dry weather discharges from the storm drain system to the City's Regional Wastewater Control Facility or to provide treatment of the dry weather flows using BMP treatment controls. The four preliminary outfalls that were identified to be feasible were thoroughly reviewed again by an outside consulting agency to determine if the project could move forward. It was determined that they would be cost-prohibitive, due to the length of the installed pipe. **(L1)**

City of Stockton

City staff remains responsive to the stormwater program and continues to implement the programs to maintain the storm drain system. **(L1)**

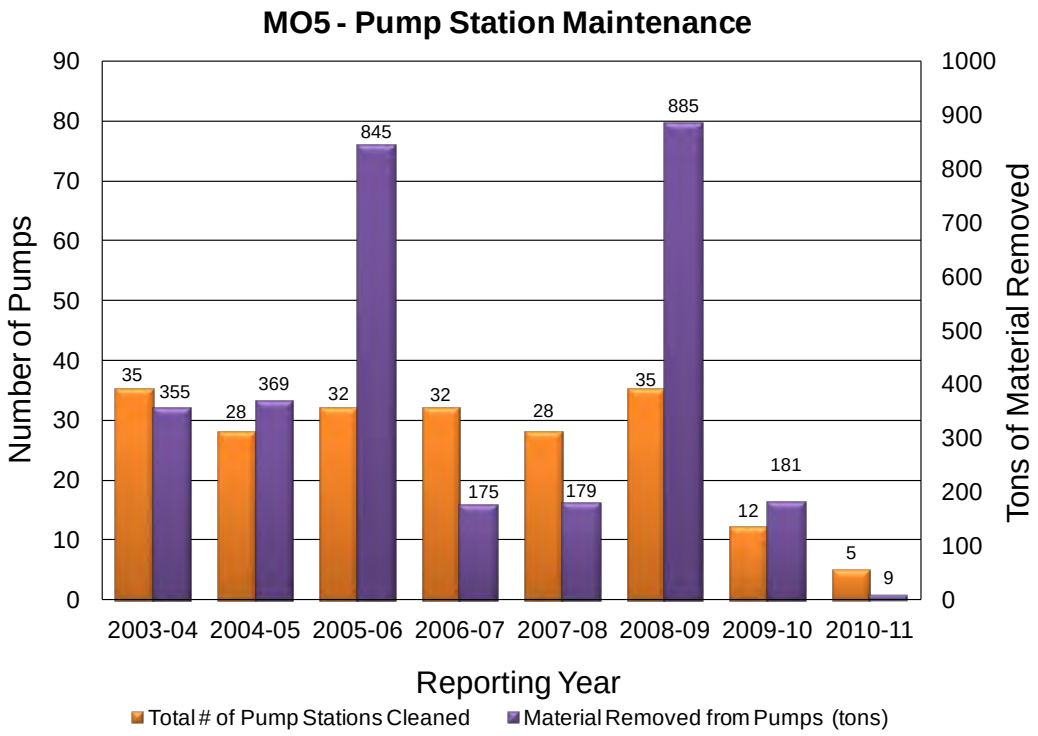
The City continues to utilize the catch basin database to assist in the maintenance of catch basins. **(L1)**

- Catch Basin Maintenance – The City prioritized catch basins during 2010-2011 and identified 3,193 high priority, 77 medium priority, and 13,024 low priority basins. The 77 medium priority basins consist of pump stations. The City regularly cleans a number of catch basins annually regardless of prioritization. Since 2003-2004, the City has inspected 8,894 high priority catch basins and cleaned a total of 2,657 high priority catch basins. Since 2005-2006, approximately 124 tons of materials have been removed from catch basins. Data are not available for 2006-2007. **(L4)**



*Data not available.

- Pump Station Maintenance – The City has inspected pump stations annually and removed approximately 2,997 tons of mud and debris since 2003-2004. **(L4)**



- Special Use Provisions: The City is requiring large events (as well as large venues) to address trash and debris removal, including containerization and street sweeping as appropriate. During 2010-2011, a total of five (5) large events were required to address trash and debris removal, resulting in collection and proper disposal of more than 35 tons of trash and debris. **(L1, L4)**

County of San Joaquin

County staff remains responsive to the stormwater program and continues to implement the programs started in 2004-2005 to maintain the storm drain system. The County continues to utilize the catch basin database developed in 2004-2005 to assist maintenance of catch basins. The program activities included the following: **(L1 & L4)**

- Notification procedures have been developed so that field staff understands who to contact internally to report illegible stenciling or missing markers and ICs or IDs.
- Pump Station Maintenance: Annual inspection of the 26 pump stations has resulted in removal of approximately 83 cubic yards of material since 2003.
- Storm Drain Maintenance: The County has prioritized catch basin cleaning, and proactively utilizes its resources in maintaining its storm drain system. Since 2003, the County has removed over 12,500 tons of debris from channels/pipes and over 188 tons of debris from catch basins.
- Dry Detention Basin Maintenance: Regular inspections and maintenance at the County's dry detention basins occurred through the 2010-2011 reporting period.
- Catch Basin Stenciling: Since 1998, approximately 38% of the 1,471 catch basins in the Phase I area of the County has been stenciled once and 22% have been re-stenciled. An additional 35

catch basins were re-stenciled during the reporting period for a grand total of 557 drains stenciled to date.

- Special Use Provisions: Since 2003, all special use permits issued have included provisions for the proper management of trash and litter.

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objectives of this Control Measure are to:

- Clean and maintain catch basin inlets to prevent debris accumulation and flooding.
- Ensure that catch basin inlets are properly stenciled, are permanently imprinted, or have legible curb markers to discourage IDs into the storm drain
- Maintain and inspect detention basins and pump stations.

These objectives will be met through implementation of specific performance standards, as detailed below.

Complete Storm Drain System Mapping (County)

The County will complete its storm drain system mapping effort.

Maintain Storm Drain System Mapping and Database

The Permittees will continue to maintain their storm drain system mapping efforts and databases.

Implement Catch Basin Maintenance Program

The Permittees will continue to implement the catch basin maintenance program at the frequencies specified in the tables below.

Frequencies for Catch Basin and Pump Station Cleaning (City)

Category	Inspection & Cleaning Frequency
Catch basins that discharges directly to waters of the state (direct outfalls)	Inspect annually prior to rainy season and clean if >40% debris accumulation
Catch basins that discharge to a pump station	Inspect every five years; more routine inspection if incident, complaint, or local flooding occurs. Clean if >40% debris accumulation
Pump stations	Inspect annually, clean every other year

Frequencies for Catch Basin and Pump Station Cleaning (County)

Category	Inspection & Cleaning Frequency
Catch basins	• Inspect annually prior to rainy season and clean if debris interferes with normal catch basin operations. • Catch basins that are reported by constituents to be clogged or problematic are prioritized for inspection and cleaning.
Pump stations	All pump stations are scheduled to be cleaned regularly.

Implement Pump Station Maintenance Program

The Permittees will continue to implement the pump station maintenance program at the frequencies specified in the tables above.

Implement Detention Basin Maintenance Program

The Permittees will continue to implement the detention basin maintenance program.

- City of Stockton: The City maintains a total of five detention basins located in the industrial sectors of south Stockton. These basins are maintained by an outside contractor, Odyssey Landscape. Detention Basins will be inspected quarterly and cleaned as needed. In addition, the Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1 now maintains three additional basins that were developed to provide water quality control functions as well as flood control.
- County of San Joaquin: Maintenance of detention basins, including removal of vegetation and debris, is performed primarily in the summer and fall in a manner consistent with the *IPM Policies and Practices Guide* (Appendix I-3 of the 2009-2010 Annual Report). Debris is removed and disposed of in accordance with regulatory requirements.

Continue to Evaluate Prioritized Outfalls, Prepare Preliminary Reports, and Implement Projects

Based on the results of the Treatment Feasibility Study and available CIP budget, the Permittees will continue to evaluate the prioritized outfalls, prepare preliminary reports, and implement projects.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Maintain storm drain system mapping and database
- Implement catch basin maintenance program
- Implement pump station maintenance program
- Implement detention basin maintenance program
- Based on the results of the Treatment Feasibility Study, continue to evaluate the prioritized outfalls, prepare preliminary reports, and implement projects

MO6 – Street Cleaning and Maintenance

2007-2012 IMPLEMENTATION

The Street Cleaning and Maintenance Control Measure ensures that Permittee streets are maintained and cleaned to reduce pollutants to the MEP. In conducting the Control Measure, the Permittee designates the streets or segments of streets based on the required level of maintenance. Street sweeping requirements and street maintenance materials control are also components of this Control Measure.

The Permittees conduct a number of activities that ensure that streets are cleaned and maintained, as outlined below.

- **Implement Street Sweeping Program:** The Permittees implement a street sweeping program.
    - City: Current and future streets and parking lots in the downtown area are swept three times each week. Residential, Industrial, Commercial and Open Space streets are swept every other week on the day after collection. Street sweeping is a component of the 15-year franchise agreements between the City, Republic (formerly Allied Waste) and Waste Management, Inc., and is sub-contracted out to Universal Sweeping.
    - County: The County currently performs street sweeping on curbed streets in residential, industrial, and commercial areas once monthly and in the open space areas as necessary.
- **Review/Revise Prioritization of Streets for Street Sweeping Program**
    - The City currently has 15-year franchise agreements with Allied Waste and Waste Management, Inc., who are responsible for street sweeping. The frequency was set as noted above in the franchise agreements in June 2004, and sweeping services are provided on a much more frequent basis than before the franchise agreements were implemented. Since then, prioritization has no longer been necessary.
    - The County reviewed the prioritization of the streets for the street sweeping program and determined that no changes were warranted at this time.
- **Implement Green Waste Collection Program:** As part of the Water Quality Based Plans, the Permittees maintain a program to collect leaves in certain problem areas twice each fall and implemented a revised solid waste and recycling program on June 1, 2004. Among other things, the program provides residents with several 90-gallon wheeled carts to use for green waste collection, rather than having them place loose green waste in the street for pickup.
- **Update and Implement Maintenance Staff Guide – Road Maintenance and Small Construction BMPs:** The Permittees have updated their respective *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs* to refer primarily to CASQA BMPs that are available online (see Appendix D-3 of the 2009-2010 Annual Report). This approach was used to ensure that BMPs remained up to date and in accordance with CASQA recommendations. The *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs* details BMPs for a wide variety of maintenance activities, including road maintenance and small construction. The Permittees continue to implement the BMPs.

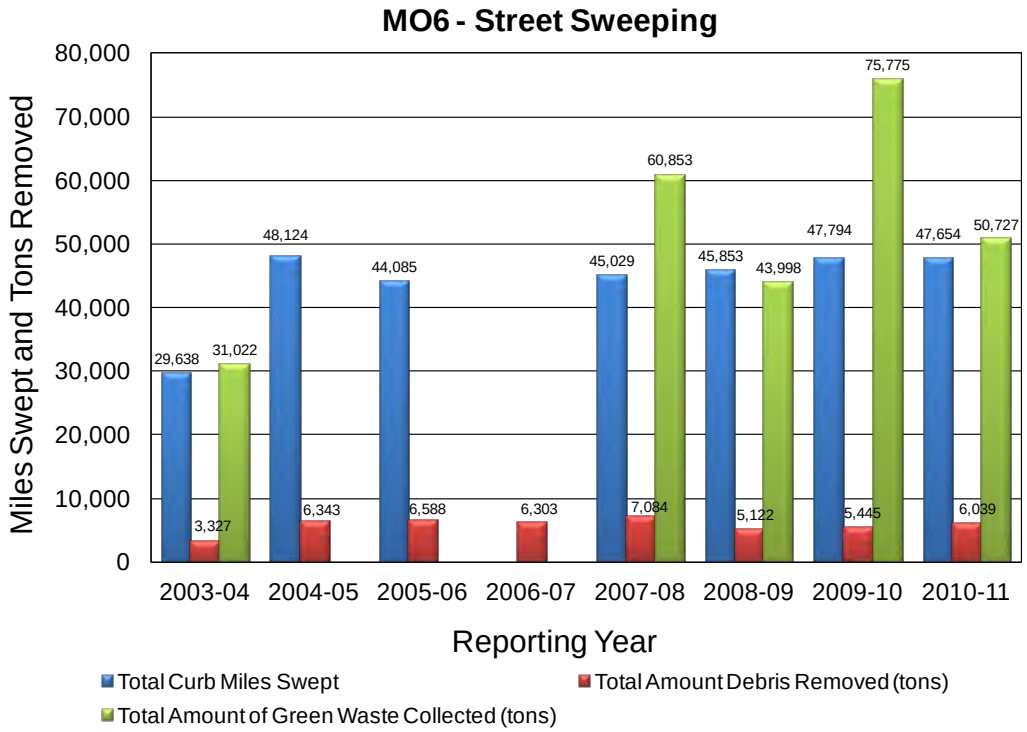
ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The street sweeping program is effectively removing material from the streets that may otherwise end up in the catch basins and/or storm drain system. **(L1)**

- Since 2003, approximately 46,251 tons of debris have been removed and properly disposed of through the street sweeping program. In addition, approximately 262,375 tons of green waste has been collected and disposed of as a part of the green waste program. Not all data are available for 2006-2007. **(L4)**

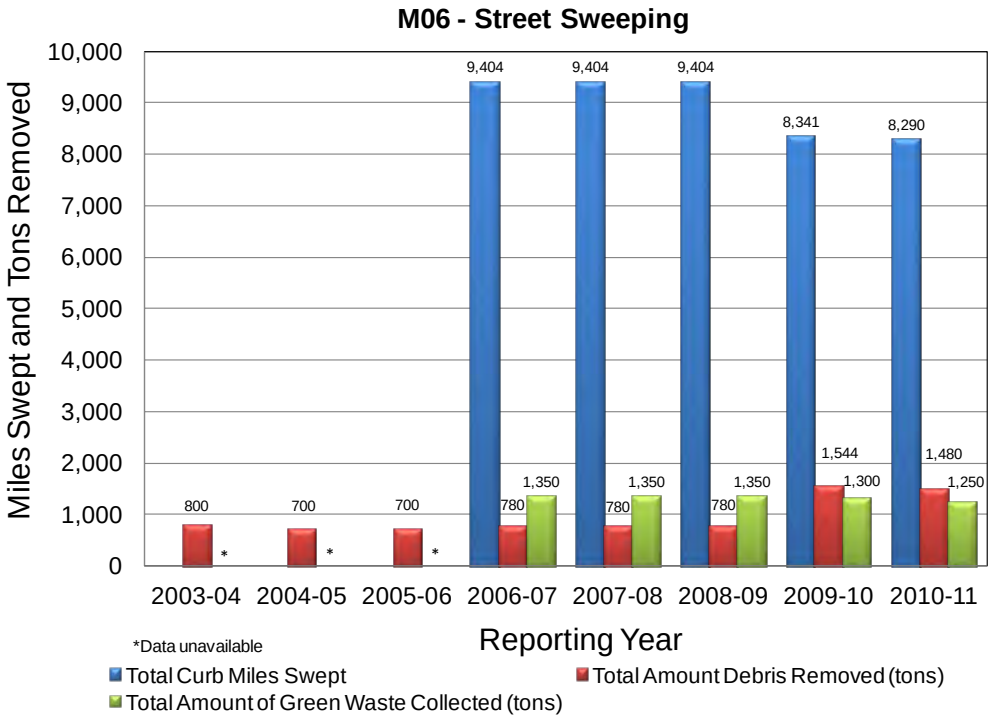


- During 2010-2011, the City updated and continued to implement the Maintenance Staff Guide – Road Maintenance and Small Construction BMPs.

County of San Joaquin

The street sweeping program is effectively removing material from the streets that may otherwise end up in the catch basins and/or storm drain system. (L1 and L4)

- Since 2003, approximately 7,564 tons of debris have been removed and disposed of properly (an average of 945 tons per year). In addition, approximately 6,600 tons of green waste have been collected since 2003 and disposed of as a part of the green waste program.



The County has established prioritization criteria for street sweeping to efficiently and effectively allocate resources. **(L1)**

The County currently implements the green waste collection program. During the reporting period, over 5,920 tons of green waste was processed by the North County Landfill. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Conduct street sweeping activities.

This objective will be met through implementation of specific performance standards, as detailed below.

Implement Street Sweeping Program

The Permittees will continue to implement the street sweeping program.

Implement Green Waste Collection Program

The Permittees will continue to implement the green waste collection program.

Implement Maintenance Staff Guide – Road Maintenance and Small Construction BMPs

The Permittees will continue to implement the *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs.*

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement the street sweeping program
- Implement the *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs*

MO7 – Parking Lots Maintenance

2007-2012 IMPLEMENTATION

The Parking Lots Maintenance Control Measure ensures that the Permittees' parking lots and structures are kept clear of debris and excessive oil buildup is prevented. This Control Measure consists of a schedule of inspections and cleaning of the parking lots and structures.

The Permittees conduct a number of activities that facilitate parking lots maintenance, as outlined below.

- **Implement BMPs for Parking Lot Cleaning:** A Parking Lot Cleaning BMPs Fact Sheet (included as Appendix D-7 to the 2009 SWMP) was developed and is currently implemented by the Permittees.
    - The City maintains 37 parking lots. All parking lots are monitored and cleaned to prevent excessive oil or debris build-up as needed. City-owned parking lots are swept bi-weekly by the sweepers contracted with the City's contracted waste haulers to control litter. MUD Stormwater has worked collaboratively with the City's Central Parking District to contract with Fleetwash to clean the parking structure surfaces and clean out sand filters that collect oily waste from these parking structures.
    - The County maintains 20 parking lots within the SUA. Parking lots are swept to control litter as part of the street sweeping effort. Each parking lot is monitored and cleaned to prevent excessive oil or debris build-up as needed. The County contracts with private contractors to clean parking lots.
- **Inspect Permittee-Owned Parking Lots Annually**
    - The City's Central Parking District is responsible for operations and maintenance of city-owned parking lots and parking structures.
    - The County inspected the County-owned and leased parking lots annually. Inspections of County-owned parking lots are conducted each August as part the County's Dry Weather Monitoring Program. To date, the County has not found any violations.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City has developed and is currently implementing BMPs for parking lot cleaning. All City-owned parking lots in the permit area have been identified (37 total in 2010-2011). **(L1)**

County of San Joaquin

The County has developed and is currently implementing BMPs for parking lot cleaning. All County owned parking lots in the permit area have been identified (20 total) and are inspected annually. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- This Control Measure will be discontinued. Permittee-owned parking lots are currently managed—and will continue to be managed—by the Permittees; however, since this effort is not associated with the POCs, it does not warrant a stand-alone Control Measure.

MO8 – Training

2007-2012 IMPLEMENTATION

Training is important to the successful implementation of the Municipal Operations Program Element. Effective training is one of the best pollution prevention BMPs that can be implemented because it prompts behavioral changes that are fundamentally necessary to protect water quality.

The objectives of the training are to:

- Increase the general awareness about the SWMP and Municipal Operations Program;
- Increase the awareness of the Municipal Operations Control Measures and procedures; and
- Prompt the behavioral changes needed to protect and improve water quality.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

During the Permit term, key staff involved with the Municipal Operations Program (219 total) participated in internal and external trainings to enhance their understanding of appropriate BMPs and stormwater-related issues. **(L1)**

County of San Joaquin

The County held several training courses for key stormwater staff (Module 2). During the Permit term, a total of 319 staff attended the Module 2 training. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Train employees who are responsible for conducting municipal operations about general stormwater issues and BMPs.

This objective will be met through implementation of specific performance standards, as detailed below.

Review and Update Training Strategies

The Permittees will review and update their respective Training Strategies, as needed.

Conduct/Participate in Municipal Operations Program Training

The Permittees will conduct/participate in Municipal Operations Program training. Both internal and external training opportunities may be utilized to meet the intent of this performance standard.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review and update Training Strategies
- Conduct/participate in Municipal Operations Program training

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Municipal Operations Program are provided below.

OBJECTIVES

The objectives address key components of the Municipal Operations Program and identify that, in order to be effective, the program must:

- Prevent SSOs or spills from entering the storm drain system and respond quickly and appropriately if an SSO or spill does enter the storm drain system.
- Implement Development Standards that require source and treatment control BMPs to reduce pollutants from City- and County-owned construction projects.
- Implement pollution prevention BMPs for public facilities (e.g., corporation yards) and FPPPs for public facilities to minimize or eliminate flows to the storm drain system.
- Implement a standard protocol for storage, usage, and disposal of pesticides, herbicides, and fertilizers on City- and County-owned property.
- Promote the use of IPM methods and less toxic alternatives.
- Clean and maintain catch basin inlets to prevent debris accumulation and flooding.
- Ensure that catch basin inlets are properly stenciled, are permanently imprinted, or have legible curb markers to discourage IDs into the storm drain.
- Maintain and inspect detention basins and pump stations.
- Conduct street sweeping activities.
- Train employees who are responsible for conducting municipal operations about general stormwater issues and BMPs.

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
MO1 – Sanitary Sewer Overflow and Spill Response																			
Implement the SSOERP	C							X		X					X		X		
MO2 – New Development and Construction Requirements for Municipal Capital Improvement Projects																			
Review CIP designs to ensure specifications and notes are included	C															X			
Require submission of NOI for CIP greater than or equal to one acre	C															X			
Develop priority projects in conformance with the SWQCCP	C															X			
MO3 – Pollution Prevention at Permittee Facilities																			
Implement a SWPPP/FPPP for Corporation Yard and other facilities, as needed, and review on an annual basis	C													X					
Review CIP projects for compliance with general stormwater requirements, including review for vehicle or equipment wash areas	C															X			
Distribute BMP Fact Sheet for Non-Emergency Firefighting Flows identifying the BMPs that must be implemented *(Fire Dept. has primary responsibility)*	C																	X	
MO4 – Landscape and Pest Management																			
Implement pesticide and fertilizer application protocol	C						X							X					
Implement IPM program	C						X							X					

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
Include language requiring IPM implementation in all new contracts	C						X							X					
Maintain internal inventory on reported pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land	C						X							X					
MO5 – Storm Drain System Maintenance																			
Maintain storm drain system mapping and database	C															X			
Implement catch basin maintenance program	C														X				
Implement pump station maintenance program	C														X				
Implement detention basin maintenance program	C								X									X	
Based on the results of the Treatment Feasibility Study and available CIP budget, continue to evaluate the prioritized outfalls, prepare preliminary reports, and implement projects	C															X			
MO6 – Street Cleaning and Maintenance																			
Implement the street sweeping program	C								X	X				X					
Implement green waste collection program	C									X				X					
Implement the *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs*	C																	X	

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
MO8 – Training																			
Review and update Training Strategy	C		X										X	X					
Conduct/Participate in Municipal Operations Program training	C		X		X								X	X				H	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
MO1 – Sanitary Sewer Overflow and Spill Response																			
Implement the SSOERP	C							X		X								X	
MO2 – New Development and Construction Requirements for Municipal Capital Improvement Projects																			
Review CIP designs to ensure specifications and notes are included	C																X		X
Require submission of NOI for CIP greater than or equal to one acre	C																X		X
Develop priority projects in conformance with the SWQCCP	C																X		X
MO3 – Pollution Prevention at Permittee Facilities																			
Implement a SWPPP/FPPP for Corporation Yard and other facilities, as needed, and review on an annual basis	C																X	X	X
Review CIP projects for compliance with general stormwater requirements, including review for vehicle or equipment wash areas	C																X	X	X
Distribute BMP Fact Sheet for Non-Emergency Firefighting Flows identifying the BMPs that must be implemented	C																		X
MO4 – Landscape and Pest Management																			
Implement pesticide and fertilizer application protocol	C						X									X		X	X
Implement IPM program	C						X									X		X	X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
Include language requiring IPM implementation in all new contracts	C						X												X
Maintain internal inventory on reported pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land	C						X									X		X	X
MO5 – Storm Drain System Maintenance																			
Complete storm drain system mapping	c	x															X		X
Maintain storm drain system mapping and database	C																X		X
Implement catch basin maintenance program	C																X	X	X
Implement pump station maintenance program	C																X	X	X
Implement detention basin maintenance program	C								X								X	X	X
Based on the results of the Treatment Feasibility Study and available CIP budget, continue to evaluate the prioritized outfalls, prepare preliminary reports, and implement projects	C																X		X
MO6 – Street Cleaning and Maintenance																			
Implement the street sweeping program	C								X	X							X		X
Implement green waste collection program	C									X							X		X
Implement the *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs*	C																	X	X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
MO8 – Training																			
Review and update Training Strategy	C		X																X
Conduct/Participate in Municipal Operations Program training	C		X		X												X	X	X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 6
Industrial and Commercial (IC)

OVERVIEW

The purpose of the Industrial and Commercial Program Element is to effectively prohibit unauthorized non-stormwater discharges and reduce pollutants in stormwater runoff from industrial and commercial facilities to the MEP. The program for industrial and commercial facilities is accomplished by tracking, inspecting, providing outreach, and ensuring compliance at industrial and commercial facilities identified as potentially significant sources of pollutants in stormwater.

CONTROL MEASURES

The Control Measures outlined in **Table 6-1** and discussed in more depth within this section form the basis of the Industrial and Commercial Program Element.

Table 6-1. Control Measures for the Industrial and Commercial Program Element

IC	Control Measure
IC1	Facility Inventory
IC2	Prioritization and Inspection
IC3	Industrial and Commercial Outreach
IC4	Enforcement
IC5	Training

IC1 – Facility Inventory

2007-2012 IMPLEMENTATION

The Facility Inventory Control Measure addresses the need to develop and maintain a complete database of industrial and commercial facilities that have a significant or potential impact to water quality. Information for the database is primarily obtained from new business licenses and/or sanitary sewer hook-up permits. The inventory provides the basis for the prioritization of facilities and serves as a repository for all information related to the facility such as the outreach, inspection, and any follow up actions required. The Permittees conduct a number of activities related to inventorying facilities, as outlined below.

- **Internal Audit of Database:** Permittees perform periodic audits of their commercial and industrial databases to ensure the information is consistent and accurate.
- **Industrial and Commercial Facility Inventory Update:** Permittees annually update their inventories of industrial and commercial facilities.
- **Industrial and Commercial Facility Mapping:** Permittees maintain current facility numbers, addresses and other identifying information.
- **Mobile Business Pilot Program Development:** Permittees developed and implemented a pilot program for carpet cleaners that includes the development and maintenance of an inventory, inspections, outreach/education, and enforcement.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City maintains and updates the inventory of industrial and commercial facilities prior to the start of each inspection round. As of June 30, 2010, there were 121 industrial facilities and 1,235 commercial facilities within the City's jurisdiction. **(L1)**

During the 2009-2010 reporting period, the City developed a mobile business pilot program for carpet cleaners and identified how the various components of the pilot program will be implemented. The strategy addresses inventory, inspections, outreach/education, and enforcement. During 2010-2011, the County, on behalf of the City, contacted each carpet cleaning business in the inventory to verify their information. Those not operating within San Joaquin County were removed from the inventory. **(L1)**

County of San Joaquin

The County has developed and updates the industrial and commercial facility database on an annual basis and audits the database periodically. As of May 1, 2012, there are 17 industrial facilities and 173 commercial facilities that are in the Phase I area of the County. **(L1)**

The County has developed maps to identify the facilities and to delineate any relevant trends in the collected data. **(L1)**

The County developed and implemented a pilot program for mobile commercial businesses – carpet cleaners. The inventory was completed during the 2009-2010 reporting period, and will be updated

annually. The pilot program's strategy includes clear steps in inventorying, outreaching, educating, and enforcing relevant ordinances for mobile carpet cleaners. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Develop and maintain an inventory of industrial and commercial facilities.

This objective will be met through implementation of specific performance standards, as detailed below.

Maintain and Update the Industrial Commercial Facility Inventory

The Permittees will continue to maintain their respective inventories of industrial and commercial facilities including those covered under the state IGP. The Permittees will update the inventory to align with the renewed IGP when it is finalized. Additionally, the inventory will be modified to include POC-related information. The inventory may include, but not be limited to the following information:

- Name and address of the facility
- Mailing address of the facility
- Name and address of owner
- Standard Industrial Classification (SIC)/ North American Industry Classification System (NAICS) code and description
- Pollutant(s) of Concern at the site
- Waste Discharge Identification (WDID) number
- Due date for next inspection
- Date of most current inspection
- Date (if) a Notice of Non-Applicability (NONA) was granted to facility
- Date of most recent Annual Report
- Check boxes for SWPPP and if there is risk of exposure
- Box to indicate whether business is commercial or industrial
- Follow-up activities (industrial only)
- Additional comments

The inventory tracks the following categories of industrial and commercial facilities:

Industrial Facilities (Facilities Required to have Coverage Under the State Industrial General Permit)

- Manufacturing Facilities
- Hazardous Waste Treatment, Storage, or Disposal Facilities
- Solid Waste Transfer Stations
- Recycling Facilities
- Transportation Facilities
- Sewage or Wastewater Treatment Facilities

Commercial Facilities

Commercial facilities will be characterized as significant sources (i.e., high priority facilities) and potential sources (i.e., low priority facilities) in order to prioritize these facilities for inspection.

Significant Sources (i.e., Facilities Likely to Use, Store, or Generate Pollutants of Concern)

- Kennels (Pathogens)
- Nurseries (Pesticides)
- Restaurants (Pathogens, DO)[1]
- Landscape installation/maintenance (Pesticides, DO)

[1] The definition of "restaurants" used for the Industrial and Commercial Program will be those fixed facilities that process unpackaged food. Such facilities include fats, oil, and grease disposal.

Potential Sources

- Auto body shops
- Auto dealers
- Auto repair shops
- Dry cleaners
- Automotive washing and detailing
- Carpet cleaners (Pilot Program)
- Commercial pesticide applicators
- Concrete pouring contractors
- Concrete cutting contractors
- General building contractors
- Paint contractors
- Portable toilet rental and maintenance
- Pressure washers
- Street sweepers
- Swimming pool contractors
- Swimming pool maintenance

Maintain and Update the Industrial and Commercial Facility Inventory

The Permittees will continue to maintain and update the industrial and commercial facility inventory/database.

Map Industrial and Commercial Facilities

The Permittees will continue to map the industrial and commercial facilities in the inventory/database.

Mobile Business Inventory for Carpet Cleaners

The Permittees will continue to maintain the inventory of carpet cleaning services in the SUA and distribute outreach materials.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Maintain and update the industrial and commercial facility inventory
- Map industrial and commercial facilities
- Maintain mobile business inventory for carpet cleaners

IC2 – Prioritization and Inspection

2007-2012 IMPLEMENTATION

The Prioritization and Inspection Control Measure establishes procedures for prioritizing industrial and commercial facilities as well as the inspection requirements associated with the site visits. The inspections ensure that the facility operator has pertinent educational materials, the operator complies with ordinances, and unauthorized non-stormwater discharges do not occur. Inspection of facilities covered under the State IGP also ensure that the operator has a current WDID number, the SWPPP is available on site, and the operator is effectively implementing BMPs in compliance with local ordinances.

The Permittees conduct a number of activities related to prioritization and inspection, as outlined below.

- **Facility Prioritization:** The Permittees have developed and utilized evaluation criteria that prioritize industrial and commercial facilities based on their threat to water quality.
- **Exceedances of Water Quality Benchmarks as Part of the Prioritization Criteria:** The Permittees evaluated and ultimately incorporated exceedances of water quality benchmark data into their criteria for prioritizing industrial facilities.
- **Inspections:** The Permittees have reviewed and revised inspection checklists as needed and inspected high priority industrial and commercial facilities twice during the permit term.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

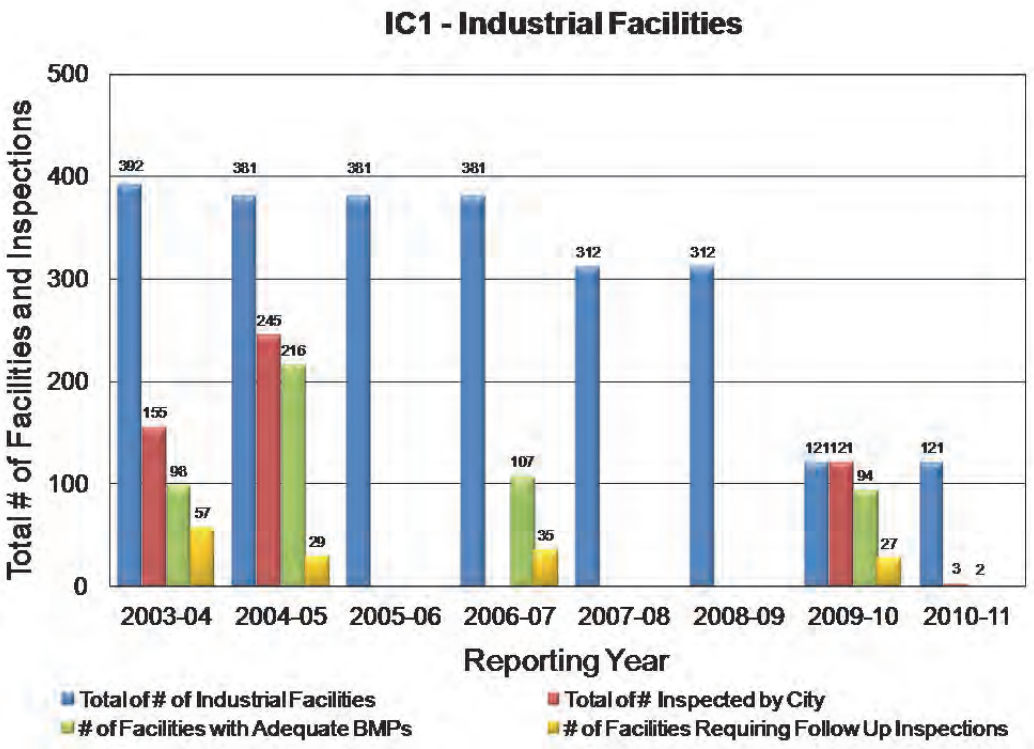
City of Stockton and County of San Joaquin

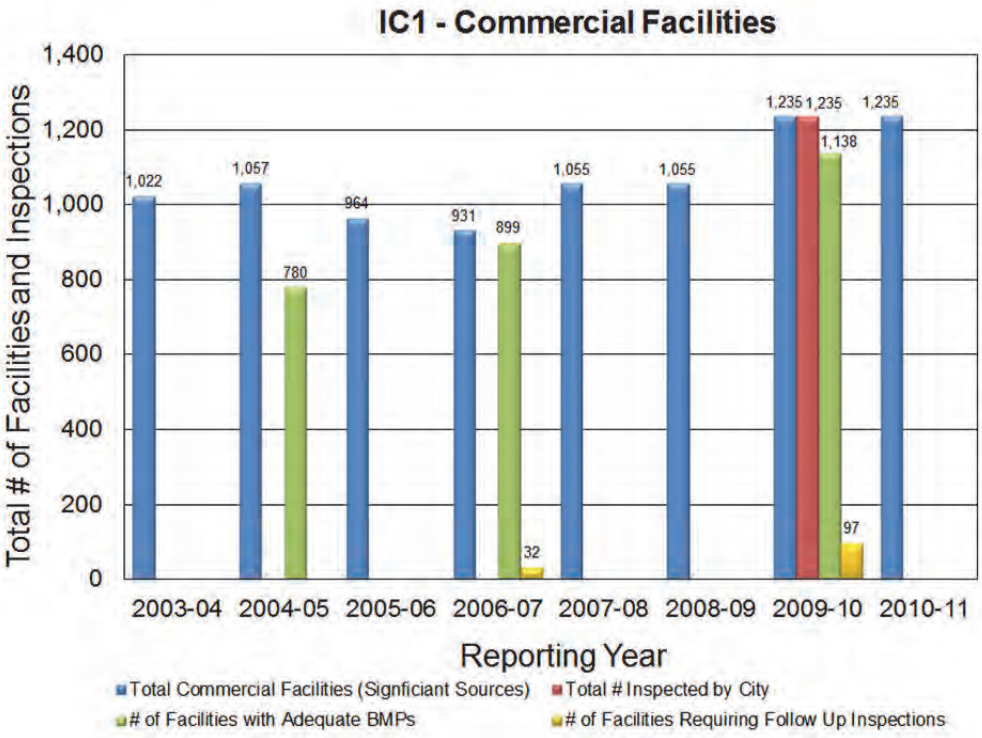
The Permittees developed and distributed a Self-Certification Form for mobile carpet cleaners in lieu of formal inspections. During 2010-2011, the County, on behalf of the Permittees, mailed Self-Certification Forms to each carpet cleaning business in the inventory as part of the mobile carpet cleaning business inspection efforts. Approximately 74% of the businesses (51 of 69) completed and returned the Self-Certification Forms after receipt of the initial mailing. Second mailings were sent out to the remaining 18 mobile cleaners that had not responded.

City of Stockton

Since 2003, the City has inspected more than 1,750 industrial and commercial facilities. During the most recent inspections conducted in 2009-2010, all of the industrial (524) and commercial (1,235) facilities inspected were prioritized as “high” (524 inspections). **(L1)**

Of the facilities inspected during the Permit term, approximately 94% were in general compliance with stormwater control requirements. All facilities (100%) requiring follow-up inspections were in compliance after those inspections were completed. **(L2, L3)**

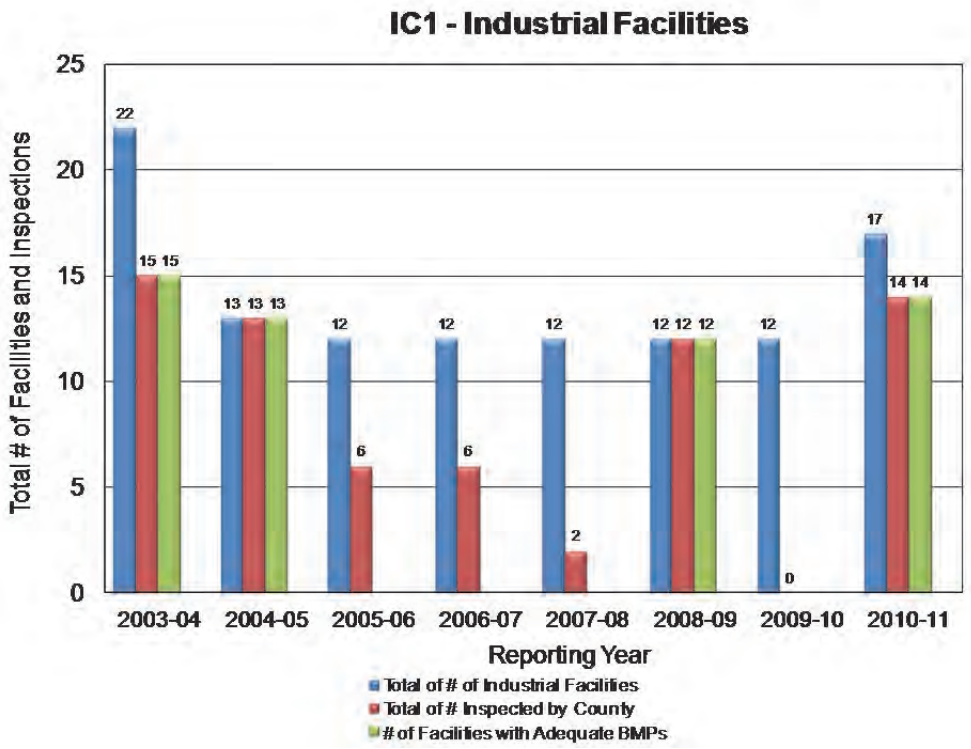

IC1 - Industrial Facilities
Total # of Facilities and Inspections
500
400
300
200
100
0
392
155
98
57
381
245
216
29
381
381
107
35
312
312
121
121
94
27
121
3
2
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Total of # of Industrial Facilities
Total of # Inspected by City
# of Facilities with Adequate BMPs
# of Facilities Requiring Follow Up Inspections

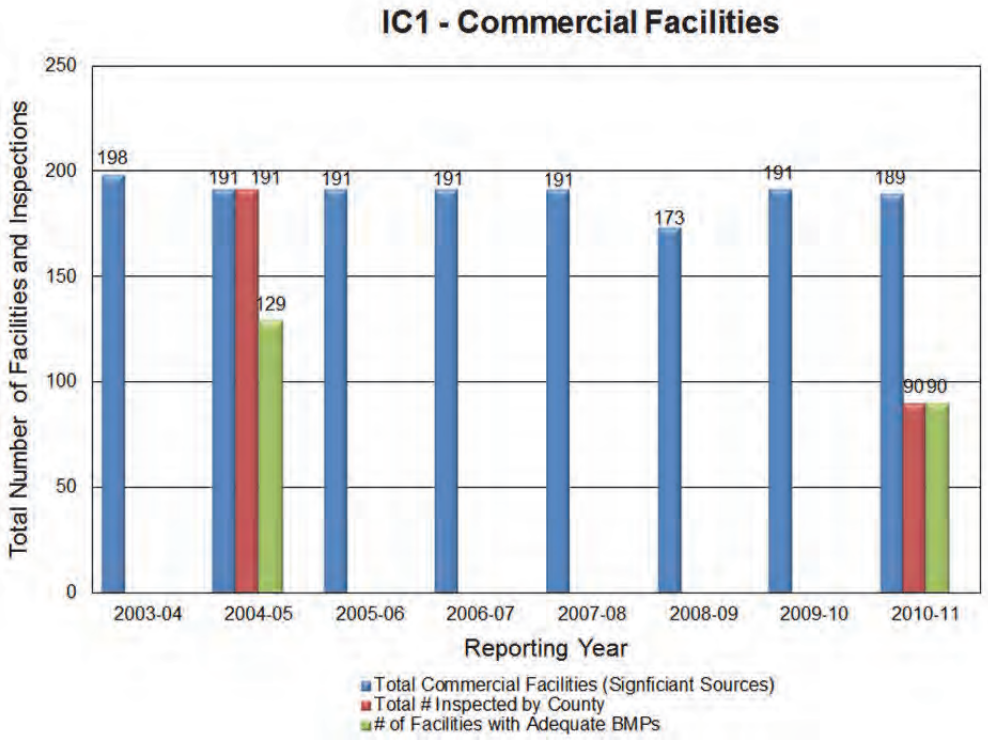

IC1 - Commercial Facilities
Total # of Facilities and Inspections
1,400
1,200
1,000
800
600
400
200
0
1,022
1,057
780
964
931
899
32
1,055
1,055
1,235
1,235
1,138
97
1,235
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Total Commercial Facilities (Signficiant Sources)
Total # Inspected by City
# of Facilities with Adequate BMPs
# of Facilities Requiring Follow Up Inspections

County of San Joaquin

The County reviewed and revised the industrial and commercial business inspection checklists. **(L1)**

The County prioritized, inspected, and followed-up with industrial and commercial facilities operating within the SUA. A portion of the commercial facilities were inspected and the majority of the industrial facilities were inspected. Since 2003, the County has inspected nearly 350 industrial and commercial facilities. All facilities (100%) were found to be in general compliance. **(L1)**


IC1 - Industrial Facilities
Total # of Facilities and Inspections
25
20
15
10
5
0
22
15 15
13 13 13
12
6
12
6
12
2
12 12 12
12
0
17
14 14
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Total of # of Industrial Facilities
Total of # Inspected by County
# of Facilities with Adequate BMPs


IC1 - Commercial Facilities
Total Number of Facilities and Inspections
250
200
150
100
50
0
198
191 191
129
191
191
191
173
191
189
90 90
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
Reporting Year
Total Commercial Facilities (Signficiant Sources)
Total # Inspected by County
# of Facilities with Adequate BMPs

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- The Permittees will utilize POCs as a screening tool to further refine the list of industrial and commercial facilities that are inspected. This will allow the Permittees to narrow the scope of inspections, while increasing their frequency.
- The Permittees will implement a Self-Certification Program for low priority facilities, similar to what has been implemented through the Mobile Carpet Cleaner Pilot Program, in order to effectively address discharges from intermittent sources.

The objectives of this Control Measure are to:

- Prioritize the industrial and commercial facilities within the inventory based on their threat to water quality.
- Conduct inspections of the industrial and commercial facilities that pose a significant threat to water quality with an inspection frequency based on the prioritization of the facility. Conduct follow up inspections to bring the facility into compliance.
- Implement a self-certification program for all commercial facilities that are low priority facilities (i.e., potential sources of pollutants).

This objective will be met through implementation of specific performance standards, as detailed below.

Prioritize Facilities Based on Pollutants of Concern

The Permittees will prioritize industrial and commercial facilities as necessary. The potential of a facility to discharge POCs will be taken into account. The facilities that are considered high priority based on their storage, handling and/or potential generation of the POCs include the following:

Commercial Facilities	POCs Addressed			
	Pesticide	Pathogen	Mercury	Low DO
Kennels		X		X
Nurseries	X	X		X
Restaurants		X		X
Landscaping Installation and Maintenance	X	X		X

Review/Revise Industrial Inspection Checklists, As Needed

The Permittees will review and revise the industrial inspection checklist to align with the renewed IGP when it is finalized, as needed.

Review/Revise Commercial Inspection Checklists, As Needed

The Permittees will review and revise commercial inspection checklists, as needed.

Inspect High Priority Facilities Annually

The Permittees will inspect high priority facilities that are considered to be significant sources (i.e., facilities likely to use, store, or generate POCs) (see IC1). Inspections will be conducted on an annual basis.

Conduct Follow-up Inspections, As Needed

The Permittees will conduct follow-up inspections as necessary to bring the facility into compliance.

Implement Self-Certification Program for Low Priority Facilities

The Permittees will implement a self-certification program for low priority facilities that are considered to be potential sources of pollutants (see IC1). The self-certification program will require all of the low priority facilities to verify that they are in compliance with applicable regulations and BMPs pursuant to the Industrial and Commercial program. The self-certification program will include outreach and will occur two times during the permit term.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Prioritize facilities based on POCs
- Review/revise Industrial Inspection Checklists, as needed

- Review/revise Commercial Inspection Checklists, as needed
- Inspect high priority facilities annually
- Conduct follow-up inspections, as needed
- Implement Self-Certification Program for low priority facilities

IC3 – Industrial and Commercial Outreach

2007-2012 IMPLEMENTATION

The Industrial and Commercial Outreach Control Measure requires industrial and commercial businesses to reduce pollutants in stormwater discharges and effectively prohibits unauthorized non-stormwater discharges to the storm drain system. Although Permittees may provide guidance to facility operators on appropriate Source and Treatment Control BMP selection and application, the selection of specific BMPs to be implemented is the responsibility of the discharger. Industrial and Commercial outreach activities include requiring BMPs at facilities and distributing educational materials. These activities are outlined below.

- **BMP Information for High Priority Facilities:** In order to assist industrial and commercial facilities in selecting and implementing the appropriate types of BMPs, the Permittees developed BMP Fact Sheets for high priority industrial and commercial businesses. The BMP Fact Sheets are distributed during the inspections and made available on the City and County websites.
- **Outreach Efforts Targeted Based on Potential of a Compliance Rating System:** Although the Permittees opted not to develop a compliance rating system, outreach was still provided to high priority facilities.
- **Outreach/Education Strategy for Mobile Business BMPs:** the County and City identified BMPs for the mobile business category identified in IC1, mobile carpet cleaners, and developed an outreach/education strategy. Permittees conducted mailings of mobile business outreach materials that included a Self-Certification Form and a Carpet Cleaning BMP Fact Sheet.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

During 2010-2011, the County, on behalf of the City, included a Carpet Cleaning BMP Fact Sheet and other outreach materials in the Self-Certification Form mailings. In addition, mobile carpet cleaning outreach was provided to homeowners via the County's website. **(L1)**

City of Stockton

The City has developed BMP Fact Sheets for high priority industrial and commercial facilities, in addition to a poster with fats, oils, and grease BMPs for distribution to restaurants. The City works to ensure that the facilities that have the potential to discharge a pollutant for which there is a water quality based plan receive pollutant specific information. Over 1,200 fact sheets were distributed during the last round of inspections that concluded on June 30, 2010. **(L1)**

County of San Joaquin

The County developed BMP Fact Sheets for the high priority industrial and commercial facilities and then revised them as needed to ensure that they included specific information regarding the water quality based programs. The County has distributed over 500 fact sheets during inspections and has informed the inspected industrial and commercial facilities of additional sources of BMPs. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Implement a business outreach program.

This objective will be met through implementation of specific performance standards, as detailed below.

Review/ Revise BMP Fact Sheets, As Needed

The Permittees will review and revise fact sheets, as needed, to ensure that new IGP requirements and POCs are adequately addressed.

Distribute BMP Information

The Permittees will distribute appropriate BMP fact sheets during inspections and with the Self-Certification Forms.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review/ revise BMP Fact Sheets, as needed
- Distribute BMP information

IC4 – Enforcement

2007- 2012 IMPLEMENTATION

The Enforcement Control Measure outlines the progressive levels of enforcement applied to industrial and commercial facilities that are out of compliance with local ordinances and establishes the protocol for referring apparent violations of facilities subject to the IGP to the Regional Water Board. The Enforcement Control Measure has been developed to address specific legal authority issues related to industrial and commercial facility discharges.

- **Progressive Enforcement Implementation:** Permittees have a progressive enforcement and referral policy so that the enforcement actions match the severity of the violation and include distinct, progressive steps. Options are available for progressive, corrective actions for repeat offenders.
- **Enforcement Action Tracking:** Permittees tracked all enforcement actions taken within the industrial and commercial inspection results.
- **Procedures for Responding to Regional Water Board-Based Complaints:** Permittees implement procedures for responding to complaints forwarded by the Regional Water Board to ensure inspections occur within two business days. Inspections initiated in response to complaints determine if the facility is out of compliance with stormwater ordinances.
- **Enforcement Strategy for Mobile Business Category:** Permittees developed an enforcement strategy that specifically addresses the mobile business category identified in IC1, carpet cleaners.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

The Permittees developed and implemented an enforcement strategy for mobile carpet cleaners operating within the SUA. During 2010-2011, the County, on behalf of the Permittees, contacted by phone those carpet cleaning businesses that were unresponsive to the initial Self-Certification Form mailing. In an effort to obtain 100% compliance, a second mailing that also included a Self-Certification Form was sent to 18 businesses (26% of all businesses in the inventory). **(L1)**

City of Stockton

The City has developed and currently a progressive enforcement policy so that the enforcement actions match the severity of the violation and include distinct, progressive steps. **(L1)**

Since 2003, the City has taken more than 155 enforcement actions against industrial and commercial businesses, including verbal warnings, NOVs, notices to clean, and cease and desist orders.

The City has modified the Industrial and Commercial database to track enforcement related issues and will continue to make necessary modifications to better track this information. **(L1)**

The City has developed and currently implements procedures for informing the Regional Water Board about potential non-filers or other enforcement related issues. **(L1)**

County of San Joaquin

The County conducted enforcement actions as needed and implemented its progressive enforcement and referral policy so that the enforcement actions match the severity of the violation and include distinct, progressive steps. A total of 90 enforcement actions have taken place since 2003. All 90 actions have been verbal warnings, and no progressive enforcement has been necessary because of the willingness of the businesses operating within the SUA to come into compliance. **(L1)**

The County reviewed and revised the Industrial and Commercial database to incorporate enforcement related information. **(L1)**

The County has developed and implemented procedures for referrals to and from the Regional Water Board. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Implement a progressive enforcement policy to ensure that adequate enforcement is conducted, and coordinate with the Regional Water Board regarding referrals of potential non-filers and inspections.

This objective will be met through implementation of specific performance standards, as detailed below.

Implement Progressive Enforcement and Referral Policy Procedures

The Permittees will continue to implement progressive enforcement and referral policy procedures.

Track Enforcement Actions Using the Industrial and Commercial Database

The Permittees will continue to track enforcement actions using the Industrial and Commercial Database.

Implement Procedures for Regional Water Board-Based Complaints

The Permittees will continue to implement procedures for responding to complaints forwarded by the Regional Water Board to ensure inspections occur within two business days. Inspections initiated in response to complaints will determine, at a minimum, if the facility is out of compliance with City stormwater ordinances.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement progressive enforcement and referral policy procedures
- Track enforcement actions using the Industrial and Commercial Database
- Implement procedures for Regional Water Board-based complaints

IC5 – Training

2007-2012 IMPLEMENTATION

Training is important to the successful implementation of the Industrial and Commercial Program Element. Effective training is one of the best pollution prevention BMPs that can be implemented because it prompts behavioral changes that are fundamentally necessary to protect water quality.

The objectives of the training are to:

- Increase the general awareness about the SWMP and Industrial and Commercial program;
- Increase the awareness of the Industrial and Commercial Control Measures and procedures; and
- Prompt the behavioral changes needed to protect and improve water quality.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

Typically, City commercial and industrial inspectors are trained in-house at WGR Southwest by senior staff prior to starting inspections. Training consists of both “classroom” and “on-site” training. **(L1)**

County of San Joaquin

The County utilizes its Industrial and Commercial Training Modules to provide training to Industrial and Commercial inspectors. The module was offered twice during the Permit term and refresher training for the Industrial and Commercial program is offered on years when the full training is not conducted. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Provide internal and external training on components of the SWMP and related Permits.

This objective will be met through implementation of specific performance standards, as detailed below.

Review and Update Training Strategies

The Permittees will review and update their respective Training Strategies, as needed.

Conduct/Participate in Industrial and Commercial Program Training

The Permittees will conduct/participate in Industrial and Commercial Program training. Both internal and external training opportunities may be utilized to meet the intent of this performance standard.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review and update Training Strategies
- Conduct/participate in Industrial and Commercial Program training

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Industrial and Commercial Program are summarized below.

OBJECTIVES

The objectives address the key components of the Industrial and Commercial program element and identify that, in order to be effective, the program must:

- Develop and maintain an inventory of industrial and commercial facilities.
- Prioritize the industrial and commercial facilities within the inventory based on their threat to water quality.
- Conduct inspections of the industrial and commercial facilities that pose a significant threat to water quality with an inspection frequency based on the prioritization of the facility. Conduct follow up inspections to bring the facility into compliance.
- Implement a business outreach program.
- Implement a progressive enforcement policy to ensure that adequate enforcement is conducted, and coordinate with the Regional Water Board regarding referrals of potential non-filers and inspections.
- Conduct/participate in internal and external training on components of the SWMP and related Permits.

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
IC1 – Facility Inventory																			
Maintain and update database	C																	X	
Map industrial and commercial facilities	C															X			
Maintain mobile business inventory for carpet cleaners	C																	X	
IC2 – Prioritization and Inspection																			
Prioritize Facilities based on POCs	E						X	X	X	X								X	
Review/Revise Industrial Inspection Checklists, As Needed	C																	X	
Review/Revise Commercial Inspection Checklists, As Needed	C																	X	
Inspect High Priority Facilities Annually	E	X	X	X	X	X	X	X	X	X								X	
Conduct Follow-up Inspections, As Needed	C						X	X	X	X								X	
Implement Self-Certification Program for Low Priority Facilities	C		X		X													X	
IC3 – Industrial/ Commercial Outreach																			
Review/ Revise BMP Fact Sheets, As Needed	E	X					X	X	X	X								X	
Distribute BMP Information	C		X		X		X	X	X	X								X	
IC4 – Enforcement																			
Implement the progressive enforcement policy	C																	X	
Track enforcement actions using the Database	C																	X	

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
IC5 – Training																			
Review and update Training Strategy	E		X															X	
Conduct/Participate in Industrial/ Commercial Program training	C		X		X													X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Performance Standards and Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
IC1 – Facility Inventory																			
Maintain and update database	C										X								X
Map industrial and commercial facilities	C																		X
Maintain mobile business inventory for carpet cleaners	C																		X
IC2 – Prioritization and Inspection																			
Prioritize Facilities based on POCs	E						X	X	X	X									X
Review/Revise Industrial Inspection Checklists, As Needed	C																		X
Review/Revise Commercial Inspection Checklists, As Needed	C																		X
Inspect High Priority Facilities Annually	E	X	X	X	X	X	X	X	X	X									X
Conduct Follow-up Inspections, As Needed	C						X	X	X	X									X
Implement Self-Certification Program for Low Priority Facilities	C		X		X														X
IC3 – Industrial/ Commercial Outreach																			
Review/ Revise BMP Fact Sheets, As Needed	E	X					X	X	X	X									X
Distribute BMP Information	C		X		X		X	X	X	X									X
IC4 – Enforcement																			
Implement the progressive enforcement policy	C																		X
Track enforcement actions using the Database	C																		X

Section 7
Construction (CO)

OVERVIEW

During construction projects, a number of activities may generate or mobilize pollutants. The purpose of the Construction Program Element is to coordinate Permittee programs and resources to effectively reduce pollutants in runoff from construction sites during all construction phases.

CONTROL MEASURES

The Control Measures outlined in **Table 7-1** and discussed in more depth within this section form the basis of the Construction Program Element.

Table 7-1. Control Measures for the Construction Program Element

LD	Control Measure
CO1	Municipal Code for Construction Sites
CO2	Plan Review and Approval Process
CO3	Construction Projects Inventory
CO4	Construction Outreach
CO5	Construction Site Inspections & BMP Implementation
CO6	Enforcement
CO7	Training

CO1 – Municipal Code for Construction Sites

2007-2012 IMPLEMENTATION

The goal of this Control Measure is to ensure that the Permittees have adequate legal authority to control pollutants from construction sites with land disturbances greater than or equal to one acre. This authority is typically provided through the adoption of an ordinance and erosion and sediment control standards. The Permittees conducted activities related to the municipal code, as outlined below.

- **Grading and Erosion Control Ordinance and Standards Review/Modification:** The Permittees reviewed and modified the ordinances and standards, as needed.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City is continuing to incorporate stormwater quality protection principles into the construction program by ensuring that the erosion and sediment control ordinance provides the City with adequate legal authority and by ensuring that the standard specifications are reviewed and revised as needed. **(L1)**

County of San Joaquin

The County is continuing to incorporate stormwater quality protection principles into the construction program by reviewing and modifying the development review process, modifying the standard specifications and ensuring that the projects incorporate the necessary conditions. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Provide adequate legal authority to control pollutants to the MS4 from construction sites with land disturbance greater than or equal to one acre in size.

This objective will be met through implementation of specific performance standards, as detailed below.

Revise Grading and Erosion Control Ordinance and Standards

The Permittees will review and revise their standards, ordinances and review process as needed, to reference the most recent version of the Construction General Permit (Order No. 2009-0009-DWQ) and/or other changes to the program.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Revise Grading and Erosion Control Ordinance and/or other standards, as needed

CO2 – Plan Review and Approval Process

2007-2012 IMPLEMENTATION

Effective planning of construction site activities leads to minimizing erosion and preventing pollutants from entering the storm drain system. Prior to issuing a grading permit, the Permittees review construction plans to ensure that erosion and sediment control BMPs and source and treatment control BMPs are identified. The Permittees require pollutants and pollutant-generating activities to be addressed during the construction phase of projects disturbing greater than or equal to one acre of land. The Permittees conducted a number of activities related to the plan review and approval process, as outlined below.

- **Grading and Building Permit Applications Reviewed for SWPPP Requirements:** The Permittees continued to check applications and ensure that NOIs were submitted for project subject to the Construction General Permit and that an erosion control plans showed the details of all the BMPs that will be used.
- **Plan & Permit Application Review Procedure Handout**: The Permittees developed a handout explaining the review procedure to be provided to all construction project applicants identified as having to comply with the Grading and Erosion Control Ordinance
- **Plan & Permit Application Review Procedure Handout Distribution**: The Permittees made handouts available to the public.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

Project plans are reviewed by a MUD representative at the Permit Center to ensure that the construction requirements are met. **(L1)**

The City provides educational materials to the developers via its website and at the permit counters. Developers and construction contractors are becoming better educated and responsive to the City's stormwater requirements as indicated by the following: **(L1)**

- During the Permit term, more than 165 applicants applied for coverage under the General Construction Permit, and they all submitted proof of an NOI to the City.

County of San Joaquin

The County is minimizing erosion and sediment control-related issues by (a) reviewing grading and building permit applications for SWPPPs and other requirements prior to issuing a grading permit and (b) updating the permit review procedure handout to ensure that the process is clear to the development community. **(L1)**

The County has developed and is implementing a Small Site SWPPP program in order to ensure that construction sites that are less than one acre are implementing BMPs and are protective of water quality. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objectives of this Control Measure are to:

- Review construction plans and issuing grading permits consistent with Permittee requirements.
- Require BMPs to control sediment and pollutants from construction sites to the MS4.

These objectives will be met through implementation of specific performance standards, as detailed below.

Review Grading and Building Permit Applications for SWPPP Requirements

The Permittees will continue to review grading and building permit applications for SWPPP requirements.

Review/Revise the Permit Review Procedure Handout

The Permittees will review and revise their respective Permit Review Procedures Handouts, as needed. In particular, the Permittees will ensure that the Permit Review Procedures Handouts incorporate any updates needed as a result of the Construction General Permit renewal, as well as any departmental/contact changes.

Distribute the Permit Review Procedure Handout

The Permittees will continue to make the Permit Review Procedures Handouts available to the public. The Permit Review Procedures Handouts may be provided in hard copy and/or electronic format (i.e., available on the websites and at permit counters).

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review grading and building permit applications for SWPPP requirements
- Review/revise the Permit Review Procedure Handout, as needed
- Distribute the Permit Review Procedure Handout

CO3 – Construction Projects Inventory

2007-2012 IMPLEMENTATION

The Construction Projects Inventory Control Measure involves tracking construction sites from the planning stage to completion. This is essential for ensuring that stormwater pollutants are reduced to the MEP. Maintaining a database to track all stages of the construction process is the foundation of construction-related source identification and helps to ensure that pollution prevention and source control are emphasized during all phases of the construction project. The Permittees developed and maintained an inventory of the construction projects.

- **Maintain and Update the Construction Project Database:** The Permittees maintain a Construction Project Database that identifies all of the construction sites greater than or equal to one acre within their jurisdiction and tracks all inspections, enforcement and follow up actions that occur at each construction site.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City has developed and is maintaining a Construction Project Database. The Construction Project Database is updated on an ongoing basis. **(L1)**

County of San Joaquin

The County has developed and is maintaining a Construction Project Database. The Construction Project Database is updated on an ongoing basis. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Maintain a tracking system (inventory) of active construction sites, as well as the inspection and follow-up activities.

This objective will be met through implementation of specific performance standards, as detailed below.

Maintain and Update the Construction Project Database

The Permittees will each continue to maintain a Construction Project Database that tracks inspections at each construction site. The Construction Project Database will continue to track the following fields:

- Site owner and contact information

- Name, address, and description (type) of project
- WDID numbers
- Inspector and inspection date
- Inspection results (e.g., site conditions) and follow-up actions

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Maintain and update the Construction Project Database

CO4 – Construction Outreach

2007-2012 IMPLEMENTATION

The Construction BMP Implementation Control Measure ensures that the necessary BMPs are implemented at construction sites to prevent pollutants from being discharged from the site. This Control Measure focuses on the Permittees' requirements for BMPs at construction sites and the associated outreach efforts to the building community.

The Permittees conduct a number of construction outreach activities, as outlined below.

- **BMP Information Distribution during Inspections:** Construction outreach activities include the distribution of educational materials during inspections.
- **Contractor Tailgate Meetings:** Permittees conduct tailgate meetings for construction projects. The tailgate meetings address Construction General Permit requirements and local requirements for construction sites, including BMPs.
- **Training for Developers, Builders and Contractors Conducted:** Permittees provided outreach to construction developers, builders, and contractors that addressed the Construction General Permit requirements and local requirements for construction sites and related BMPs.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

All construction project applicants identified as having to comply with the Grading and Erosion Control Ordinance are provided with a two-page handout describing the application review procedure. The City also provides a link on its website to the State's Model SWPPP that includes a list of BMPs applicable to construction activities. **(L1)**

The City has developed and is distributing construction-related outreach materials and held tailgate meetings as needed. **(L1)**

The MUD Stormwater Inspector held tailgate meetings on-site with the site superintendent. The MUD Stormwater Inspector reviews the CGP and associated City requirements at these meetings. **(L1)**

The City advertised and invited City staff, developers, builders, and contractors to an external training on Qualified SWPPP Developer & Qualified SWPPP Practitioner certification. **(L1)**

County of San Joaquin

All construction project applicants identified as having to comply with the Grading and Erosion Control Ordinance are provided with outreach information. **(L1)**

To ensure that appropriate BMPs are implemented at construction sites to prevent pollutants from being discharged to the storm drain system and waterways, the County has developed and distributed construction-related outreach materials, held tailgate meetings, and supported two workshops. **(L1)**

The County has conducted contractor tailgate meetings for County Contract Projects. The tailgate meetings address particular construction sites and development projects. Sites are selected based on project type, potential impact to water quality, and potential for BMP failure. **(L1)**

The County advertised and invited County staff, developers, builders, and contractors to an external training on Qualified SWPPP Developer & Qualified SWPPP Practitioner certification. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- The contractor tailgate meetings will not be held. The Permittees have found that these meetings are not an effective outreach or training mechanism for this target audience. Instead, BMP information will continue to be distributed during inspections, and the Permittees will notify the target audience of appropriate training opportunities.

The objective of this Control Measure is to:

- Provide regular internal (Permittee staff) and external (contractors, developers, etc.) training on applicable components of the SWMP and the related Permits.

This objective will be met through implementation of specific performance standards, as detailed below.

Distribute BMP Information during Inspections

The Permittees will continue to distribute educational materials to construction project applicants. Materials may be distributed in hard copy and/or electronically.

Notify Developers, Builders and Contractors of Training Opportunities

The Permittees will notify project applicants (i.e., developers, builders, and contractors) of internal and/or external training opportunities regarding construction-related requirements.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Distribute BMP information during inspections
- Notify developers, builders and contractors of training opportunities

CO5 – Construction Site Inspections & BMP Implementation

2007-2012 IMPLEMENTATION

An effective construction site inspection program includes having adequate legal authority to enforce requirements, tracking active construction sites to identify repeat violators, and conducting inspections to ensure that the sources are identified and BMPs are being implemented and maintained. The inspection program also provides the basis for notifying the Regional Water Board when inspectors identify non-compliant sites, including non-filers or repeat violators.

The Permittees conduct a number of activities related to construction site inspections and BMP implementation, as outlined below.

- **Stormwater Construction Site Inspection Form Review/Revision as Needed:** Permittees reviewed and updated the Construction Site Inspection Form, as needed.
- **Construction Site Compliance Options Evaluation:** Permittees evaluated options for construction site compliance. No modifications were made since the Permittees found that the intent of the compliance options evaluation is currently being met through other processes (e.g., Inspection Form).
- **Construction Sites ≥ 1 Acres Inspected Twice Monthly During the Wet Season and One Time During the Dry Season:** All construction sites greater than or equal to one (1) acre are inspected once per month (at a minimum) during the wet season and one time during the dry season until a NOT for coverage under the General Construction Permit is issued by the Regional Water Board.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City reviewed the Construction Site Inspection Form, determined that it was adequate, and conducted routine inspections of all active construction sites within City's jurisdiction. **(L1)**

Developers/contractors remain responsible and continue to be proactive when implementing and maintaining the construction site BMPs. This is indicated, in part, by the following: **(L1)**

- Since 2003, the City has conducted over 5,894 inspections and found that 90.5% of the construction sites that were inspected were in compliance with the City's stormwater program requirements and ordinances and did not require enforcement actions or follow-up inspections. **(L3)**

County of San Joaquin

The County reviewed the Construction Site Inspection Form, determined that it was adequate, and conducted routine inspections of all active construction sites within the County Phase I area. **(L1)**

Developers/contractors remain responsible when implementing and maintaining the construction site BMPs and continue to be proactive. This is indicated, in part, by the following: **(L3)**

- Since 2003, the County has conducted over 888 inspections and found that approximately 90% of the construction sites that were inspected were in compliance with the County's stormwater program requirements and ordinances and did not require enforcement actions or follow-up inspections.

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- Given that sediment may convey POCs if not managed correctly, the dry season inspections were increased from once during the dry season to monthly inspections.

The objective of this Control Measure is to:

- Inspect construction sites to ensure proper BMP implementation and compliance with Permittees' requirements and all applicable Permit conditions.

This objective will be met through implementation of specific performance standards, as detailed below.

Review/ Revise the Stormwater Construction Site Inspection Form

The Permittees will review and revise the Stormwater Construction Site Inspection Form, as needed.

Inspect Construction Sites ≥1 Acre

The Permittees will continue to inspect all construction sites greater than or equal to one (1) acre, at a minimum, once per month during the wet season, as well as once per month during dry season to verify compliance with local ordinances and applicable standards. These inspections will be conducted until a NOT for coverage under the Construction General Permit is issued by the Regional Water Board. Additional inspections will be conducted to follow up when problems are detected during the initial inspections.

To address project sites that are less than one (1) acre, the Permittees will provide educational materials regarding appropriate BMPs.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Revise/revise the Stormwater Construction Site Inspection Form, as needed
- Inspect construction sites ≥ 1acre

CO6 – Enforcement

2007-2012 IMPLEMENTATION

The Construction BMP Implementation Control Measure ensures that appropriate BMPs are implemented at construction sites to prevent pollutants from being discharged to the storm drain system and waterways. This Control Measure focuses on the City's and County's requirements for BMPs at construction sites and the associated outreach efforts to the building community.

The Permittees conduct a number of construction outreach activities, as outlined below.

- **Progressive Enforcement and Referral Policy Implementation:** The Permittees' inspectors currently have the legal authority to issue administrative complaints and, if necessary, to pursue civil actions, criminal actions, and criminal penalties, including arrests and issuance of citations. The Regional Board receives copies of notices of violation.
- **Enforcement Action Tracking Using Construction Database:** The Permittees track enforcement actions using their respective Construction Project Inventory Databases.
- **Procedure Review/Modification for Informing Regional Water Board of Violations:** Permittees reviewed procedures for informing the Regional Board of violations at construction sites subject to the General Construction Permit and found the current procedures to be sufficient.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City tracks enforcement actions in the Construction Project Inventory Database, which is regularly maintained. **(L1)**

While 1,133 enforcement actions have been taken between 2002-2003 and 2009-2010, most of the enforcement actions (891 of 1,133, or 79%) were due to verbal warnings. No criminal enforcement has been required during any year. **(L1)**

County of San Joaquin

The County tracks enforcement actions in the Construction Project Inventory Database, which is regularly maintained. **(L1)**

While 86 enforcement actions have been taken since 2003, most of the enforcement actions (33 of 86, or 38%) were due to verbal warnings. The second most common violation was NOVs, which accounted for 32 of the 86 total violations, or 37%. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Bring forth enforcement actions for sites in violation of Permittee requirements and advise the Regional Water Board of apparent violations of General Construction Permit requirements**.**

This objective will be met through implementation of specific performance standards, as detailed below.

Implement Progressive Enforcement Policy

The Permittees will continue to implement their respective progressive enforcement policies.[1] Corrective actions are taken in every instance where a responsible party is identified.

Track Enforcement Actions in the Construction Project Inventory Database

The Permittees will continue track enforcement actions using their respective Construction Project Inventory Databases.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Implement Progressive Enforcement Policy
- Track enforcement actions in the Construction Project Inventory Database

[1] **City:** *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* (MUD Directive, Appendix B-8 of the 2009-2010 Annual Report); **County:** *NPDES Construction Investigation-Enforcement Management Policy* (see Appendix B-9 of the 2009 SWMP)

CO7 – Training

2007-2012 IMPLEMENTATION

Training is important to the successful implementation of the Construction Program Element. Effective training is one of the best pollution prevention BMPs that can be implemented because it prompts behavioral ch anges that are fundamentally necessary to protect water quality.

The objectives of the training are to:

- Increase the general awareness about the SWMP and Construction program;
- Increase the awareness of the Construction Control Measures and procedures; and
- Prompt the behavioral changes needed to protect and improve water quality.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City's construction inspector attended seven (7) separate trainings in support of Qualified SWPPP Practitioner (QSP), Certified Erosion, Sediment, and Storm Water Inspector (CESSWI), and Certified Inspector of Sediment and Erosion Control (CISEC) certifications. In addition, nine (9) City staff attended a Qualified SWPPP Developer & Qualified SWPPP Practitioner Training Program. City staff works to incorporate the lessons from these outside training sessions into their day-to-day inspection and enforcement activities. **(L1)**

County of San Joaquin

The County conducted internal refresher training and supported two external training opportunities during the Permit term for its staff. In addition, one (1) County staff is a certified Qualified SWPPP Developer (QSD) and Practitioner (QSP) in addition to a Certified Erosion, Sediment, and Storm Water Inspector (CESSWI). The County Stormwater Inspector attended external training relating to the Construction General Permit which became effective July 1, 2010, for storm water discharges associated with construction and land disturbance activities. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Participate in internal and external training on components of the SWMP and related Permits.

This objective will be met through implementation of specific performance standards, as detailed below.

Review and Update Training Strategies

The Permittees will review and update their respective Training Strategies, as needed.

Conduct/Participate In Construction Program Training

The Permittees will conduct and/or participate in Construction Program training. Both internal and external training opportunities may be utilized to meet the intent of this performance standard.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review and update Training Strategies
- Conduct Construction Program training

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Construction Program are summarized below.

OBJECTIVES

The objectives address the key components of the Construction program element and identify that, in order to be effective, the program must:

- Provide adequate legal authority to control pollutants to the MS4 from construction sites with land disturbance greater than or equal to one acre in size.
- Review construction plans and issuing grading permits consistent with Permittee requirements.
- Require BMPs to control sediment and pollutants from construction sites to the MS4.
- Maintain a tracking system (inventory) of active construction sites as well as the inspection and follow up activities.
- Provide regular internal (Permittee staff) and external (contractors, developers, etc.) training on applicable components of the SWMP and the related Permits.
- Inspect construction sites to ensure proper BMP implementation and compliance with Permittees' requirements and all applicable Permit conditions.
- Bring forth enforcement actions for sites in violation of Permittee requirements and advise the Regional Water Board of apparent violations of General Construction Permit requirements**.**
- Participate in internal and external training on components of the SWMP and related Permits.

2012-2017 PROPOSED PERFORMANCE STANDARDS YAND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
CO1 – Municipal Code for Construction Sites																			
Revise Grading and Erosion Control Ordinance and/or other standards, as needed	C															X			
CO2 – Plan Review and Approval Process																			
Review grading and building permit applications for SWPPP requirements	C															X			
Review/ revise the Permit Review Procedure Handout, as needed	C															X			
Distribute the Permit Review Procedure Handout	C															X			
CO3 – Construction Projects Inventory																			
Maintain and update the Construction Project Database	C															X		X	
CO4 – Construction Outreach																			
Distribute BMP information during inspections	C																	X	
Notify developers, builders and contractors of training opportunities	N																	X	
CO5 – Construction Site Inspections & BMP Implementation																			
Review/revise the Stormwater Construction Site Inspection Form, as needed	C																	X	
Inspect construction sites ≥1 acre once per month	E								X					X				X	

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
CO6 – Enforcement																			
Implement Progressive Enforcement Policy	C																	X	
Track enforcement actions in the Construction Project Inventory Database	C																	X	
CO7 – Training																			
Review and update Training Strategy	N		X															X	
Conduct/Participate in Construction Program training	C	X	X	X	X	X												X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
CO1 – Municipal Code for Construction Sites																			
Revise Grading and Erosion Control Ordinance and/or other standards, as needed	C											X							X
CO2 – Plan Review and Approval Process																			
Review grading and building permit applications for SWPPP requirements	C										X						X		X
Review/ revise the Permit Review Procedure Handout, as needed	C										X						X		X
Distribute the Permit Review Procedure Handout	C										X						X		X
CO3 – Construction Projects Inventory																			
Maintain and update the Construction Project Database	C										X								X
CO4 – Construction Outreach																			
Distribute BMP information during inspections	C																		X
Notify developers, builders and contractors of training opportunities	N																		X
CO5 – Construction Site Inspections & BMP Implementation																			
Review/revise the Stormwater Construction Site Inspection Form, as needed	C																		X
Inspect construction sites ≥1 acre once per month	E								X										X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
CO6 – Enforcement																			
Implement Progressive Enforcement Policy	C										X								X
Track enforcement actions in the Construction Project Inventory Database	C										X								X
CO7 – Training																			
Review and update Training Strategy	N		X																X
Conduct/Participate in Construction Program training	C	X	X	X	X	X													X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
IC5 – Training																			
Review and update Training Strategy	E		X																X
Conduct/Participate in Industrial/ Commercial Program training	C		X		X								X						X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 8
Planning and Land Development (LD)

OVERVIEW

The addition of impervious areas for homes, industrial and commercial businesses, parking lots, and/or streets and roads increases the volume of stormwater runoff, which, in turn, may increase the potential for POCs to be transported off site. The Planning and Land Development Program Element ensures that the impacts on stormwater quality from new development and redevelopment are addressed through the implementation of Site Design Controls, Source Controls, Volume Reduction Measures, and Treatment Controls. The general strategy for development is to avoid, minimize, and mitigate (in that order) the potential adverse impacts to stormwater. The potential for long-term stormwater impacts from development is also reduced by requiring ongoing operation and maintenance of post-construction BMPs selected for a site.

CONTROL MEASURES

The Control Measures outlined in **Table 8-1** and discussed in more depth within this section form the basis of the Planning and Land Development Program Element.

Table 8-1. Control Measures for the Planning and Land Development Program Element

LD	Control Measure
LD1	Incorporation of Water Quality Protection Principles into Procedures and Policies
LD2	New Development Standards
LD3	Plan Review Sign-Off
LD4	Maintenance Agreement and Transfer
LD5	Training

LD1 – Incorporation of Water Quality Protection Principles into Procedures and Policies

2007-2012 IMPLEMENTATION

Water quality and watershed protection principles and policies, such as minimization of impervious areas, pollutant source controls, preservation of natural areas, and peak runoff controls, can help to minimize the impacts of urban development on the local hydrology and aquatic environment. Integration of stormwater quality and watershed principles into General Plans will serve as the basis for directing future planning and development in order to minimize these adverse effects. In addition, the California Environmental Quality Act (CEQA) process provides for consideration of water quality impacts and identification of necessary mitigation measures. The permittees have conducted a number of activities as outlined below.

- **Review and Revise the General Plan:**
  - The City's policies, goals, and objectives for new development are established in the *Stockton General Plan 2035*, adopted in December 2007.[1] These policies address how the City should direct development efforts, with consideration for social, economic, and environmental impacts. The *Stockton General Plan 2035* includes the *Goals & Policies Report*, which, within Section 9.4, generally refers to stormwater quality and watershed protection principles and implementation measures (Appendix G-1 of the 2009 SWMP).
  - The County has provided input into its General Plan. As a result, some of the draft documents (available to the public at: www.sjcgpu.com/docs.html) specifically call out LID. The Draft Vision and Guideline Principles call for LID. The County's Water Resources Division will continue to guide the General Plan pertaining to water quality principles.
- **Review and Revise the CEQA Documents:** The current CEQA review process includes procedures for considering potential stormwater quality impacts and providing for appropriate mitigation.
- **Revise Municipal Code:** The Permittees reviewed codes and ordinances to ensure that enforcement mechanisms are in place to require new development and redevelopment projects to comply with the SWQCCP requirements for post-construction BMPs.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City's current CEQA review process includes procedures for considering potential stormwater quality impacts and providing for appropriate mitigation. The City's MUD reviews all CEQA documents, responding to checklist items under the Hydrology and Water Quality section. **(L1)**

The City's Stormwater Management and Discharge Control Ordinance No. 010-97 (Section 13.20) serves as the enforcement mechanism to ensure new development and redevelopment projects comply with the General Plan and City policies, including the SWQCCP requirements for post-construction BMPs. In

[1] Available at: http://www.stocktongov.com/CD/2035GeneralPlan/index.cfm

2008-2009, the City updated/codified the Stormwater Management Control Ordinance. No additional changes to the Standards were required. **(L1)**

County of San Joaquin

The County has provided input regarding the General Plan update so that it includes water quality protection principles and promotes LID concepts. **(L1)**

The County reviews all CEQA documents and determines the potential scope of the proposed project and whether the project will be subject to County conditions, the SWQCCP, the small site SWPPP, or the Construction General Permit. **(L1)**

The County's Stormwater Management and Discharge Control Ordinance serves as the enforcement mechanism to ensure new development and redevelopment projects comply with the General Plan and City policies, including the SWQCCP requirements for post-construction BMPs. The County reviewed and determined that the current standards allow County staff to enforce the 2009 SWQCCP and San Joaquin County Hydrology Manual, so no ordinance revisions are needed at this time. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No program modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Continue to ensure that water quality and watershed protection principles are incorporated into policies and planning procedures, as needed.

This objective will be met through implementation of specific performance standards, as detailed below.

Revise General Plan, As Needed

The City and the County will continue to ensure that water quality protection principles are promoted through their respective General Plans.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Revise General Plan, as needed, to ensure that water quality protection principles are promoted

LD2 – New Development Standards

2007- 2012 IMPLEMENTATION

Post-construction BMPs, including those for site design, source control, volume reduction, and treatment, are necessary for development and redevelopment projects in order to mitigate potential water quality impacts. In addition, Priority Projects, as specified in the Permit, require specific mitigation measures.

The Permittees conduct a number of activities that promote and require the use of new development standards, as outlined below.

- **SWQCCP Revisions:** In 2009, the Permittees updated the 2003 SWQCCP to reflect new permit requirements with a special emphasis on the implementation of LID strategies in the SUA. Priority projects are required to implement the 2009 SWQCCP.
- **Local Development Standards Compatibility:** The Permittees recently reviewed development regulations in the context of the 2009 SWQCCP requirements. This review identified that the majority of codes and ordinances do not present barriers to the 2009 SWQCCP.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

Since mid-July 2009, the City has required Priority Projects to implement the 2009 SWQCCP. A fact sheet and Volume Reduction Calculator were developed to communicate changes to the SWQCCP and assist with compliance. **(L1)**

The City reviewed local development standards for compatibility with the 2009 SWQCCP and determined that the majority of Stockton's codes and ordinances do not present barriers to the 2009 SWQCCP. The City will continue to hold a dialogue with Public Works staff to discuss the potential of updating the Standard Specifications during the next revision. **(L1)**

County of San Joaquin

Since February 2010, the County has required Priority Projects to implement the 2009 SWQCCP. A fact sheet and Volume Reduction Requirement Calculator were developed to communicate changes to the SWQCCP and assist with compliance. **(L1)**

The County reviewed code and ordinances for barriers or impediments to the 2009 SWQCCP. The County also reviewed potential policy conflicts with other Departments. No incompatibilities were identified between the codes and ordinances or the policies. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No program modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Provide clear development standards for developers, design engineers, agency engineers, and planners to use in the selection and implementation of appropriate post-construction BMPs.

This objective will be met through implementation of specific performance standards, as detailed below.

Require Priority Projects to Comply with 2009 SWQCCP

The Permittees will continue to require Priority Projects to implement LID techniques as specified within the 2009 SWQCCP.

Revise 2009 SWQCCP, As Needed

The Permittees will update the 2009 SWQCCP as needed to clarify and correct any minor errors and/or unintentional omissions.

Revise Local Development Standards, As Needed

The Permittees will look for opportunities to revise standards to continue to ensure that LID techniques and the 2009 SWQCCP are promoted throughout Permittees' development standards.

Conduct Survey of Project Applicants

The Permittees will conduct a survey of project applicants to determine the effectiveness and user-friendliness of the 2009 SWQCCP. Survey results may be used in future revisions of the 2009 SWQCCP and/or in the development of outreach materials.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Require priority projects to comply with 2009 SWQCCP
- Revise 2009 SWQCCP, as needed
- Revise local development standards, as needed
- Conduct survey of project applicants

LD3 – Plan Review Sign-Off

2007- 2012 IMPLEMENTATION

Stormwater quality controls should be considered throughout the development plan review and approval process. Permittees provide a comprehensive review of development plans in order to ensure that stormwater controls minimize stormwater quality impacts. The Permittees' plan review activities include maintaining a post-construction plan review database and developing and implementing an inspection program. These activities are outlined below.

- **Post-Construction Plan Review Database/Checklist:** Permittees require that each Priority Project submit documentation on how the project complies with the requirements contained within the 2009 SWQCCP. Permittees utilize a database/checklist to document control measures proposed on the site plan.
- **Project Plan and Grading Plan Post-Construction BMP Review:** Permittees review project and grading plans to ensure that stormwater BMPs are incorporated.
- **Post-Construction BMP Tracking:** Permittees track all permanent post-construction BMPs to assist in monitoring and maintenance.
- **Priority Project Inspections:** Permittees have developed inspection programs to ensure that post-construction BMPs are properly constructed and maintained.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

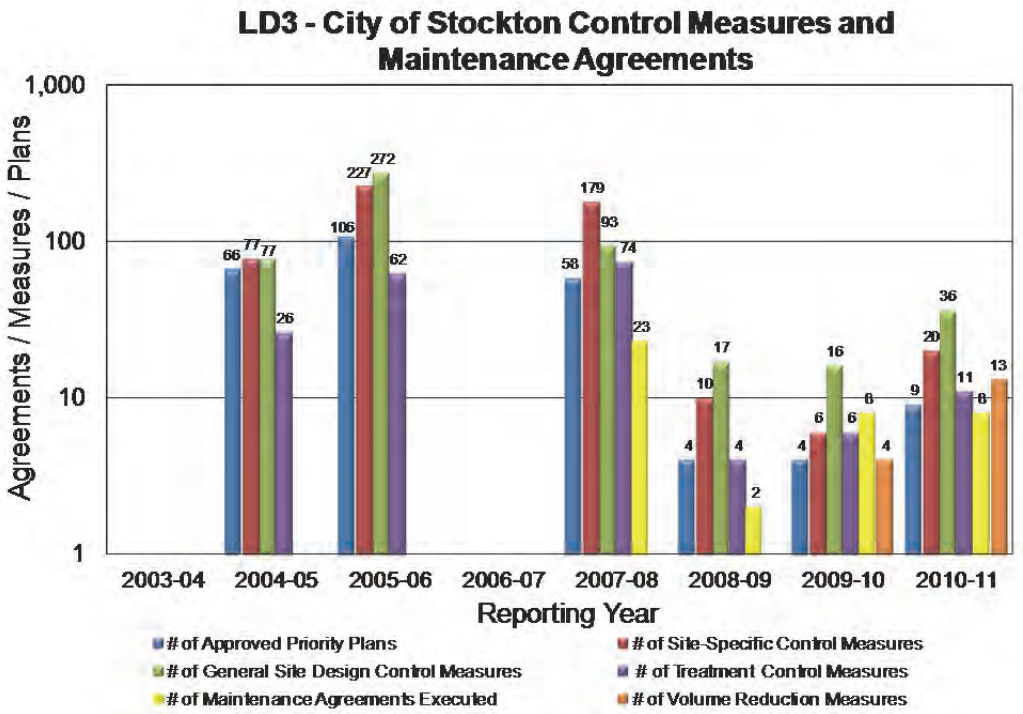
City of Stockton

The City continued to require submittal of a Stormwater Quality Control Plan (SWQCP) that documents how the project is complying with the 2009 SWQCCP. The City also uses the Microsoft Excel Volume Reduction Requirement Calculator to document control measures proposed on the site plan. **(L1)**

The City's Development Review Committee (DRC), which is made up of representatives from various departments, primarily reviews and approves larger projects and subdivisions and ensures that the erosion control, SWPPP requirements, and post-construction controls are identified and included on the tentative map. A MUD representative continues to participate on the DRC to ensure that post-construction stormwater quality controls are addressed and included during the planning of new development projects. **(L1)**

The City has a comprehensive database established for all developments projects reviewed for stormwater quality issues as well as for other requirements. **(L1)**

Since 2003, the City has reviewed nearly 250 Priority Project plans. Of the Priority Projects approved since 2003, 619 Site Design Controls, 536 Source Controls, 17 Volume Reduction Measures, and 184 Treatment Control Measures were incorporated. Note that Volume Reduction Measures were not required until the adoption of the revised SWQCCP in 2009. **(L1)**



The City completed the GIS layer of all post-construction BMPs that have been approved and constructed within the City to date. The City will continue to develop layers that identify devices maintained by the Consolidated Storm Drainage Maintenance Assessment District and identify the properties that benefit from those devices. **(L1)**

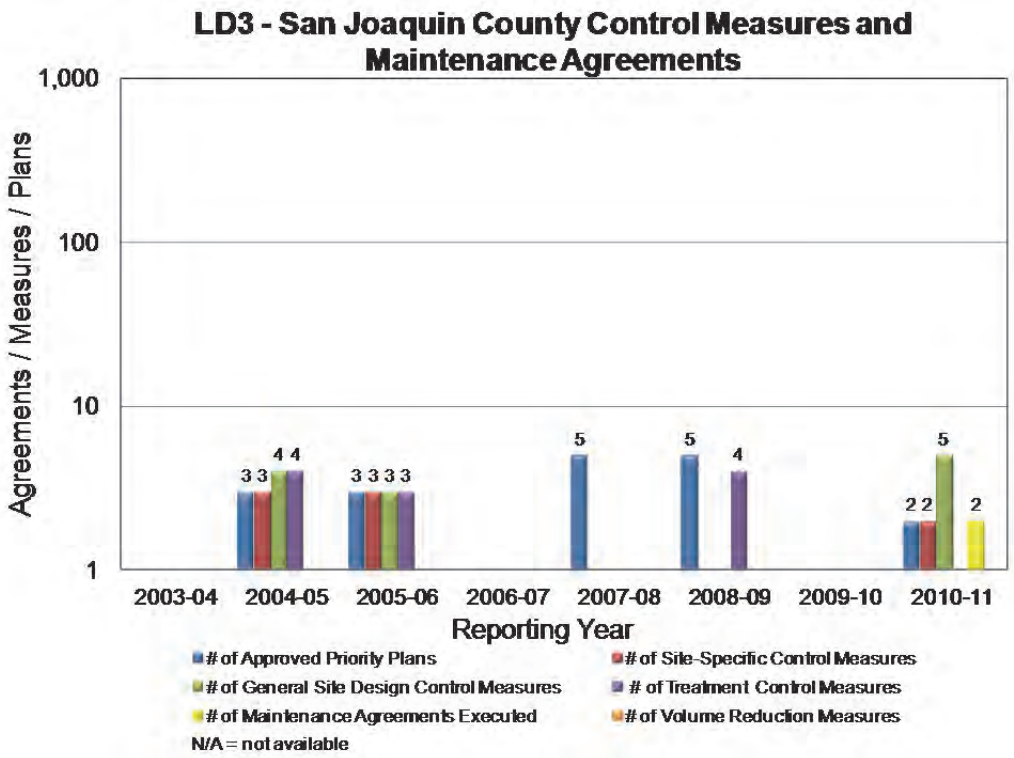
The City developed a fact sheet for the development community to summarize the SWQCCP requirements. **(L1)**

County of San Joaquin

The County reviewed and revised the plan review checklist to reflect the requirements outlined in the 2009 SWQCCP. In addition, Permittees developed a Microsoft Excel Volume Reduction Requirement Calculator to assist staff and private developers in meeting the new development requirements. The County is utilizing the revised Phase I Plan Review Checklist and Volume Reduction Requirement Calculator to review all new Priority Projects. **(L1)**

The County adopted a new software application (Permit Plus) that is aiding in inter-department communication and coordination for Plan Reviews. **(L1)**

Since 2003, 40 project applications have been reviewed, and 18 of those were approved. Of the 18 approved projects, 7 Site Design Controls, 6 Source Controls, and 11 Treatment Control Measures have been implemented for 18 priority projects. **(L1)**



The County created a GIS layer for tracking projects with post-construction BMPs, developed an inspection program, and established inspection fees. **(L1)**

The County developed a fact sheet for the development community to summarize the SWQCCP requirements. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No program modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Provide a comprehensive review of development plans to ensure that post-construction BMPs are properly selected to minimize stormwater quality impacts.

This objective will be met through implementation of specific performance standards, as detailed below.

Update Post-Construction Plan Review Database or Post-Construction Plan Review Checklist, As Needed

The Permittees updated their databases to reflect 2009 SWQCCP requirements during the 2007-2012 Permit term. The Post-Construction Plan Review Database will be updated as needed.

Implement Post-Construction Plan Review Checklist or Post-Construction Plan Review Database

The Permittees will continue to implement their Post-Construction Plan Review Database to document control measures proposed in site plans.

Review Project Plans and Grading Plans for Post-Construction BMPs

The Permittees will continue to review project and grading plans to ensure that post-construction BMPs are incorporated.

Track Projects with Post-Construction BMPs

The Permittees will continue to utilize GIS to plot and track all post-construction BMPs that have been approved and constructed. The following information is tracked:

- Municipal Project ID
- State WDID No.
- Project Acreage
- BMP Type and Description
- BMP Location (coordinates)
- Date of Acceptance
- Date of O&M Certification
- Inspection Date and Summary
- Corrective Action
- Date Certificate of Occupancy Issued

Conduct Inspections of Post-Construction BMPs during Construction

The Permittees will continue to utilize construction inspections to ensure that post-construction BMPs are constructed per the requirements of the 2009 SWQCCP.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Update Post-Construction Plan Review Checklist or Post-Construction Plan Review Database, as needed
- Implement Post-Construction Plan Review Checklist or Post-Construction Plan Review Database
- Review project plans and grading plans for post-construction BMPs
- Track projects with post-construction BMPs
- Conduct inspections of post-construction BMPs during construction

LD4 – Maintenance Agreement and Transfer

2007-2012 IMPLEMENTATION

Maintenance agreements and transfers ensure that selected post-construction stormwater control measures will remain effective upon project completion. As a condition of approval for all Priority Projects, the Permittees require the owner/developer/successor-in-interest (ODS) of stormwater Control Measures to provide proof of control measure maintenance in the form of a Stormwater Treatment Device Access and Maintenance Agreement and a Maintenance Plan.

- **Stormwater Treatment Device Access and Maintenance Agreement:** Permittees require the submittal of a stormwater maintenance agreement as a condition within the project approval process for Priority Projects. Responsible parties are required to operate and maintain any private facilities.
- **Post-Construction BMP Tracking Spreadsheet:** Permittees track privately and publically owned post-construction BMPs using GIS.
- **Maintenance Oversight Protocols:** Permittees implemented an oversight protocol that requires the owner of privately maintained post-construction BMPs to submit documentation that the unit has undergone periodic inspection, the manufacturer's general maintenance guidelines for the unit have been followed, and the unit continues to operate at peak performance.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton

The City continues to require and execute maintenance agreements for all post-construction BMPs. **(L1)**

The City has implemented GIS as a method for tracking post-construction BMPs. **(L1)**

The City finalized and implemented post-construction BMP maintenance oversight protocols. A letter was developed and sent to 68 owners of post-construction BMPs to remind them of their maintenance responsibilities and to request documentation of maintenance activities. Reponses were received from more than 73.5% of owners. A second, more severe letter was sent to owners who failed to respond to the first letter. **(L1)**

County of San Joaquin

The County continues to require maintenance agreements for all post-construction BMPs. **(L1)**

The County has implemented GIS as a method for tracking post-construction BMPs. **(L1)**

The County established post-construction BMP Maintenance oversight protocols. The County will conduct biannual inspection for commercial and residential properties and annual inspections for industrial facilities. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No program modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Ensure that selected post-construction BMPs will remain effective upon project completion by requiring a maintenance agreement and transfer or establishing a maintenance district zone for all priority development projects.

This objective will be met through implementation of specific performance standards, as detailed below.

Require Stormwater Treatment Control Access and Maintenance Agreement

The Permittees integrated the development/submittal of a stormwater maintenance agreement as a condition within the project approval process for Priority Projects. The Permittees will continue to require that a Maintenance Agreement be executed between the Permittee and the ODS for any private facilities who remain the responsible party in operating and maintaining the post-construction BMP(s).

Maintain Post-Construction BMP Tracking Spreadsheet

The Permittees will continue to maintain their respective Post-Construction BMP Tracking spreadsheets.

Implement Post-Construction Maintenance Oversight Protocols

The Permittees will continue to implement post-construction maintenance oversight protocols. The City implements a self-certification maintenance program and will continue to require ODS of post-construction BMPs to verify periodic inspection and maintenance (as needed). The County will continue to conduct post-construction BMP maintenance oversight during biannual commercial inspections and the annual industrial inspections.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Require stormwater treatment control access and Maintenance Agreement
- Maintain Post-Construction BMP Tracking spreadsheet
- Implement post-construction maintenance oversight protocols

LD5 – Training

2007-2012 IMPLEMENTATION

Training is important to the successful implementation of the Planning and Land Development Program Element. Effective training is one of the best pollution prevention BMPs that can be implemented because it prompts behavioral changes that are fundamentally necessary to protect water quality.

The objectives of the training are to:

- Increase the general awareness about the SWMP and Planning and Land Development program;
- Increase the awareness of the Planning and Land Development Control Measures and procedures; and
- Prompt the behavioral changes needed to protect and improve water quality.

ASSESSMENT

In this section, an assessment of the implementation of this Control Measure over the past five to 10 years is provided for the City and County. The outcome level that is associated with each metric is identified as L1 (Outcome Level 1), L2 (Outcome Level 2), etc.

City of Stockton and County of San Joaquin

Training during the 2007-2012 permit term primarily centered around the SWQCCP update. Staff attended stakeholder meetings during the SWQCCP revision and participated in the 2009 SWQCCP Workshop held in 2010. The Permittees held a design charrette for Permittee staff involved in project planning and design. Staff additionally attended a CASQA-approved training course on Qualified SWPPP Developer/ Qualified SWPPP Practitioner (QSD/ QSP) certification. These events provided training for more than 200 people, including 30 City employees and 28 County employees. **(L1)**

2012-2017 PROPOSED PROGRAM

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. No program modifications were identified for this Control Measure.

The objective of this Control Measure is to:

- Train employees who are responsible for Planning and Land Development activities about general stormwater issues, plan review, and development standards (e.g., SWQCCP).

This objective will be met through implementation of specific performance standards, as detailed below.

Review and Update Training Strategy

The Permittees will review and update their respective Training Strategies, as needed.

Conduct/Participate In Planning and Land Development Program Training

The Permittees will conduct/participate in Planning and Land Development Program training. Both internal and external training opportunities may be utilized to meet the intent of this performance standard.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Review and update Training Strategy
- Conduct Planning and Land Development Program training

2012-2017 Proposed Program

The objectives and implementation schedule for the proposed 2012-2017 Planning and Land Development Program are provided below.

OBJECTIVES

The objectives address the key components of the Planning and Land Development Program Element and identify that, in order to be effective, the program must:

- Continue to ensure that water quality and watershed protection principles are incorporated into policies and planning procedures, as needed.
- Provide clear development standards for developers, design engineers, agency engineers, and planners to use in the selection and implementation of appropriate post-construction BMPs.
- Provide a comprehensive review of development plans to ensure that post-construction BMPs are properly selected to minimize stormwater quality impacts.
- Ensure that selected post-construction BMPs will remain effective upon project completion by requiring a maintenance agreement and transfer or establishing a maintenance district zone for all priority development projects.
- Train employees who are responsible for Planning and Land Development activities about general stormwater issues, plan review, and development standards (e.g., SWQCCP).

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
LD1 – Incorporation of Water Quality Protection Principles into Procedures and Policies																			
Revise General Plan, As Needed	C															X		X	
LD2 – New Development Standards																			
Require Priority Projects to Comply with 2009 SWQCCP	C						X	X	X	X						X		X	
Revise 2009 SWQCCP, As Needed	C															X		X	
Revise Local Development Standards, As Needed	C															X		X	
Conduct Survey of Project Applicants	N			X												X		X	
LD3 – Plan Review Sign-Off																			
Update Post-Construction Plan Review Checklist, As Needed	C															X		X	
Implement Post-Construction Plan Review Checklist	C															X		X	
Review Project Plans and Grading Plans for Post-Construction BMPs	C															X		X	
Track Projects with Post-Construction BMPs	C															X		X	
Conduct Inspections of Post-Construction BMPs During Construction	C						X	X	X	X						X		X	
LD4 – Maintenance Agreement and Transfer																			
Require Stormwater Treatment Control Access and Maintenance Agreement	C															X		X	
Maintain Post-Construction BMP Tracking Spreadsheet	C															X		X	

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
Implement Post-Construction Maintenance Oversight Protocols	C															X		X	
LD5 – Training																			
Review and Update Training Strategy	C			X												X		X	
Conduct/participate in Planning and Land Development Program Training	C		X		X											X		X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Performance Standards and Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
LD1 – Incorporation of Water Quality Protection Principles into Procedures and Policies																			
Revise General Plan, As Needed	C										X						X		X
LD2 – New Development Standards																			
Require Priority Projects to Comply with 2009 SWQCCP	C						X	X	X	X	X						X		X
Revise 2009 SWQCCP, As Needed	C																		X
Revise Local Development Standards, As Needed	C										X	X					X		X
Conduct Survey of Project Applicants	N			X															X
LD3 – Plan Review Sign-Off																			
Update Post-Construction Plan Review Checklist, As Needed	C																X		X
Implement Post-Construction Plan Review Checklist	C																X		X
Review Project Plans and Grading Plans for Post-Construction BMPs	C																X		X
Track Projects with Post-Construction BMPs	C										X								X
Conduct Inspections of Post-Construction BMPs During Construction	C						X	X	X	X	X								X
LD4 – Maintenance Agreement and Transfer																			
Require Stormwater Treatment Control Access and Maintenance Agreement	C											X					X		X
Maintain Post-Construction BMP Tracking Spreadsheet	C																		X

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
Implement Post-Construction Maintenance Oversight Protocols	C																		X
LD5 – Training																			
Review and Update Training Strategy	C			X															X
Conduct/participate in Planning and Land Development Program Training	C		X		X														X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works

Section 9

Water Quality Based Programs

OVERVIEW

During the Permit term, WQBPs were developed and/or updated to address specific POCs that were identified as impacting or potentially impacting local receiving water quality in the SUA. Specific work plans addressing each of these POCs were designed to characterize the fate and transport of the POC and to assist with source identification and selection of the BMPs that should be implemented.

During the course of the Permit, the following pollutant-specific water quality-based plans were implemented:

- Pesticide Plan[1]
- Pathogen Plan[1]
- Mercury Plan[2]
- Low DO Plan[1]

As described in Section 1, the Permittees are proposing a slightly modified approach for the fourth term permit that would allow for a prioritization of water quality issues and POCs, as well as the ability to prioritize the stormwater program control measures and performance standards so that they may more specifically target the POCs, rather than focusing on other performance standards that do not have as direct an impact on the POCs.

The Water Quality Monitoring Program (Section 2) identifies the POCs that will form the basis of the stormwater program efforts as well as the proposed approach for the continued water quality monitoring program and data collection efforts. The Permittees have conducted a series of analyses and identified the POCs that will drive the implementation of the SWMP over the next permit term. The Permittees identified the POCs for the fourth term permit as the following:

- Pesticides (Chlorpyrifos, Pyrethroids)
- Pathogen Indicators (*E. coli*, Fecal Coliform)
- Mercury
- DO

Based on the results of the water quality monitoring and other analyses, the POCs identified for the stormwater program for the fourth term permit include and will continue to build upon the existing WQBPs.

The Program Elements described in Section 3 through Section 8 each include baseline Performance Standards (i.e., those efforts that should be a part of a functioning stormwater program), as well as those that specifically target the POCs.

The purpose of the Water Quality Based Programs section is to group the programmatic data and water quality monitoring data (from Sections 2-8) by POC (and thus by pollutant-specific plan) in order to report out on and assess the effectiveness of each of the water quality-based plans.

For the purpose of the ROWD, a discussion and assessment of the implementation of each WQBP is provided in the following sections, which are organized as follows:

---

[1] Continued from the second term permit

[2] Developed in response to the Permit requirements

- Overview
    - NPDES Permit Requirements
    - Other Regulatory Considerations
- 2007-2012 Implementation
- 2012-2017 Proposed Program
    - Approach
    - Assessment

Pesticide Plan

OVERVIEW

OP pesticides (including diazinon and chlorpyrifos) act by compromising the nervous systems of exposed organisms. They are broad-spectrum pesticides, used to kill a wide variety of insect pests, including ants, fleas, cockroaches, aphids, spiders, and wasps. However, they can also be highly toxic to birds, honeybees, other beneficial insects, and mammals. Following their widespread use in the 1990s, diazinon and chlorpyrifos became problematic within the environment. They are among the most commonly found pesticides in air, rain, and fog, with the highest concentrations present near major cities.

In June 2000, U.S. EPA announced an agreement with pesticide manufacturers to remove most products containing chlorpyrifos (Dursban) from retail sale and phase out most residential and selected professional uses by the end of 2001. Under terms of an agreement with pesticide manufacturers released in December 2000, residential outdoor and indoor uses and sales were to be phased out by the end of 2004. Additionally, most urban uses of diazinon were phased out by U.S. EPA on December 31, 2005.

As the OP pesticides diazinon and chlorpyrifos are phased out, a new generation of insecticides, including pyrethroids, will replace them as the most commonly used household and agricultural pesticides. Although pyrethroids are less toxic to birds and mammals than OP pesticides, they are still potentially harmful to aquatic life.[3] In addition, unlike diazinon and chlorpyrifos, pyrethroids are hydrophobic and tend to bind to sediment, as opposed to remaining in the water column, so they can be present in both water and sediment.

NPDES Permit Requirements

The 2002 303(d) list of impaired water bodies identified OP pesticides (in particular, diazinon and chlorpyrifos) as problematic pollutants that were impacting local waterbodies. In order to address the OP pesticide impairment of urban streams, and as specified in Provision D.18.a.v. of the second term permit, the Permittees developed the 2004 Pesticide Plan, which addressed the use of diazinon and chlorpyrifos by the City, the County, and others.[4] The 2004 Pesticide Plan included control measures and/or performance standards that focused on:

- Pesticide-specific outreach provided through the public education and outreach programs;
- Coordination with HHW collection agencies;
- Promotion of landscaping alternatives, such as the use of IPM;
- Assessment of the relative contribution of urban stormwater runoff to diazinon and chlorpyrifos concentrations in waterbodies of concern within the Permittees' jurisdiction; and
- A diazinon and chlorpyrifos mitigation program, should urban stormwater be a significant contributor.

The Permit included a requirement for the continued implementation of the 2004 Pesticide Plan (specified in Provision D.28.a) and incorporated the *Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos Total Maximum Daily Load* (SSJDDC TMDL). An updated Pesticide Plan was submitted to the Regional

[3] http://www.epa.gov/oppsrrd1/reevaluation/pyrethroids-pyrethrins.html

[4] The 2004 Pesticide Plan was provided to the public, interested parties, and the Regional Water Board for review, and after submitted comments were addressed, it was finalized with an addendum letter to Regional Water Board on September 22, 2004.

Water Board as a part of the 2008 SWMP on June 1, 2008. The Pesticide Plan was subsequently revised and submitted to the Regional Water Board on April 15, 2009 with the 2009 SWMP.

The 2009 Pesticide Plan built upon the previous plan and extended the Permittees' monitoring efforts to track a new generation of chemicals (pyrethroids), since they were being heavily used as a replacement for diazinon and chlorpyrifos. As such, the most important component of the 2009 Pesticide Plan may be the promotion of IPM, which is applicable to all types of pesticides. The 2009 Pesticide Plan included control measures and/or performance standards that focused on:

- Pesticide-specific outreach provided through the public education and outreach programs;
- Coordination with HHW collection agencies;
- Promotion of landscaping alternatives, such as the use of IPM;
- Monitoring of diazinon, chlorpyrifos, and pyrethroids.

Other Regulatory Considerations

Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL (In Effect)

Water samples collected starting from the mid-1990s from streams, sumps, and sloughs in Stockton during storm runoff events indicated that Stockton urban waterways contained concentrations of chlorpyrifos and diazinon in excess of California Department of Fish and Game (DFG) recommended values, and caused toxicity to invertebrates. In 2002, the Regional Water Board identified urban creeks in the Stockton area as being impaired for diazinon and chlorpyrifos, and placed them on the 2002 303(d) list.[5] The identified pesticide impairment of Sacramento-San Joaquin Delta (Delta) waterways led to the development of the SSJDDC TMDL. The *Basin Plan Amendment for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento-San Joaquin Delta* (Diazinon and Chlorpyrifos BPA) was adopted by the Regional Water Board on June 23, 2006[6] and was approved by the State Board, the Office of Administrative Law, and U.S. EPA by June 2007.

The TMDL recognized that U.S. EPA phase-out of urban diazinon and chlorpyrifos uses was expected to significantly reduce the concentrations of those pesticides in urban runoff. Since the Permittees already had a Pesticide Plan that had been developed and implemented, starting in 2004, the Regional Water Board identified that the Diazinon and Chlorpyrifos BPA would not require the Permittees to implement additional management measures or treatment technology to control diazinon or chlorpyrifos nor to increase the monitoring of those pesticides. The WQOs for chlorpyrifos and diazinon as presented in the Diazinon and Chlorpyrifos BPA are included in **Table 9-1**.

[5] SWRCB. 2003. Final 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments (Region 5). State Water Resources Control Board (SWRCB). Sacramento, California. Available at: http://www.waterboards.ca.gov/tmdl/docs/2002reg5303dlist.pdf.

[6] SWRCB. 2006. Delta Diazinon and Chlorpyrifos TMDL-Final Basin Plan Amendment Staff Report, June 2006. State Water Resources Control Board (SWRCB). Sacramento, California. Available at: http://www.swrcb.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/delta_op_pesticide/index.shtml.

Table 9-1. Water Quality Objectives for Chlorpyrifos and Diazinon as Presented in the Basin Plan Amendment for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento-San Joaquin Delta

Pesticide	Acute (1-hour average) Maximum Concentration[1]	Chronic (4-day average) Maximum Concentration[1]
Chlorpyrifos	0.025 µg/L	0.015 µg/L
Diazinon	0.16 µg/L	0.10 µg/L

[1] Not to be exceeded more than once in a three-year period.

The Regional Water Board also established the Loading Capacity (LC) for the Delta Waterways, as follows:

$$\frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} = S, S \leq 1$$

Where:

C_D = Diazinon concentration in the receiving water (µg/L)

C_C = Chlorpyrifos concentration in the receiving water (µg/L)

WQO_D = Acute or chronic diazinon water quality objective (µg/L)

WQO_C = Acute or chronic chlorpyrifos water quality objective (µg/L)

S = The sum. A sum equal to, or exceeding, one (1.0) indicates that the beneficial use may be impacted.

The Waste Load Allocations (WLAs) and Load Allocations (LAs) for point source discharges to the Delta Waterways are equivalent to the LC defined above. In order to ensure that the pesticide impairment of Stockton urban waterways is being addressed, the Permittees will continue to implement the Pesticide Plan.

Central Valley Pesticide TMDL (Under Development)

The Central Valley Pesticide TMDL process was initiated in 2006 and is an effort to develop a comprehensive pesticide BPA for the Sacramento and San Joaquin River watersheds, including the Delta. The Amendment would be designed to establish WQOs and a program of implementation for pesticides that are impacting or could potentially impact aquatic life uses in surface waters. The focus of this BPA would be on natural streams that have aquatic life uses and on those pesticides that have the greatest potential to impact aquatic life.

As a part of the TMDL process, the Regional Water Board contracted with the University of California, Davis to develop a methodology for determining water quality criteria, along with water quality criteria documents for specific pesticides. To date, water quality criteria documents have been finalized for chlorpyrifos, diazinon, diuron, and malathion, as well as the pyrethroids bifenthrin, lambda-cyhalothrin, cyfluthrin, cypermethrin, and permethrin. The Regional Water Board is planning a two-phased process, with the first phase consisting of a BPA for diazinon and chlorpyrifos, and the second phase consisting of a BPA for pyrethroid pesticides.

Although this TMDL is still under development, the regulatory framework under consideration would include beneficial uses, site specific numeric WQOs, implementation policies, and/or monitoring requirements. The Permittees will continue to track and participate in the development of this TMDL.

2007-2012 IMPLEMENTATION

A brief summary of the implementation actions and water quality monitoring program results is provided below.

Stormwater Program Activities

The Permittees conduct a number of activities under other Program Elements that support the Pesticide WQBP. The performance standards are part of the Public Outreach and Municipal Operations Programs and are summarized below.

Public Outreach

The Pesticide Plan relies heavily on public education and outreach efforts that promote less toxic pest control methods and the use of IPM strategies. Education and outreach efforts during the Permit term focused on public outreach to residential users via outreach materials distributed at local hardware stores, public events, and the websites (see **Section 4**). Public education and outreach efforts included the following:

- **OWOW Program Outreach:** The Permittees participated in the University of California (UC) Statewide IPM Program with Orchard Supply Hardware to encourage the use of less toxic products and proper disposal of pesticides.
- **Annual Public Outreach Messages:** The Permittees promoted educational materials through their websites to encourage IPM practices. In addition, the City installed and maintained an electronic IPM kiosk. The kiosk is located in City Hall and provides residents with information on IPM, proper use and disposal of pesticides, pest identification, runoff, and water conservation. The kiosk also holds literature racks with additional fact sheets from the OWOW Program.
- **Pest Control Workshops:** The County's Solid Waste Division supported the San Joaquin UC Master Gardeners Program during the Permit term. Home Gardening Sessions were hosted by the Master Gardeners of San Joaquin UC Cooperative Extension (UCCE). The Home Gardening Sessions are held monthly highlighting particular topics in the garden. The IPM session is held annually. Safer pesticide use, less-toxic pesticide alternatives, and the use of native plants to minimize the need for pesticides and reduce water use continue to be program guidelines.
- **Survey of Pesticides Available to the Public:** The Permittees developed a survey during 2008-2009[7], and the first survey was completed during the 2009-2010 reporting year (Appendix I-1 of the 2009-2010 Annual Report). The second survey was conducted during 2011-2012, and the 2011 Pesticide Survey Assessment is included as **Appendix I-2**.
- **Coordination with HHW Collection:** The Permittees promote the County's HHW Program on their websites. The County maintains and updates hazardous waste disposal information on its website[8] to inform the public of proper pesticide handling and disposal procedures. During the Permit term, the Permittees collected pesticide liquids and solids via the HHW Program (see **Section 4**).

[7] The survey design and protocols were submitted with the 2009 Annual Work Plan, and were included as Appendix I-1 in the 2008-2009 Annual Report

[8] http://www.sjgov.org/solidwaste/HHW facility home.htm

Municipal Operations

The Pesticide Plan also relies on Municipal Operations efforts that promote less toxic pest control methods and use of IPM (see **Section 5**). The Permittees' Municipal Operations activities included the following:

- **Implement Pesticide and Fertilizer Application Protocol and Develop Formal Document Describing IPM-Related Policies and Procedures:** During the Permit term, the Permittees reviewed and modified their IPM policies and procedures, including pesticide, herbicide, and fertilizer application protocols.
- **Implement IPM Program and Landscaping Standards:** The Permittees and their contractors implemented their IPM Programs, which focus on the long-term prevention and elimination of pests through a combination of alternative approaches on municipally owned land (e.g., parks, golf courses). The programs include protocols for routine and non-routine use of pesticides and fertilizers, as well as the City's Landscaping Standards for reduction of herbicide and pesticide use by means of appropriate plant selection and usage.
- **Maintain and Expand Internal Inventory on Pesticide Use:** The Permittees annually compiled pesticide use data for contractors (City) and the Department of Parks and Recreation (County) and summarized this information in the Annual Reports.
- **Training for Municipal Employees:**
    - City of Stockton: Because pesticide application is now primarily performed by outside contractors, training for municipal employees on proper pesticide application protocols is no longer necessary. Contract language for outside contractors performing pest management and landscape maintenance promotes the use of IPM.
    - County of San Joaquin: The County incorporates IPM practices into Module 2, Municipal Operations training and supports additional training offered to the Channel Maintenance Division's pesticide applicators required by the State. In addition, the County's pesticides applicators, hosted by the County's State Licensed Pesticide Control Advisor undergo quarterly development updates and pesticide application and safety training. Record Keeping and licensing is kept in accordance with the County's IPM Policies and Practices Guide.

Water Quality Monitoring Results[9]

The Permittees conducted pesticide monitoring from 2004-2008 under the Pesticide Plan adopted in 2004. The data gathered from these monitoring events were summarized in the 2007 ROWD. The Permittees submitted a Pesticide Plan Update in April 2009 that included revised monitoring efforts to reflect requirements in the third term permit. The Permittees added pyrethroids to the analyte list because pyrethroids are replacing diazinon and chlorpyrifos as the pesticide most used by urban and agricultural users. Monitoring in accordance with the Pesticide Plan Update began in July 2008 and continued through the Permit term.

During 2004-2011, monitoring was conducted in the Calaveras River (CR-2R), Mosher Slough (MS-14, MS-14R), Five-Mile Slough (5M-R), and Smith Canal (SC-5R). The monitoring locations are shown in **Figure 9-1**. Monitoring was conducted for chlorpyrifos and diazinon in all waterbodies and for pyrethroids in urban runoff/discharges during the following time periods:

[9] Data are included as **Appendix I-1**.

- One wet weather event during the dormant spray season: December – March [Dormant Spray Season]
- One wet weather event following the dormant spray season: March – June [Non-Dormant Spray Season]
- One event during the dry season: June – October [Dry Weather]

The data collected since 2004 are included this assessment. During this timeframe, the events specified in **Table 9-2** were conducted at the Pesticide Plan monitoring sites.

Table 9-2. 2004-2011 Pesticide Plan Monitoring

		Number of Events, by Type		
			Dormant Spray Season	Non-Dormant Spray Season
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**	**Wet Weather**
Mosher Slough	MS-14D	5	7	5
	MS-14RUS	5	6	5
	MS-14R	5	7	5
Five Mile Slough	FM-3R	4	5	3
Calaveras River	CR-2R	4	5	3
Smith Canal	SC-5R	4	5	3
Rainwater Collection Sites	NE-Rain	0	4	4
	NW-Rain	0	4	4

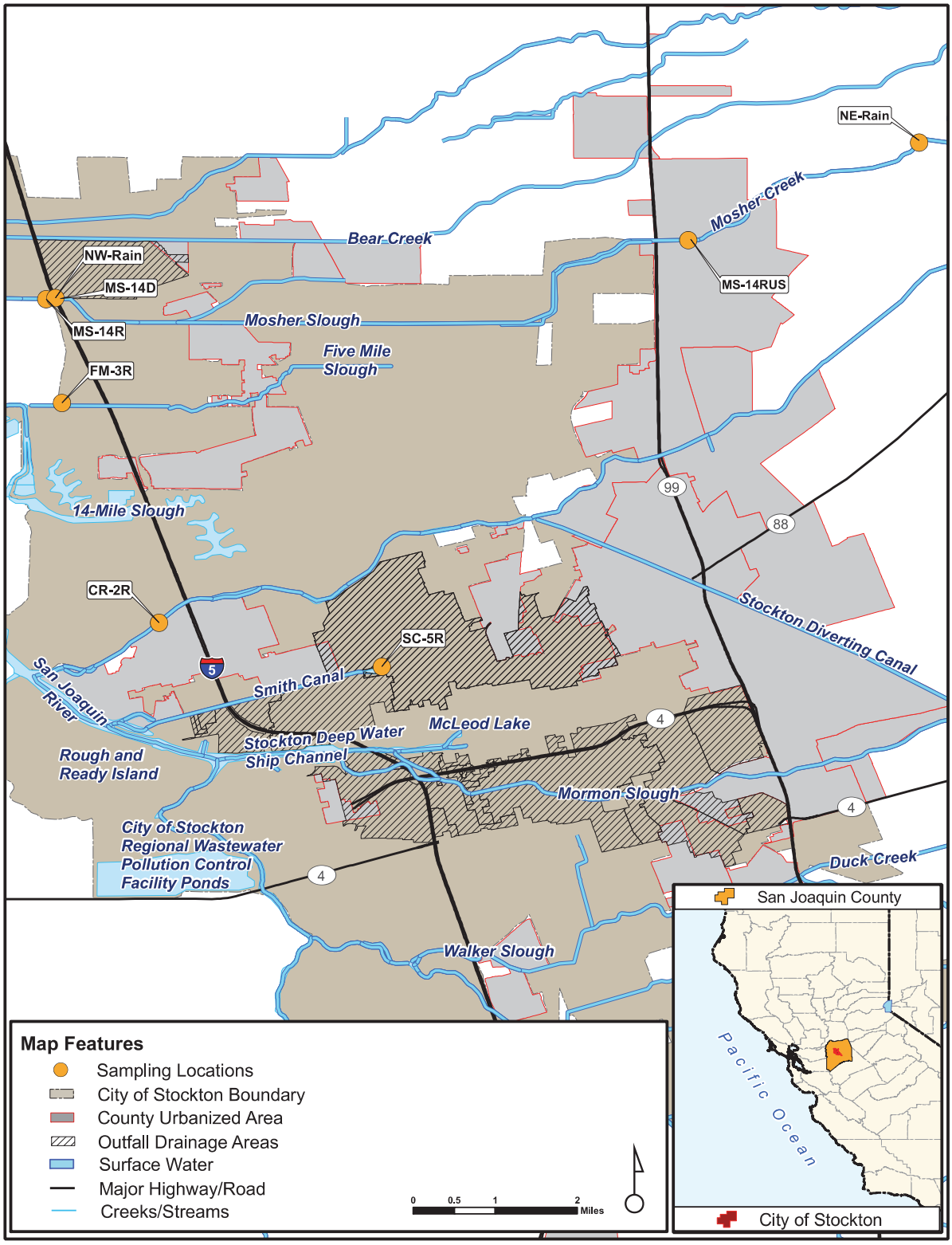


Figure 9-1. Pesticide Plan Monitoring Locations for 2004-2011

MS=Mosher Slough, 5M=Five-Mile Slough, CR=Calaveras River, SC=Smith Canal; R=Receiving Water

Pesticide Plan Monitoring Results

During 2004-2008, a total of 33 samples (receiving water, urban runoff, and rainwater) was collected and analyzed for diazinon and chlorpyrifos, and a total of 42 samples (receiving water, urban runoff, and rainwater) was collected and analyzed for pyrethroids. These data were collected in accordance with the 2004 Pesticide Plan and were summarized and analyzed in the 2007 Stockton ROWD. The frequency of detection and the rate of WQO exceedances for each constituent and sample type are shown in **Table 9-3** (wet weather events) and **Table 9-4** (dry weather events).

Table 9-3. Frequency of Detections and WQO Exceedances during the Pesticide Plan (2004-2008) for Wet Weather Events

Pesticide and Sample Type	Number of Samples[c]	Number of Detections	Detection Rate	Number of Samples above the WQO[a]	WQO Exceedance Rate
Chlorpyrifos					
Receiving Water	15	2	13%	2	13%
Urban Runoff	5	2	40%	2	40%
Rainwater	4	1	25%	1	25%
Diazinon					
Receiving Water	15	10	67%	3	20%
Urban Runoff	5	4	80%	2	40%
Rainwater	4	1	25%	0	0%
Pyrethroids					
Receiving Water	15	0	0%	NA[b]	NA
Urban Runoff	5	0	0%	NA[b]	NA
Rainwater	0	0	0%	NA[b]	NA

Notes:
a = WQOs for diazinon and chlorpyrifos for the Delta Waterways are provided in Table 9-1.
b = Although there are no applicable WQOs for pyrethroids, future annual reports will compare the data to the criteria proposed within the UC Davis Water Quality Criteria Reports.
c = During three events in December 2004 and January 2005, chlorpyrifos and diazinon were analyzed at a higher MDL than that used for subsequent events. The results for these three events were excluded from this table.

Table 9-4. Frequency of Detections and WQO Exceedances during the Pesticide Plan (2004-2008) for Dry Weather Events

Pesticide and Sample Type	Number of Samples[c]	Number of Detections	Detection Rate	Number of Samples above the WQO[a]	WQO Exceedance Rate
Chlorpyrifos					
Receiving Water	7	0	0%	0	0%
Urban Runoff	2	0	0%	0	0%
Diazinon					
Receiving Water	7	0	0%	0	0%
Urban Runoff	2	0	0%	0	0%
Pyrethroids					
Receiving Water	7	0	0%	NA[b]	NA
Urban Runoff	2	0	0%	NA[b]	NA

Notes:
a = WQOs for diazinon and chlorpyrifos for the Delta Waterways are provided in (result of insert ref to entire caption:) Table 9-1.
b = Although there are no applicable WQOs for pyrethroids, future annual reports will compare the data to the criteria proposed within the UC Davis Water Quality Criteria Reports.
c = During three events in December 2004 and January 2005, chlorpyrifos and diazinon were analyzed at a higher MDL than that used for subsequent events. The results for these three events were excluded from this table.

During 2008-2011, a total of 55 samples (receiving water, urban runoff, and rainwater) was collected and analyzed for diazinon, chlorpyrifos, and pyrethroids. Complete monitoring data were submitted as appendices to the 2008-2009 Annual Report, 2009-2010 Annual Report, and 2010-2011 Annual Report. In cases of non-detection, results are reported as "less than" the method detection limit. The frequency of detection and the rate of WQO exceedances for each constituent and sample type are shown in **Table 9-5** (wet weather events) and **Table 9-6** (dry weather events).

Table 9-5. Frequency of Detections and WQO Exceedances during the Pesticide Plan (2008-2011) for Wet Weather Events

Pesticide and Sample Type	Number of Samples	Number of Detections	Detection Rate	Number of Samples above the WQO[a]	WQO Exceedance Rate
Chlorpyrifos					
Receiving Water	24	3	13%	2	8%
Urban Runoff	5	2	40%	2	40%
Rainwater	8	4	50%	4	50%
Diazinon					
Receiving Water	24	9	38%	0	0%
Urban Runoff	5	3	60%	0	0%
Rainwater	8	8	100%	1	13%
Pyrethroids					
Receiving Water	24	11[b]	46%	NA[c]	NA
Urban Runoff	5	5[b]	100%	NA[c]	NA
Rainwater	8	2[b]	25%	NA[c]	NA

Notes:
a = WQOs for diazinon and chlorpyrifos for the Delta Waterways are provided in Table 9-1.
b = Number of samples where one or more pyrethroids were detected
c = Although there are no applicable WQOs for pyrethroids, future annual reports will compare the data to the criteria proposed within the UC Davis Water Quality Criteria Reports.

Table 9-6. Frequency of Detections and WQO Exceedances during the Pesticide Plan (2008-2011) for Dry Weather Events

Pesticide and Sample Type	Number of Samples	Number of Detections	Detection Rate	Number of Samples above the WQO[a]	WQO Exceedance Rate
Chlorpyrifos					
Receiving Water	15	1	7%	1	7%
Urban Runoff	3	0	0%	0	0%
Diazinon					
Receiving Water	15	5	33%	0	0%
Urban Runoff	3	1	33%	0	0%
Pyrethroids					
Receiving Water	15	1[b]	7%	NA[c]	NA
Urban Runoff	3	2[b]	66%	NA[c]	NA

Notes:
a = WQOs for diazinon and chlorpyrifos for the Delta Waterways are provided in Table 9-1.
b = Number of samples where one or more pyrethroids were detected
c = Although there are no applicable WQOs for pyrethroids, future annual reports will compare the data to the criteria proposed within the UC Davis Water Quality Criteria Reports.

Comparisons of the two sets of results from 2004-2008 and 2008-2011are summarized in **Table 9-7** and **Table 9-8**.

Table 9-7. Detection Rates and WQO Exceedances Observed for 2004-2008 and 2008-2011 Pesticide Plan Monitoring for Wet Weather Events

Pesticide and Sample Type	Detection Rate		WQO Exceedance Rate	
	2004-2008	2008-2011	2004-2008	2008-2011
Chlorpyrifos				
Receiving Water	13%	13%	13%	8%
Urban Runoff	40%	40%	40%	40%
Rainwater	25%	50%	25%	50%
Diazinon				
Receiving Water	67%	38%	20%	0%
Urban Runoff	80%	60%	40%	0%
Rainwater	25%	100%	0%	13%
Pyrethroids				
Receiving Water	0%	46%	NA	NA
Urban Runoff	0%	100%	NA	NA
Rainwater	0%	25%	NA	NA

Table 9-8. Detection Rates and WQO Exceedances Observed for 2004-2008 and 2008-2011 Pesticide Plan Monitoring for Dry Weather Events

Pesticide and Sample Type	Detection Rate		WQO Exceedance Rate	
	2004-2008	2008-2011	2004-2008	2008-2011
Chlorpyrifos				
Receiving Water	0%	7%	0%	7%
Urban Runoff	0%	0%	0%	0%
Diazinon				
Receiving Water	0%	33%	0%	0%
Urban Runoff	0%	33%	0%	0%
Pyrethroids				
Receiving Water	0%	7%	NA	NA
Urban Runoff	0%	66%	NA	NA

Assessment of WQO Exceedance Rates[10]

When comparing the data collected from 2004-2008 to those data collected from 2008-2011, the following observations may be made. In general, wet weather was more problematic than dry weather.

Chlorpyrifos

- Wet Weather Events: Although a slight decrease in the WQO exceedance rate (from 13% to 8%) was observed for receiving water samples, the WQO exceedance rate for urban runoff samples remained the same (40%), and those for rainwater samples increased (from 25% to 50%).
- Dry Weather Events: For receiving water samples, the WQO exceedance rate increased slightly (from 0% to 7%). No detections in urban runoff were observed during dry weather events.

Diazinon

- Wet Weather Events: The WQO exceedance rates decreased for both receiving water and urban runoff samples (from 20% to 0% and from 40% to 0%, respectively). However, the WQO exceedance rate increased for rainwater samples (from 0% to 13%). The one WQO exceedance for diazinon occurred in rainwater collected from a site outside of the SUA.
- Dry Weather Events: No WQO exceedances occurred.

Pyrethroids

- Pyrethroids were not detected in any samples prior to 2008, so the detection rate increased to 46% in receiving water samples, 100% in urban runoff samples, and 25% in rainwater samples. Currently, no WQOs have been established for pyrethroids.

[10] There is some question as to the applicability of these WQOs and criteria to stormwater discharges. It is not clear that a proper Water Code section 13241 analysis was performed on the state WQOs used herein. In addition, the State Board has determined that the federal water quality criteria, such as are contained in the CTR, do "not apply to regulation of storm water discharges." *See* SWRCB Policy for Implementation of Toxics Standards for the Inland Surface Waters, Enclosed Bays, and Estuaries of California at pg. 1, fn 1; *see also* CTR Preamble, 65 Fed. Reg. 31682 (5/18/00), which does not identify municipal stormwater as a potentially affected entity. Moreover, there is no indication that these objectives and criteria were ever intended to be applied to stormwater discharges at the end of pipe. Nevertheless, these objectives and criteria are used herein for a conservative evaluation of exceedances.

Spatial and Temporal Trends Observed during Pesticide Plan Monitoring Period of Record (2004-2011)

To display the wet and dry weather chlorpyrifos, diazinon, and pyrethroid data collected during the Pesticide Plan and elucidate spatial and temporal variations in pesticide concentrations, a GIS tool was utilized, as shown in **Figure 9-2** through **Figure 9-5**. A few general trends were observed, as discussed below.

Chlorpyrifos

Spatial and temporal trends observed for chlorpyrifos during 2004-2011 Pesticide Plan monitoring are shown in **Figure 9-2**.

- Chlorpyrifos data collected indicated that relative to prior years, the number of detections increased during 2009-2010. This was particularly true for the post dormant wet weather event on March 21, 2010, during which chlorpyrifos concentrations exceeded WQOs for rainwater, urban discharge, and receiving water.
- Four of the eight rainwater samples (50%) collected during 2004-2011 contained chlorpyrifos at concentrations above the acute WQO, and an additional sample exceeded the chronic WQO. The presence of chlorpyrifos in rainwater after the phase-out suggests that, in some cases, rainwater may already contain chlorpyrifos concentrations above the WQO before it falls to the ground.
- Samples collected from Mosher Slough monitoring sites (MS-14R, MS-14D, MS-14RU) exhibited the most detections, which were primarily observed during wet weather events.

The continued WQO exceedances of chlorpyrifos in urban runoff samples suggest that the phase-out by U.S. EPA (completed in 2005) has not yet been fully realized in terms of reducing chlorpyrifos impacts via stormwater.

Diazinon

Spatial and temporal trends observed for diazinon during 2004-2011 Pesticide Plan monitoring are shown in **Figure 9-3**. As discussed below, and consistent with previous monitoring results, data collected indicate that WQOs for diazinon are consistently attained in SUA waterways.

- The consistent presence of diazinon in rainwater after the phase-out of diazinon by U.S. EPA suggests that, in some cases, rainwater may have already contained diazinon concentrations above the DFG WQO before it even falls to the ground.
- All detections of diazinon during the current Permit term (except for one rainwater sample collected on December 21, 2008) have been at levels below relevant WQOs.

The lack of diazinon WQO exceedances in either urban runoff or receiving water samples indicates that diazinon is no longer a pollutant of concern in SUA waterways.

Pyrethroids

Pyrethroids were monitored in water column samples from urban discharges and receiving waters. Spatial and temporal trends are shown in **Figure 9-4** and **Figure 9-5** for wet and dry weather, respectively. Pyrethroid results for 2004-2008 were all non-detect and thus were not included in the figures. Although there are no applicable WQOs for pyrethroids, future annual reports will compare the data to the criteria proposed within the UC Davis Water Quality Criteria Reports.

- During 2008-2011, pyrethroids were detected at all sites, and detections were greater in wet weather events.

- In 2010-2011, bifenthrin was most frequently detected (3 detections total, at two sites, MS-14D and FM-3R); permethrin was detected twice (once at MS-14D and once at SC-5R during the wet weather event); and prallethrin was detected once (at MS-14D). In contrast, a greater range of pyrethroids had been detected at multiple locations during the 2009-2010 monitoring year, and had been more frequently detected during wet weather events.
- Pyrethroids were most frequently detected at the urban discharge location on Mosher Slough, MS-14D and the upstream Mosher Slough site, MS-14RUS. However, detections of pyrethroids were less frequent for the downstream receiving water site on Mosher Slough, MS-14R.
- During 2009-2010, pyrethroids had been added to the constituents monitored in rainwater to more comprehensively characterize sources of pyrethroids to the water column. Pyrethroids were detected during the post-dormant wet weather event in both rainwater sampling locations in 2010. Due to low rainfall totals during the March 2, 2011 wet weather event, sufficient rainfall was not collected for analysis; however, rainfall will continue to be sampled to assess whether it is a source of pyrethroids to the water column.

Since pyrethroids tend to bind with sediments, most pyrethroid studies to date have focused on sediment samples; however, recent research has begun to focus on pyrethroids in the water column, and a recent publication has shown that they are ubiquitous in urban runoff within the Central Valley.[11] The 2008-2011 Pesticide Plan results confirm that pyrethroids are present in Stockton area waterways, and the focus of continued Pesticide Plan monitoring should be on pyrethroids. In future annual reports, in the absence of WQOs, pyrethroid monitoring results will be compared with other available values in order to gauge the extent of urban contributions.[12]

[11] Weston, DP, Lydy, MJ. 2010. Urban and agricultural sources of pyrethroid insecticides to the Sacramento-San Joaquin Delta of California. Environmental Science and Technology 44, 1833-1840.

[12] http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/index.shtml

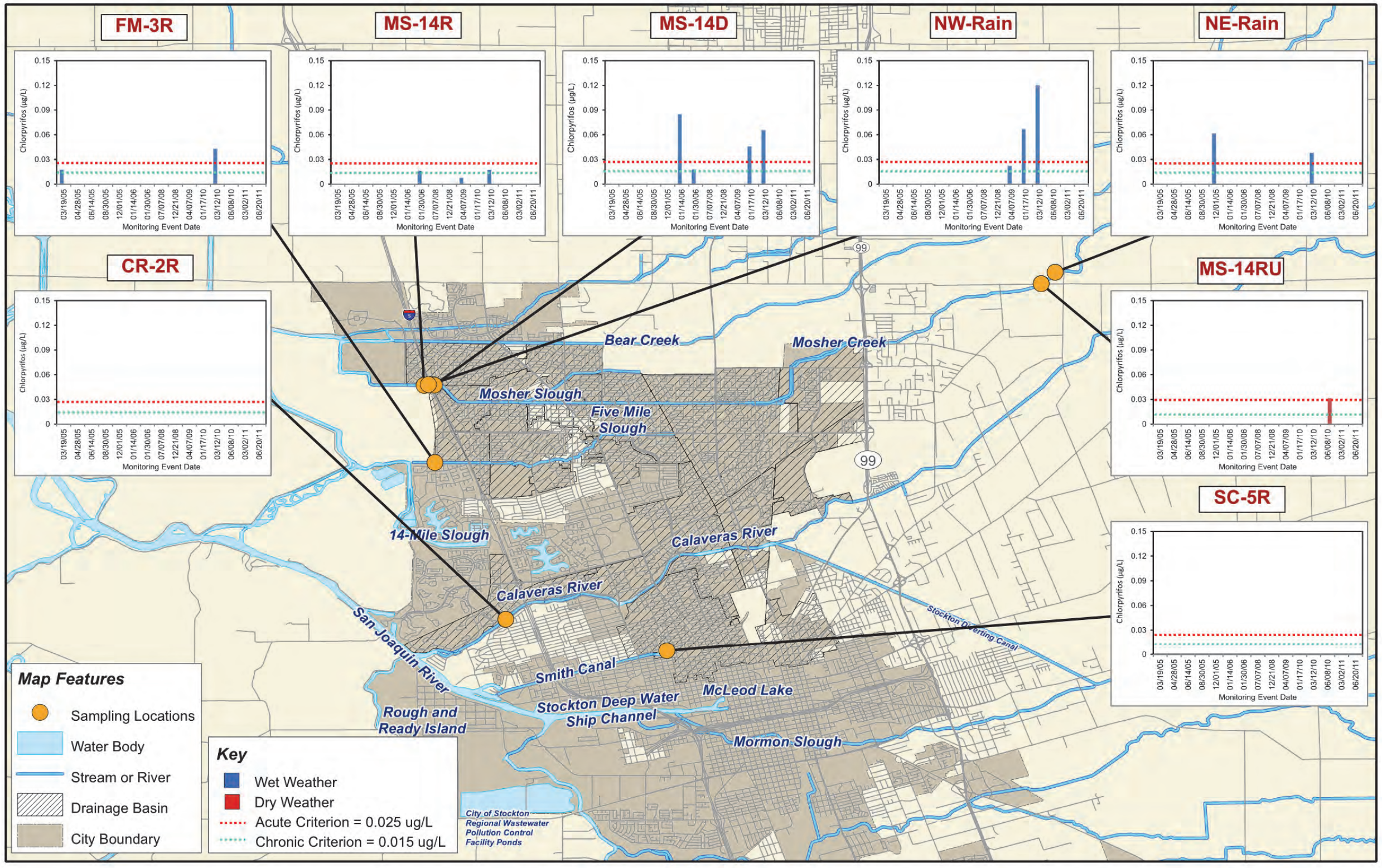


Figure 9-2. Chlorpyrifos Concentrations Observed During Pesticide Plan Monitoring (2004-2011)

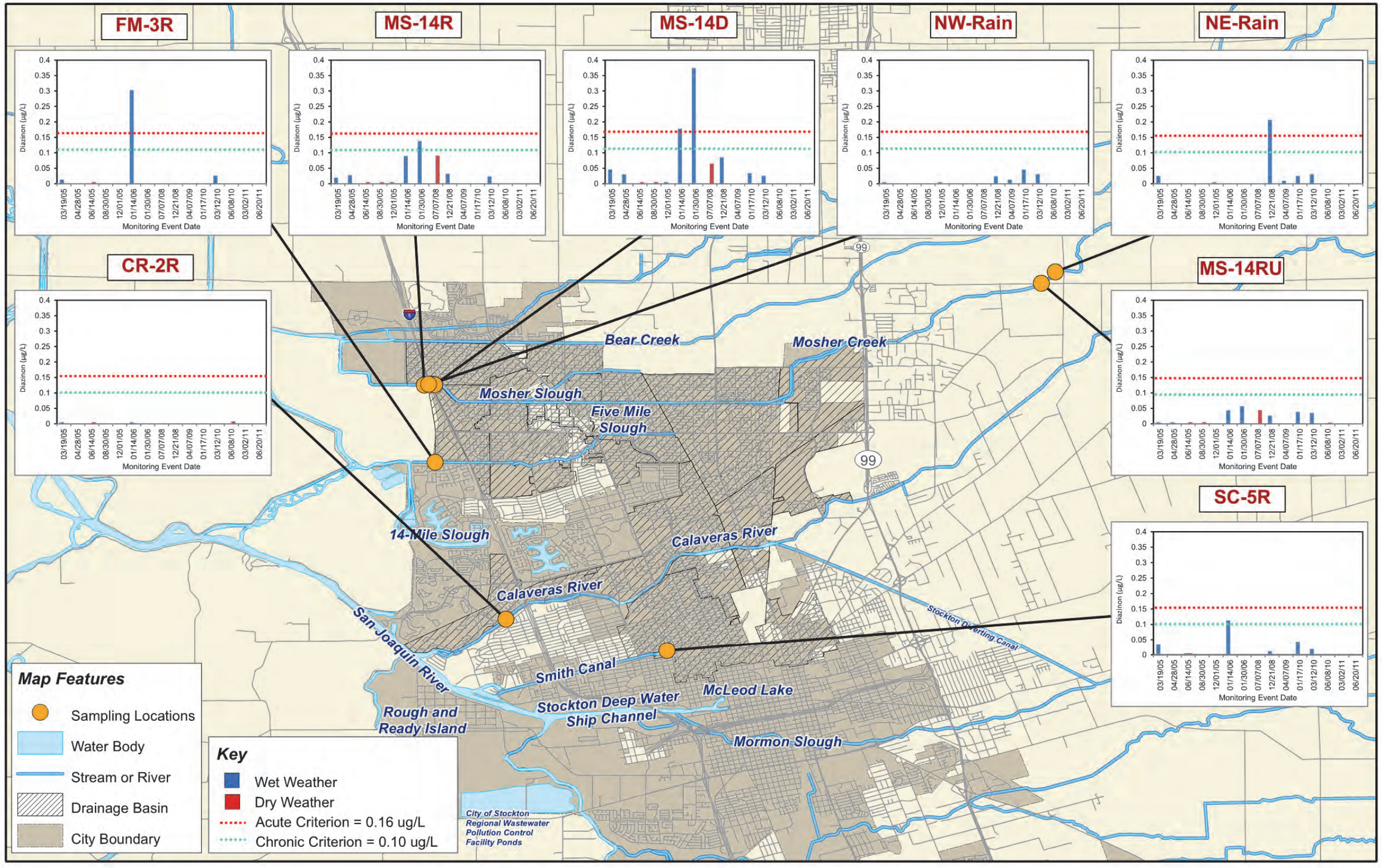


Figure 9-3. Diazinon Concentrations Observed During Pesticide Plan Monitoring (2004-2011)

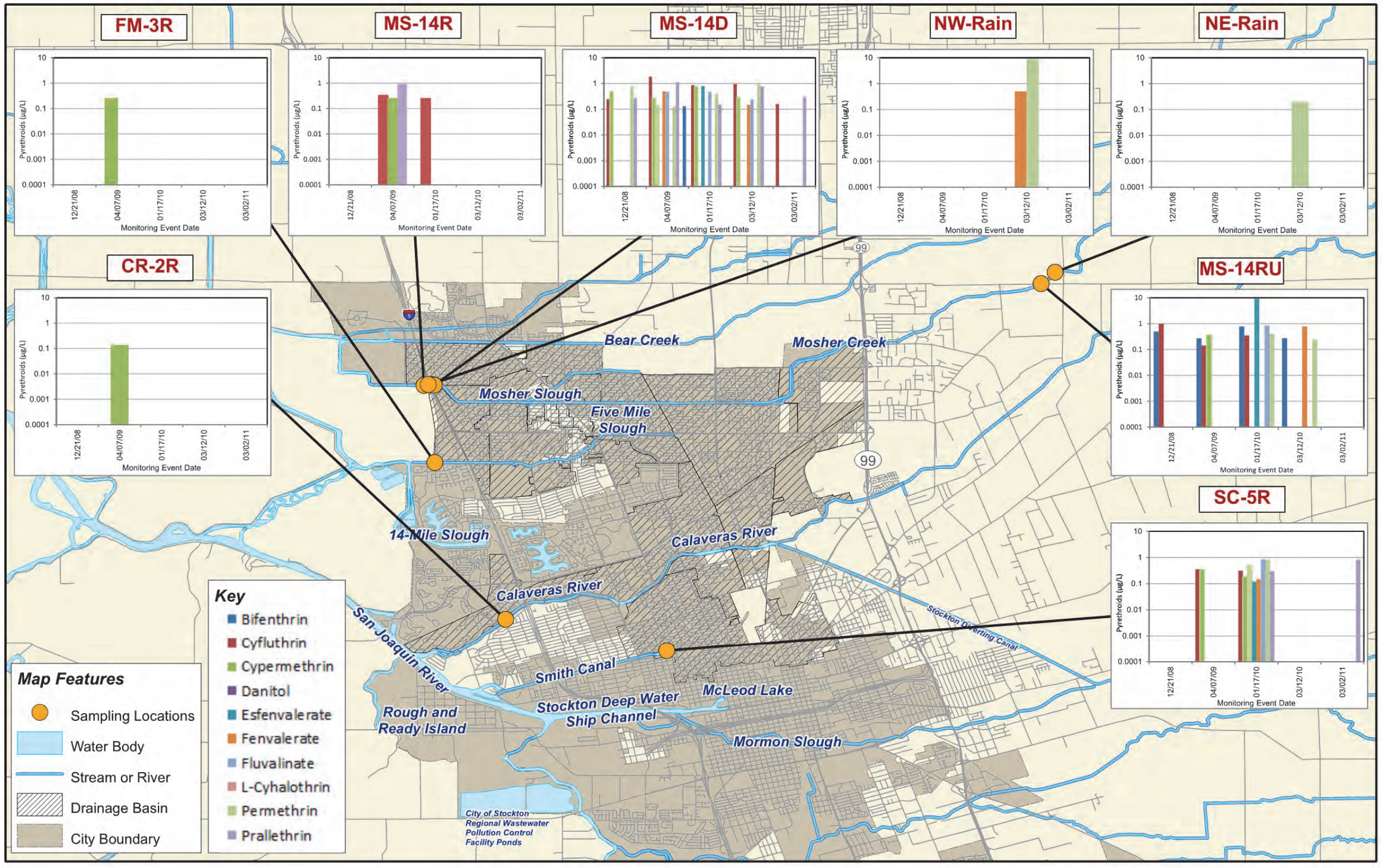


Figure 9-4. Wet Weather Pyrethroid Concentrations Observed During Pesticide Plan Monitoring (2008-2011)

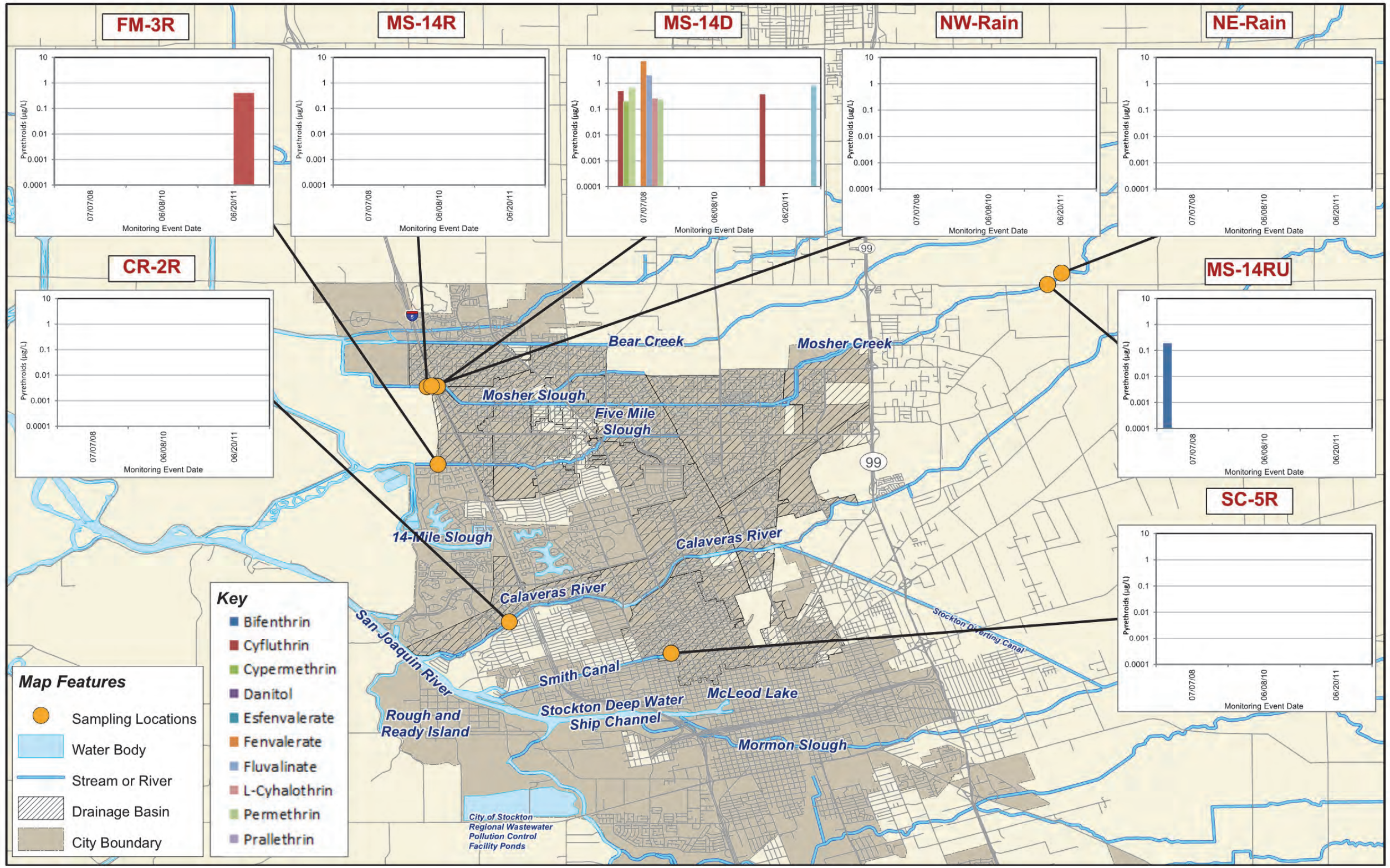


Figure 9-5. Dry Weather Pyrethroid Concentrations Observed During Pesticide Plan Monitoring (2008-2011)

2012-2017 PROPOSED PROGRAM

The overall goal of the Pesticide Plan is to protect water quality by implementing IPM and the associated BMPs in order to minimize or eliminate pesticides in stormwater runoff and to monitor the MS4 discharges and receiving waters in order to assess the progress of the program. As the OP pesticides diazinon and chlorpyrifos are phased out, a new generation of chemicals (e.g., pyrethroids) will replace them as the most commonly used pesticides. As such, the most important component of the Pesticide Plan may be the promotion of IPM, which is applicable to all types of pesticides.

The 2012 Pesticide Plan includes control measures and/or performance standards that are focused on:

- Pesticide-specific outreach provided through the public education and outreach programs;
- Coordination with HHW collection agencies;
- Promotion of landscaping alternatives, such as the use of IPM; and
- Assessment of the relative contribution of urban stormwater runoff to chlorpyrifos and pyrethroid levels in waterbodies of concern within the Permittees' jurisdiction.

Under the proposed program, the WQBP-related Performance Standards will be completed as efforts under other Program Elements. All continuing WQBP-related monitoring efforts are captured in Section 2. The monitoring program will be revised as needed to address any additional monitoring needs that may be identified during the upcoming permit term. The annual reports will use this information to report out on each of the WQBPs.

The proposed performance standards, as outlined in Sections 1 and 3 through 8, are summarized in the following table.

2012-2017 Proposed Program: Pesticide Plan

Key Performance Standards with Focus on Pesticides	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit	N	Program Coordination						
Track legislative and regulatory efforts related to the WQBPs	N	Program Coordination						
Continue field observations for ID/IC and document/ report evidence of non-stormwater discharges/ connections or illegal dumping	C		ID1					
Investigate and eliminate ICs	C		ID2					
Respond to IDs	C		ID3					
Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response	E		ID3					
Map reported ID incidents and locations	C		ID3					
Promote Used Oil and HHW Programs	C			PO1				
Coordinate with HHW program for pesticide disposal	C			PO1				
Conduct follow-up Public Opinion Survey(s) during the permit term and re-evaluate the questions as needed to address the POCs	C			PO3				
Conduct one Pest Control Product Survey regarding sales and use of residential and commercial pest control products	C			PO3				

Key Performance Standards with Focus on Pesticides	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Identify and/or create, revise, and distribute educational materials with information on POCs, as needed	C			PO3				
Update website with information on POCs, as needed	E			PO3				
Conduct Mixed Media Campaigns focused on the POCs	E			PO3				
Participate in three (3) community-wide events throughout the year	C			PO3				
Work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children	N			PO4				
Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children	C			PO4				
Implement pesticide and fertilizer application protocol	C				MO4			
Implement IPM program	C				MO4			
Include language requiring IPM implementation in all new contracts	N				MO4			
Maintain internal inventory on reported pesticide use and track reported pesticide use on rights-of-way and municipally owned and operated land	C				MO4			
Prioritize Facilities based on POCs	E					IC2		
Inspect Facilities with POCs Annually	E					IC2		

Key Performance Standards with Focus on Pesticides	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Conduct Follow-up Inspections, As Needed	C					IC2		
Review/ Revise BMP Fact Sheets, As Needed	E					IC3		
Distribute BMP Information	C					IC3		
Require Priority Projects to Comply with 2009 SWQCCP	C							LD2
Conduct Inspections of Post-Construction BMPs During Construction	C							LD3

Notes:
1. C = Continue; E = Enhance; N = New

The proposed monitoring program for pesticides is summarized for each water body in the tables below. Please refer to Section 2.7 for more information.

Proposed Pesticide Monitoring Program: Mosher Slough

Constituents Monitored	Type of Monitoring	Sites Monitored						
		MS-14RUS	MS-2D	MS-2R	MS-4D	MS-14	MS-14R	MS-13
Chlorpyrifos and pyrethroids	Water quality	G	G	G	G	G	G	G
Sediment toxicity	Sediment toxicity						Sed	

Notes:
G = Grab
Sed = Sediment

Proposed Pesticide Monitoring Program: Calaveras River

Constituents Monitored	Type of Monitoring	Sites Monitored							
		CR-1R	CR-46	CR-46R	CR-42	CR-41	CR-41R	CR-39	CR-39R
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
Sediment toxicity	Sediment toxicity			Sed					

Notes:
G = Grab
Sed = Sediment

Proposed Pesticide Monitoring Program: Smith Canal

Constituents Monitored	Type of Monitoring	Sites Monitored					
		SC-1	SC-1R	SC-2D	SC-2R	SC-4D	SC-4R
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G
Sediment toxicity	Sediment toxicity		Sed				

Notes:
G = Grab
Sed = Sediment

Proposed Pesticide Monitoring Program: Duck Creek

Constituents Monitored	Type of Monitoring	Sites Monitored							
		DC-65RUS	DC-69	DC-66[1]	DC-66R[1]	DC-65[2]	DC-65R[2]	WK-64	WK-64R
Chlorpyrifos and pyrethroids	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G
Sediment toxicity	Sediment toxicity						Sed		

Notes:
1. These sites will be monitored during dry weather only
2. These sites will be monitored during wet weather only
G = Grab
Sed = Sediment

Proposed Pesticide Monitoring Program: Five-Mile Slough

Constituents Monitored	Type of Monitoring	Sites Monitored					
		5M-28	5M-28R	5M-26	5M-26R	5M-25	5M-25R
Chlorpyrifos	Water quality	G	G	G	G	G	G

Notes:
G = Grab
Sed = Sediment

ASSESSMENT

The Permittees' PEA strategy builds upon the results of the initial PEAs included as a part of the Annual Reports and addresses the stormwater program in terms of achieving both programmatic goals (i.e., raising awareness, changing behavior) and environmental goals (i.e., reducing pollutant discharges, improving environmental conditions). The PEA strategy is described in detail in Section 1 and will continue to evolve over the next permit term.

Management questions and associated goals have been identified for the POC-based implementation of the stormwater program. The management questions and goals will be evaluated as part of the annual effectiveness assessment during the Annual Reporting process and will be re-evaluated as needed. The goals are established by the Permittees as a way to gauge the success of their efforts. However, the numeric goals may be increased or decreased as needed by the Permittees and based on the implementation of the program.

The POC-Based management questions outlined below provide valuable feedback regarding the WQBPs. The CASQA Outcome Level is identified within the brackets.

Pesticide Plan Management Questions

1. Are the impacted waterways (receiving waters) meeting the TMDL targets for chlorpyrifos and diazinon as specified in the *Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL*? **[Environmental – OL6]**
2. Are the impacted waterways meeting the proposed criteria for pyrethroids (where they have been developed)? **[Environmental – OL6]**
3. Are the urban stormwater dischargers a significant source of chlorpyrifos and diazinon to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
4. Are the urban stormwater dischargers a significant source of pyrethroids to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
5. Are the Permittees meeting the load allocations (LAs) for urban discharge for diazinon and chlorpyrifos as specified in the *Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL*? **[Environmental – OL5]**
6. Are the Permittees effectively implementing BMPs that target pesticides? **[Programmatic – OL2-4]**
7. Is the general public aware of the need to reduce the use of pesticides and use more Integrated Pest Management (IPM) based approaches for the control of pests? **[PO1]**
    a. Based on the results of the Public Opinion Survey, <30% of the residents of the SUA report using pesticides within the past year.
8. Is the general public aware of the need to properly dispose of pesticide-containing products at the County HHW Facility, and are they doing so? **[P01]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of pesticide-containing products at the County HHW Facility.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of pesticide-containing products at the County HHW Facility.

i. How much pesticide containing products are turned in on an annual basis to the HHW collection center? What is the breakdown of the items collected?

ii. Identify the source(s) of information for the residents (public service announcements [PSAs], brochures, community events, "Our Water Our World" campaign [OWOW][13], etc.)

9. Is the general public improperly disposing of pesticide-related trash? **[PO1]**

   a. How much of the trash/debris that was collectively removed from the SUA as a part of the stream cleanup events was debris that contains pesticides?

10. Are the Permittees actively implementing the IPM program and actively managing their use of pesticides on their right-of-way and other landscaped areas? **[MO4]**

    a. How many acres is IPM used on, and what approaches are used?

    b. How much total active ingredient is used for the pesticides applications?

11. Are the industrial and commercial sites that use, store, or could generate pesticides aware of the BMPs that they should be implementing on site, and are they implemented and maintained? **[IC2]**

    c. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs and are doing so.

[13] Bay Area Stormwater Management Agencies Association campaign with Orchard Supply Hardware (OSH) to encourage the use of less toxic products and proper disposal of pesticides

Pathogen Plan

OVERVIEW

Six urban waterbodies in the SUA are listed as impaired on the CWA §303(d) list due to high levels of fecal indicator bacteria. Although fecal indicator bacteria do not generally cause illness themselves, they are widely measured as representative surrogates for pathogenic microorganisms.

NPDES Permit Requirements

In accordance with Provision D.18.b of the second term Permit (Order No. R5-2002-0181), the Permittees developed and implemented a Pathogen Plan to identify, monitor, and mitigate bacteria sources. The Pathogen Plan was submitted to the Regional Water Board on August 18, 2004. The Permittees have implemented the Pathogen Plan since 2004. Preliminary Pathogen Plan results were summarized in detail in the 2007 ROWD. In December 2007, the Permittees received their third term Permit, which included a requirement for the continued implementation of the Pathogen Plan. The Pathogen Plan was updated in April 2009 and approved by the Regional Water Board as a part of the approval of the 2009 SWMP.

Other Regulatory Considerations

Stockton Urban Waterbodies Pathogen TMDL

In 2002, the Regional Water Board designated six waterbodies within the SUA as impaired by pathogen indicator bacteria. Subsequent to this designation, the Regional Water Board developed and adopted Resolution No. R5-2008-0030 to approve the *TMDL for Pathogens in Stockton Urban Waterbodies, San Joaquin County* (approved by U.S. EPA on May 13, 2008) for pathogen indicator bacteria in Five-Mile Slough, Lower Calaveras River, Mormon Slough, Mosher Slough, Smith Canal and Walker Slough.[14] The Pathogen TMDL establishes the following water quality targets for indicator bacteria:

Indicator organism	Waterbody Usage Designation	Target	Criteria Source
Fecal coliform	REC-1	• Geometric Mean not to exceed 200 MPN/100 ml for any 30-day period • Geometric mean of 90% of samples must be below 400 MPN/100 ml	Basin Plan Objective
E. coli	REC-1	• Geometric Mean not to exceed 126 MPN.100 ml for any 30-day period • Any single sample not to exceed 235/100 ml	Basin Plan Objective, U.S. EPA Ambient Water Quality Criteria[15]

The Regional Water Board specified that TMDL implementation would occur through the Permittees' MS4 Permit and the existing Pathogen Plan.

[14] SWRCB, 2008. Total Maximum Daily Loads of Pathogens in Stockton Urban Waterbodies, San Joaquin County. State Water Resources Control Board (SWRCB). Sacramento, California.

[15] U.S. EPA. 1986. Ambient Water Quality Criteria for Bacteria – 1986.

Approach

The Pathogen Plan addresses indicator bacteria impairment in urban waterbodies in the SUA. To assist with source assessment and to address some of the issues associated with using traditional indicator bacteria, one of the major goals of the Pathogen Plan is to apply novel techniques that quantify source-specific bacteria to obtain information regarding specific sources (e.g., human or non-human) of fecal contamination to the impaired waterbodies.

The overall goals of the Pathogen Plan are to identify, monitor and mitigate the controllable sources of bacteria. The Pathogen Plan was designed to accomplish these goals and satisfy permit requirements through the following components:

- **Characterization Monitoring** (using traditional indicator bacteria) to determine the magnitude of bacterial contamination at various points in each waterbody
- **Source Identification Studies** to identify the host (i.e., human, cow/horse, or dog) that contributed to fecal contamination
- **BMP Development and Implementation** to identify effective BMPs to reduce fecal contamination
- **Effectiveness Monitoring** and Plan Assessment to determine whether BMPs have affected fecal contamination

The Pathogen Plan will be implemented in three phases. The Pathogen Plan addresses six waterbodies and focuses on two waterbodies for each phase (**Table 9-9**).

Table 9-9. Pathogen Plan Implementation Phases

Implementation Phase	Waterbody	Start Date	End Date
Phase I (9.3.1)	Smith Canal Mormon Slough	July 1, 2004	June 30, 2012
Phase II (9.3.2)	Mosher Slough Five Mile Slough	July 1, 2007	June 30, 2015
Phase III (9.3.3)	Lower Calaveras River Walker Slough	July 1, 2010	June 30, 2018

Each phase of the Pathogen Plan includes the following elements (**Figure 9-6**), the results of which are discussed in the subsequent sections.

Characterization Monitoring

The goal of the characterization monitoring is to determine long-term trends in bacteria loading and identify bacteria "hot spots" that contribute to significant bacteria loadings. Monitoring of traditional indicator bacteria (i.e., total coliform, fecal coliform, and E. coli) is conducted at strategic locations along the impaired waterbodies. All monitored sites are examined to determine if any sites consistently exceed bacteria criteria. Those sites that consistently exceed bacteria criteria are considered primary candidates for Source Identification Studies.

Source Identification Studies

Microbial Source Tracking (MST) Studies employ analytical methods to evaluate the organisms (i.e., human or non-human) from which the indicator bacteria likely originated. The MST method is based on species-specific techniques that target *Bacteroidales-Prevotella (Bacteroidales)*, anaerobic bacteria that are highly abundant in the intestines of warm-blooded animals. Their anaerobic nature is desirable because environmental persistence is thought to be much less than aerobic microbes (e.g., fecal coliform) that can persist for years and perhaps even regrow in the environment. *Bacteroidales* were shown to be the most reliable human marker in comparison studies[16] of microbial source tracking methods that were performed by the Southern California Coastal Waters Research Program. In addition, U.S. EPA utilized *Bacteroidales* during a recent epidemiological study[17] and found a positive correlation between *Bacteroidales* concentrations and gastrointestinal illness in swimmers.

Researchers at the University of California, Davis (UC Davis) have developed the polymerase chain reaction (PCR) methods[18] that were used for this Pathogen Plan. These methods allow for identification of unique deoxyribonucleic acid (DNA) sequences, which are used to selectively monitor *Bacteroidales* from specific hosts. At this time, methods have been developed to quantify bacteria from the following hosts:

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[16] Griffith, J. F. et al., 2003. "Evaluation of microbial source tracking methods using mixed fecal sources of aqueous test samples." *J. Water Health*. Vol.4, No. 1, p.141-151.

[17] Wade, T. et al., 2006. Rapidly Measured Indicators of Recreational Water Quality Are Predictive of Swimming-Associated Gastrointestinal Illness. *Environ Health Perspect* 114:24-28.

[18] Kildare, B., Leutenegger, C., McSwain, B., Bambic, D., Rajal, V., Wuertz, S. 2007. 16s rRNA-based assays for quantitative detection of universal, human-, cow-, and dog-specific fecal *Bacteroidales*: A Bayesian approach. Water Research, 41: 3701-3715.

- General warm-blooded animal inputs (referred to as “universal”);
- Humans;
- Cow and horses; and
- Dogs.

Current MST assays do not directly discriminate between viable and non-viable cells, since DNA of both live and dead cells, as well as extracellular DNA, can be amplified. Yet, it is paramount for a meaningful interpretation of source tracking data to distinguish between recent and older contamination events. Although *Bacteroidales* cannot survive for prolonged periods in the aerobic environment, their DNA can persist in the environment after cells have died. It is known that DNA of selected pathogens can persist after cell death for up to 3 weeks.

Researchers at UC Davis recently developed an assay to detect sequences only from live cells based on application of a compound that penetrates dead cell membranes and inhibits PCR amplification.[19] Recent data from UC Davis suggested that the assay for viable *Bacteroidales* cells detects fecal contamination that occurred within the previous 28 hours, whereas assays for all *Bacteroidales* could detect extracellular DNA that persists in the environment for as long as 177 hours. Therefore, the detection of viable *Bacteroidales* provides more useful information for MST. For this reason, analysis of viable *Bacteroidales* was added to source ID analyses during Phase II.

In addition, samples are analyzed for concentrations of human-specific viruses known as entero- and adenovirus. These viruses are known to be epidemiologically-relevant indicators of water that has been impacted by human waste.[20] Direct quantification of viruses (instead of bacteria only) provides important information about health risks and allows for prioritization of resources to address bacteria sources that pose the greatest health risks to recreational water users.

BMP Implementation

The ultimate goal of the Pathogen Plan is to mitigate bacterial impairment by gaining specific information about sources of fecal bacterial contamination and to implement BMPs that focus on those specific sources. Targeted BMPs are selected based on the dominant controllable sources of fecal contamination determined by source ID monitoring.

Effectiveness Monitoring

After BMPs have been implemented for a sufficient time period, the effectiveness of control programs is assessed. Assessment includes long term monitoring of fecal indicator bacteria levels to determine if the implementation of the BMPs has resulted in a positive change in the quality of the water in the outfalls and/or receiving waters.

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[19] Bae, S., Wuertz, S. 2009. Discrimination of viable and dead fecal *Bacteroidales* bacteria by quantitative PCR with propidium monoazide. Applied and Environmental Microbiology, 75:2940-2944.

[20] Rajal, V., McSwain, B., Thompson, D., Leutenegger, C., Wuertz, S., 2007. Molecular quantitative analysis of human viruses in California stormwater. Water Research, 41: 4287-4298.

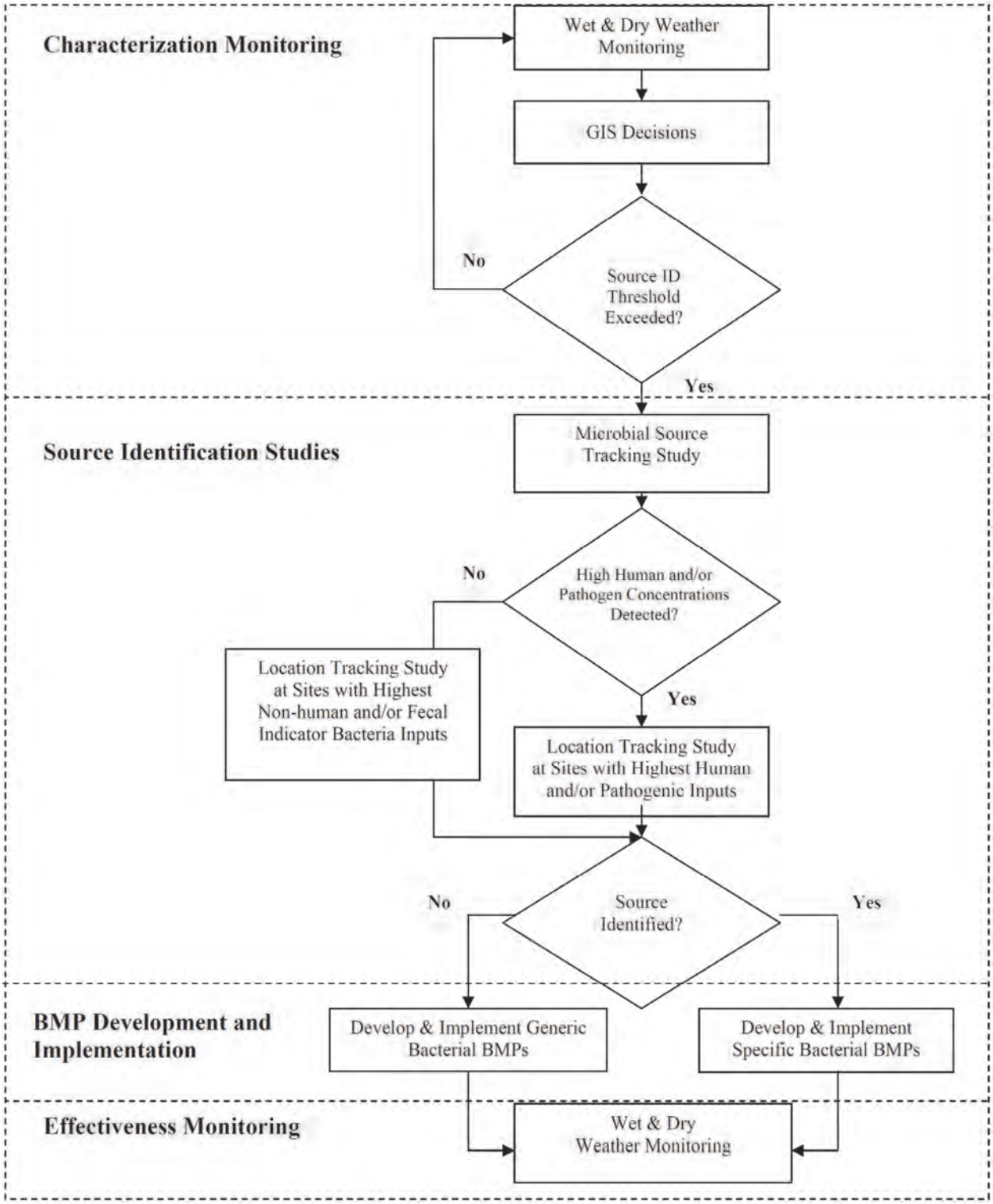

Figure 9-6. Pathogen Plan Monitoring Approach

2007-2012 IMPLEMENTATION[21]

During the Permit term, several efforts were implemented, as follows:

- Completed Phase I Source Identification Monitoring and Began Phase I BMP Implementation
- Completed Phase II Characterization Monitoring and Source ID Monitoring, and Began Phase II BMP Implementation
- Began Phase III Characterization Monitoring

These efforts are discussed in more detail in the following sections. The discussion is organized by the three Pathogen Plan Implementation Phases.

Phase I Activities

Phase I waterbodies (Smith Canal and Mormon Slough) and monitoring locations are shown in **Figure 9-7**. Phase I Pathogen Plan components underway during the Permit term are discussed in the following sections.

Phase I Characterization Monitoring

Characterization monitoring was completed during 2004-2005, and a detailed analysis of characterization monitoring results was presented in the 2005-2006 Annual Report and the 2007 ROWD. Some of the overarching conclusions from that monitoring are provided below.

- Receiving water concentrations of indicator bacteria exhibited a pattern where geometric mean concentrations increased with increasing distance from the San Joaquin River, with concentrations near the terminal ends of Smith Canal and Mormon Slough consistently higher than WQOs.
- The indicator bacteria concentrations in Smith Canal suggested that bacteria sources to the stormwater system are ubiquitous, since the geometric mean concentrations observed at all discharge sites were above the relevant WQOs.
- In Mormon Slough, due to accessibility and insufficient flow issues, only one discharge site was consistently monitored during characterization monitoring, so it is unknown how indicator concentrations varied between discharge sites. However, the fecal coliform concentrations at the monitored discharge location (MR-2D) were relatively low and met the geometric mean WQOs. Moreover, based on current knowledge, there are no known stormwater outfalls that flow during dry weather upstream of MR-1R, which exhibited some of the highest bacteria concentrations observed during the characterization study. Together, these observations suggest that sources other than stormwater, including homeless encampments, which are common along Mormon Slough, may be more significant.

[21] Data are included as **Appendix I-1**.

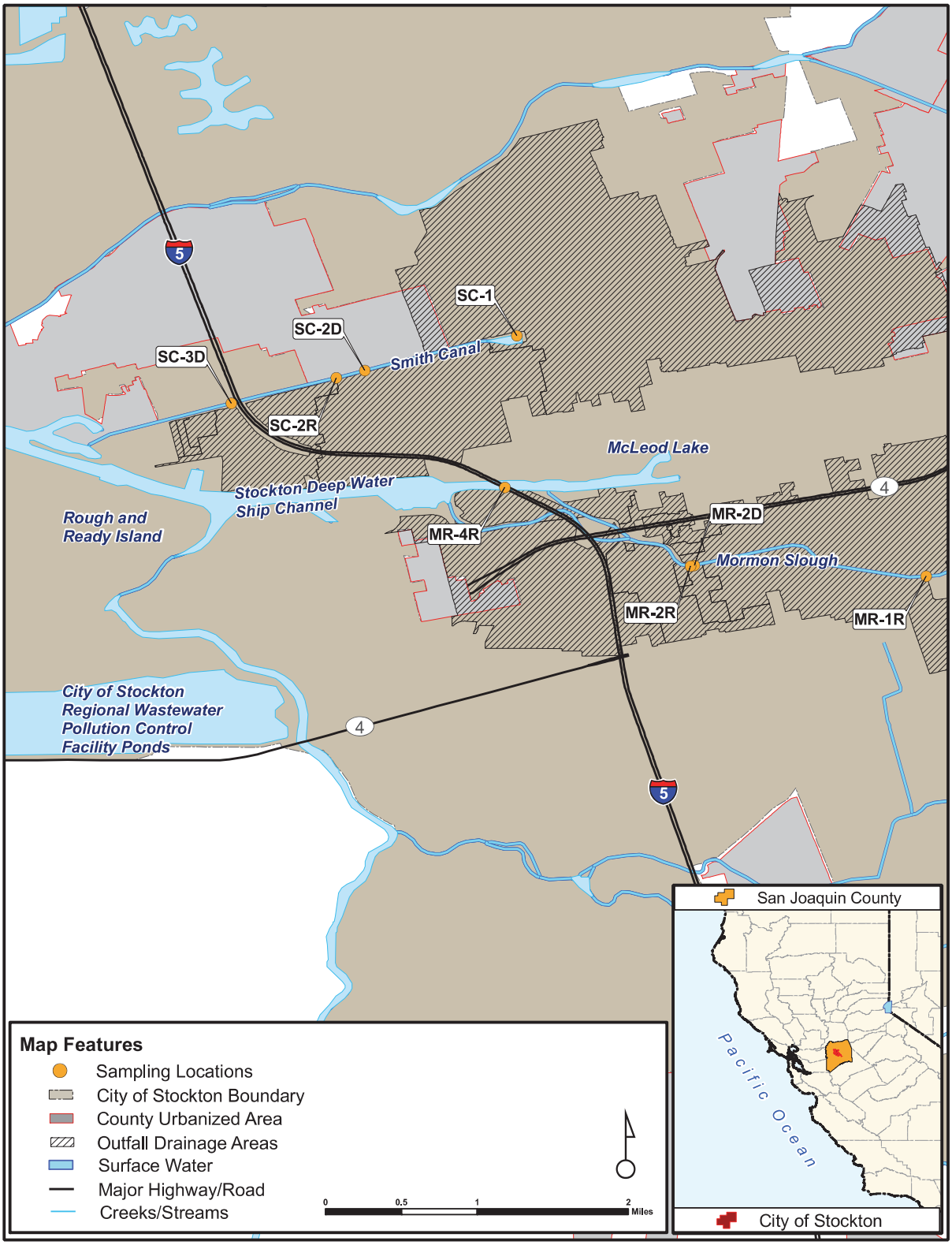

Figure 9-7. Pathogen Plan Phase I Waterbodies and Monitoring Locations

Phase I Source Identification Monitoring

After Phase I characterization monitoring was completed, sites were selected for Source ID studies, and MST monitoring began in January 2006. The locations of sites selected for Phase I Source ID monitoring were based both on accessibility and patterns observed during characterization monitoring. The final source ID event was completed on 11/1/2008. Results of Source ID events completed prior to 2008-2009 were reported in the 2007-2008 Annual Report, and the complete set of results is summarized below.

During 2006-2008 Phase I Source Identification Monitoring, the events specified in **Table 9-10** were conducted.

Table 9-10. 2006-2008 Phase I Source Identification Monitoring

		Number of Events, by Type	
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**
Smith Canal	SC-1	5	3
	SC-2D	5	3
	SC-3D	5	3
	SC-2R	5	3
Mormon Slough	MR-2D	5	3
	MR-1R	4	3
	MR-2R	5	3
	MR-4R	5	3

As shown in **Figure 9-8**, Universal Bacteroidales were detected in all samples, with the exceptions of one sample each at the receiving water location MR-1R and discharge locations SC-1). Human Bacteroidales concentrations were highest at the Legion Park pump station (SC-1). In Mormon Slough, human Bacteroidales were consistently detected at the receiving water locations, although they were not detected frequently at the Mormon Slough discharge location, suggesting that human sources may not be primarily contributed through the storm drain system at Mormon Slough. Cow/horse *Bacteroidales* were detected in samples from the Smith Canal SC-2D and MR-1R discharge locations. Dog *Bacteroidales* were consistently detected in Mormon Slough receiving water, but not at the discharge location MR-2R. Most detections occurred during wet weather events.

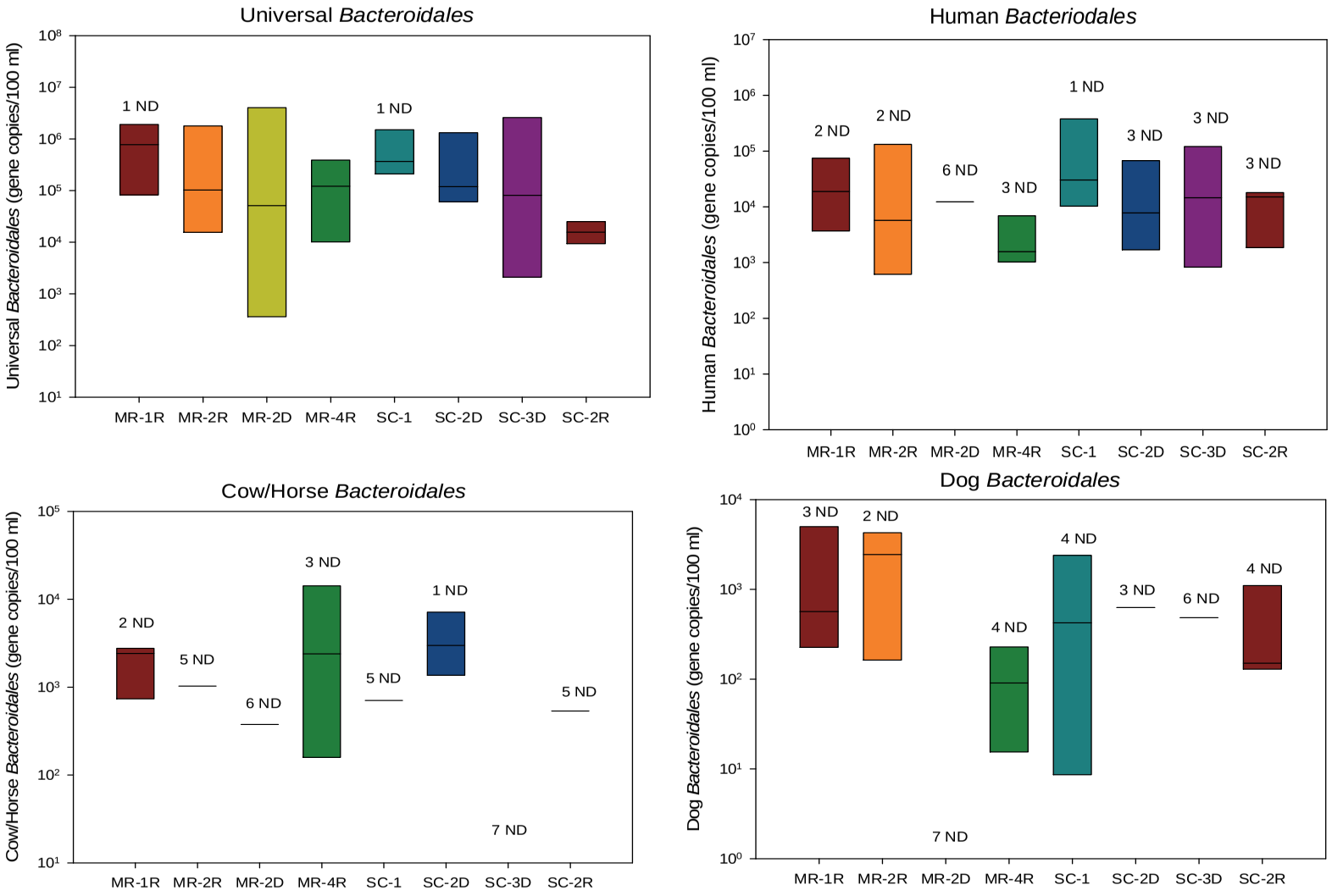

Figure 9-8. Microbial Source Tracking results at all Phase I sampling events for each species-specific *Bacteroidales* marker.

The center-line in each plot indicates the median, the top boundary of each box marks the 75th percentile, and the bottom boundary of each box marks the 25th percentile. The number of samples with *Bacteroidales* markers below the detection limit is indicated by the number of non-detects.

Phase I BMP Implementation

Targeted BMPs were selected based on the dominant controllable sources of fecal contamination determined from the source ID monitoring. BMPs were implemented to focus on the following specific sources: dog waste, horse/cow fecal input, and human fecal input.

Pet Waste Control

- The Permittees' efforts to promote proper disposal of pet waste have focused on public education and outreach efforts, as well as installation of pet waste stations and signage at local parks. Efforts by the Permittees during the Permit term are summarized in **Section 4** (Public Outreach).

Horse/Cow Source Control

Source identification monitoring identified horse/cow fecal input in Phase I waterbodies. The City identified significant industrial users, tracked by its wastewater pretreatment program, that could be potential sources of livestock fecal contamination. One facility, Islamic Meat and Poultry, was identified as a potential source within the Mormon Slough drainage area. Industrial inspections during 2005 identified numerous stormwater concerns at the facility, including overflowing refuse bins containing manure and facility waste, as well as manure on the ground. Manure exposure to the storm drain was noted, and a notice of violation was sent to the facility on March 22, 2005. A subsequent inspection in 2005 noted that the stormwater concerns had been addressed.

During the 2010 industrial inspections, no stormwater concerns were noted at the facility, and no live animals were present at the property. The facility will continue to be monitored during industrial inspections to ensure that they continue to implement proper BMPs to prevent fecal contamination.

No additional facilities holding live cattle or horses were identified in the Smith Canal or Mormon Slough drainage areas; however, the Permittees will continue to investigate other potential sources for livestock fecal contamination.

Human Source Control

Human-derived fecal contamination was identified in Phase I waterbodies through source identification monitoring. BMPs for human fecal source control were identified in the updated Pathogen Plan submitted with the Permittees' 2007 SWMP. To date, the Permittees have preliminarily identified houseboats on Smith Canal as a possible contributor of human fecal pollution. Initial permits are issued for houseboats, but no further inspections are conducted after the initial permit issuance.

The Permittees have also identified SSOs as a possible alternative source of human-derived fecal contamination in the Smith Canal and Mormon Slough drainage areas.

Phase I Effectiveness Monitoring

Effectiveness monitoring for Phase I waterbodies is scheduled to begin in 2012, to allow time for further targeted BMP implementation. Effectiveness monitoring will focus on indicator bacteria at sampling locations in Smith Canal and Mormon Slough.

Phase II Activities

Phase II waterbodies (Mosher Slough and Five Mile Slough) and monitoring locations are shown in **Figure 9-9**. Phase II Pathogen Plan components completed during the Permit term are discussed in the following sections.

Phase II Characterization Monitoring

Characterization monitoring was initiated for the Phase II sites (Mosher Slough and Five-Mile Slough) in November 2007, and was completed in May 2009. In addition to the Phase II waterbodies, four locations upstream of the SUA (on Mosher Slough, the Calaveras River, and Duck Creek) were also monitored in order to assess the upstream contribution of indicator bacteria. In total, 24 dry weather and five wet weather events were conducted. Results are summarized in **Table 9-11**. A discussion of the trends in indicator bacteria were included in the 2008-2009 Annual Report, and are shown here in **Figure 9-10** through **Figure 9-15**. Receiving water concentrations of indicator bacteria in both waterbodies exhibited a similar trend to the Phase I waterbodies, where geometric mean concentrations were lowest near the San Joaquin River (SJR), as mixing with the SJR dilutes and reduces the concentrations of indicator bacteria. In general, when compared to Phase I characterization monitoring (presented in the 2005-2006 Annual Report), Phase II waterbodies had a lower frequency of exceedances of single sample WQOs.

For Mosher Slough, concentrations of indicator bacteria in receiving water were low at site MS-5R which is just downstream of the Morada detention basin. Concentrations were generally higher in urban discharge relative to receiving water, except for urban discharge site MS-1D, which had the lowest concentrations of indicator bacteria of any site except for receiving water site MS-14R (near the SJR). These trends were apparent in both dry weather and wet weather event samples. Concentrations of indicators in the Mosher Slough location upstream of the SUA, MS-14RU, were slightly higher overall than the locations directly downstream within the SUA, suggesting that there are sources of indicator bacteria to Mosher Slough that are upstream of the SUA.

Concentrations of indicator bacteria in Five-Mile Slough followed a similar pattern to Mosher Slough, with the lowest concentrations at the furthest downstream location (FM-3R), and slightly higher in receiving water locations upstream. Indicator concentrations were highest in urban discharge samples further upstream (FM-2D and FM-1D).

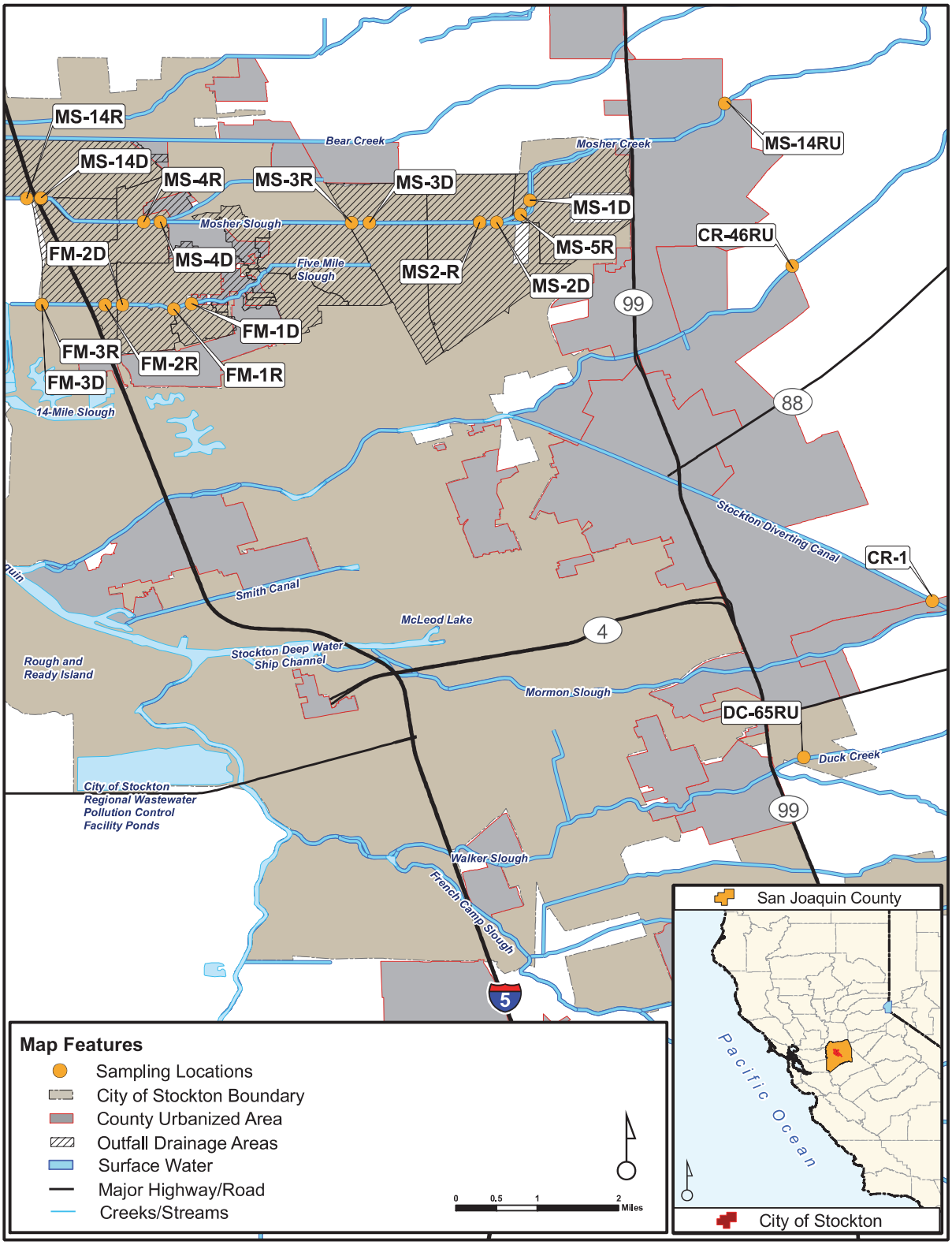

Figure 9-9. Pathogen Plan Phase II Monitoring Locations

During 2007-2009 Phase II Characterization Monitoring, the events specified in **Table 9-11** were conducted:

Table 9-11. 2007-2009 Phase II Characterization Monitoring

		Number of Events, by Type	
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**
Mosher Slough	MS-14R	24	5
	MS-14D	24	5
	MS-4R	24	5
	MS-4D	24	5
	MS-3R	24	5
	MS-3D	24	5
	MS-2R	24	5
	MS-2D	24	5
	MS-5R	22	4
	MS-1D	24	4
Five-Mile Slough	FM-3R	24	5
	FM-3D	24	5
	FM-2R	24	5
	FM-2D	23	5
	FM-1R	24	5
	FM-1D	24	5
Upstream Locations	CR-1	15	2
	CR-46RU	19	3
	MS-14RU	22	4
	DC-65RU	22	5

E. coli

When compared to single sample WQOs (235 MPN/100 mL), the overall frequency of exceedances was 36%.

- At Mosher Slough, 122 of 286 samples (43%) were above single sample WQOs.
- At Five-Mile Slough, 45 of 173 samples (26%) were above single sample WQOs.
- At upstream locations, 29 of 90 samples (32%) were above single sample WQOs.

Sites where 50% or more samples exceeded single sample WQOs include the following:

- FM-2D (68%)
- MS-14D (59%)
- MS-2D (62%)
- MS-3D (69%)
- MS-4D (66%)

Dry Weather

Dry weather *E. coli* exceedances for each waterbody are broken down as follows:

- At Mosher Slough, 92 of 238 samples (39%) were above single sample WQOs.
- At Five-Mile Slough, 37 of 143 samples (26%) were above single sample WQOs.
- At upstream locations, 23 of 78 samples (29%) were above single sample WQOs.

Wet Weather

Wet weather *E. coli* exceedances for each waterbody are broken down as follows:

- At Mosher Slough, 30 of 48 samples (63%) were above single sample WQOs.
- At Five-Mile Slough, 8 of 30 samples (27%) were above single sample WQOs.
- At upstream locations, 6 of 12 samples (50%) were above single sample WQOs.

Fecal Coliform

When compared to single sample WQOs (400 MPN/100 mL), the overall frequency of exceedances was 42%.

- At Mosher Slough, 141 of 286 samples (49%) were above single sample WQOs.
- At Five-Mile Slough, 57 of 173 samples (33%) were above single sample WQOs.
- At upstream locations, 29 of 90 samples (32%) were above single sample WQOs.

Sites where 50% or more samples exceeded single sample WQOs include the following:

- FM-2D (79%)
- MS-14D (66%)
- MS-14RU (54%)
- MS-2D (76%)
- MS-3D (72%)

- MS-3R (59%)
- MS-4D (62%)

Dry Weather

Dry weather *E. coli* exceedances for each waterbody are broken down as follows:

- For Mosher Slough, 104 of 238 samples (44%) were above single sample WQOs.
- For Five-Mile Slough, 43 of 143 samples (30%) were above single sample WQOs.
- For upstream locations, 23 of 78 samples (29%) were above single sample WQOs.

Wet Weather

Wet weather *E. coli* exceedances for each waterbody are broken down as follows:

- For Mosher Slough, 37 of 48 samples (77%) were above single sample WQOs.
- For Five-Mile Slough, 14 of 30 samples (47%) were above single sample WQOs.
- For upstream locations, 6 of 12 samples (50%) were above single sample WQOs.

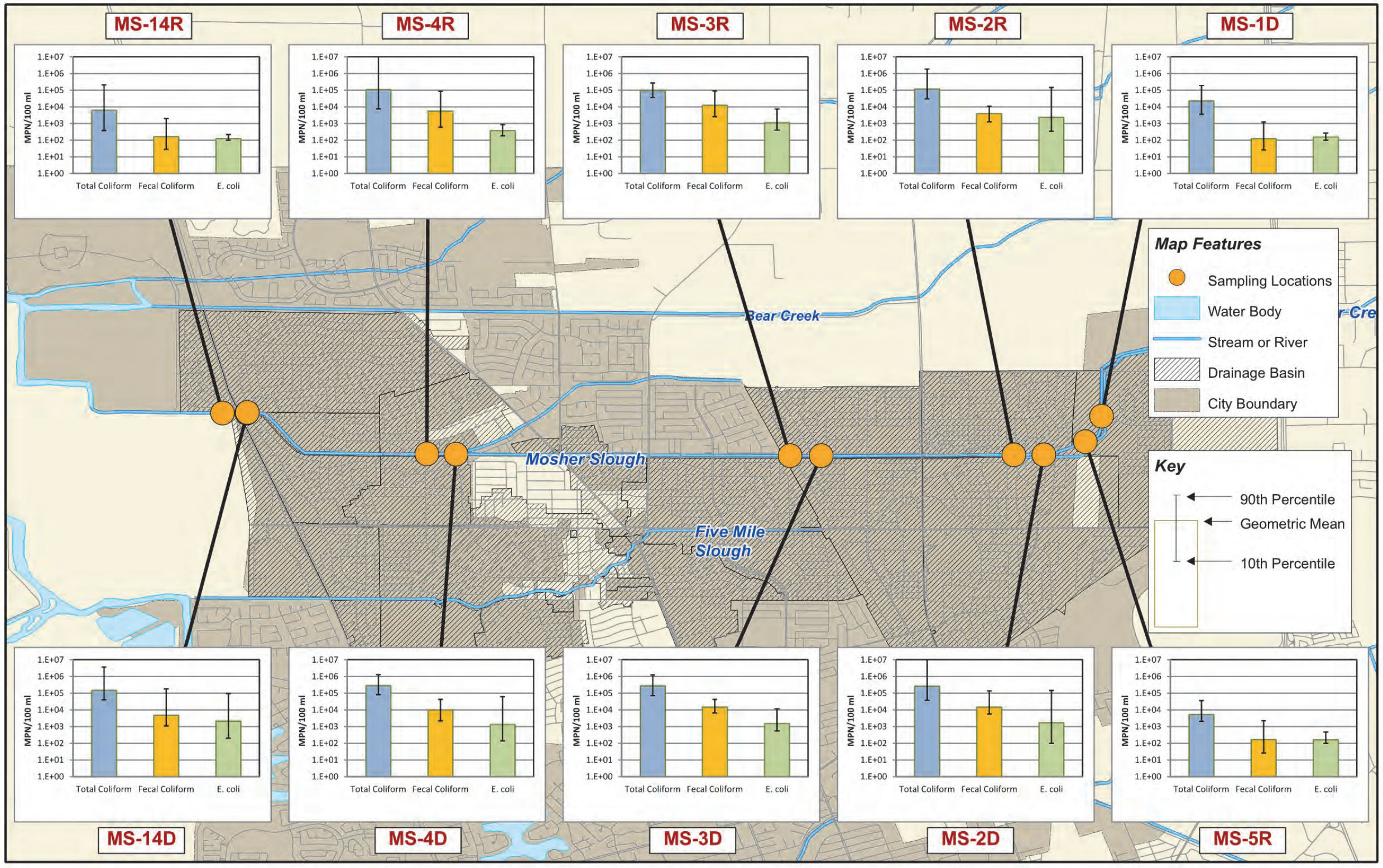

Figure 9-10. Wet Weather Event Phase II Characterization Monitoring Results for Mosher Slough (2007-2009).

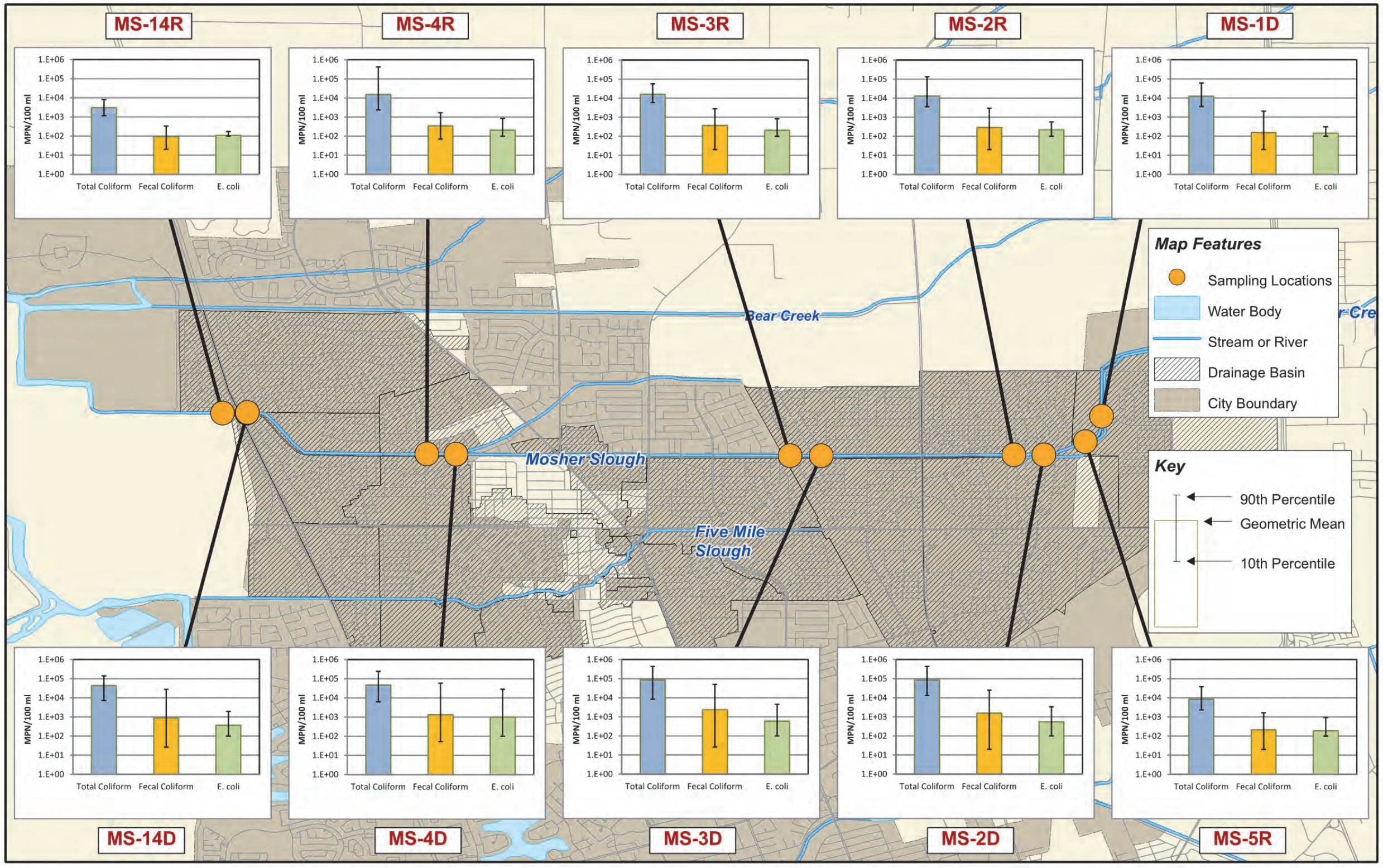

Figure 9-11. Dry Weather Event Phase II Characterization Monitoring Results for Mosher Slough (2007-2009).

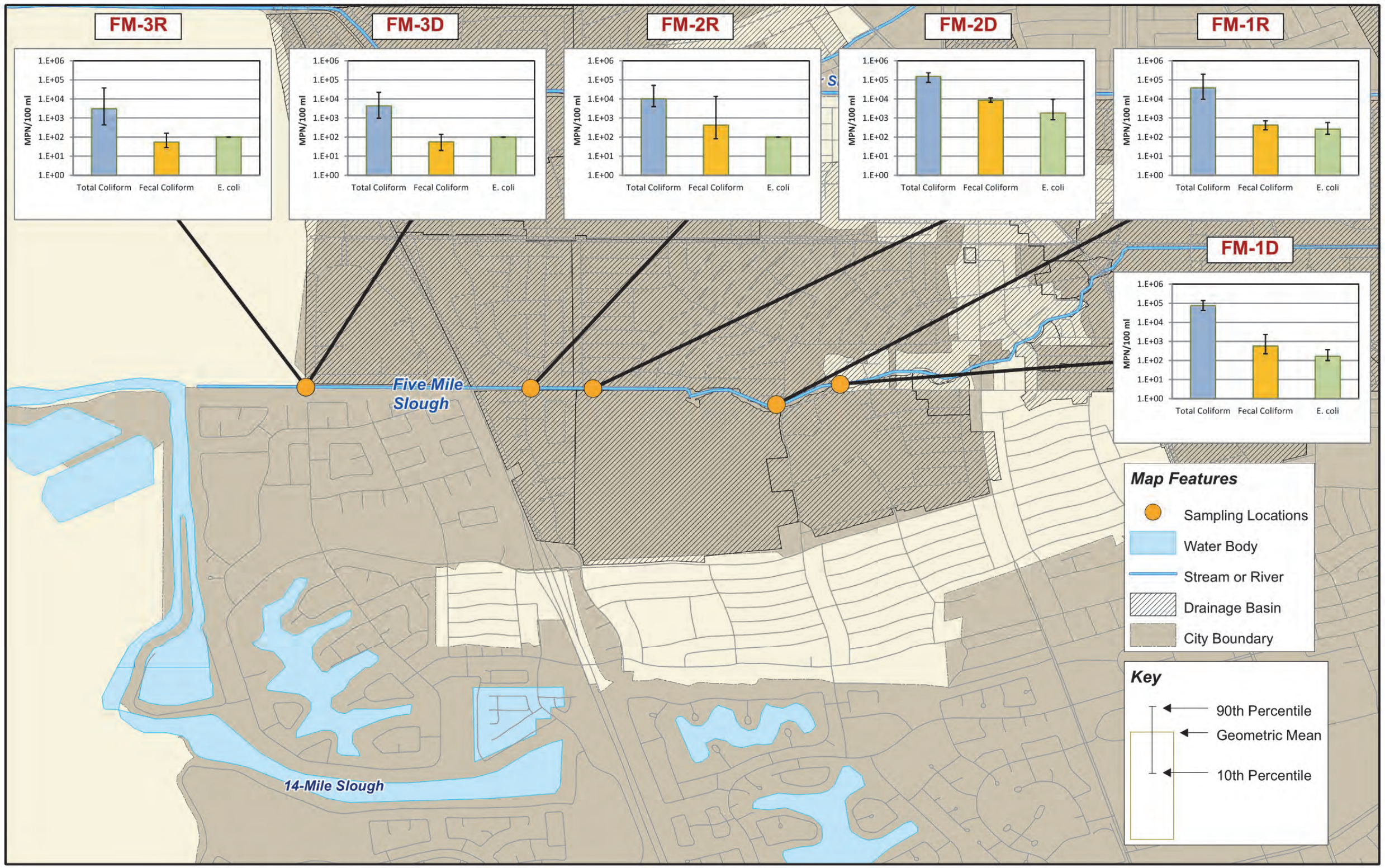

Figure 9-12. Wet Weather Event Phase II Characterization Monitoring Results for Five-Mile Slough (2007-2009).

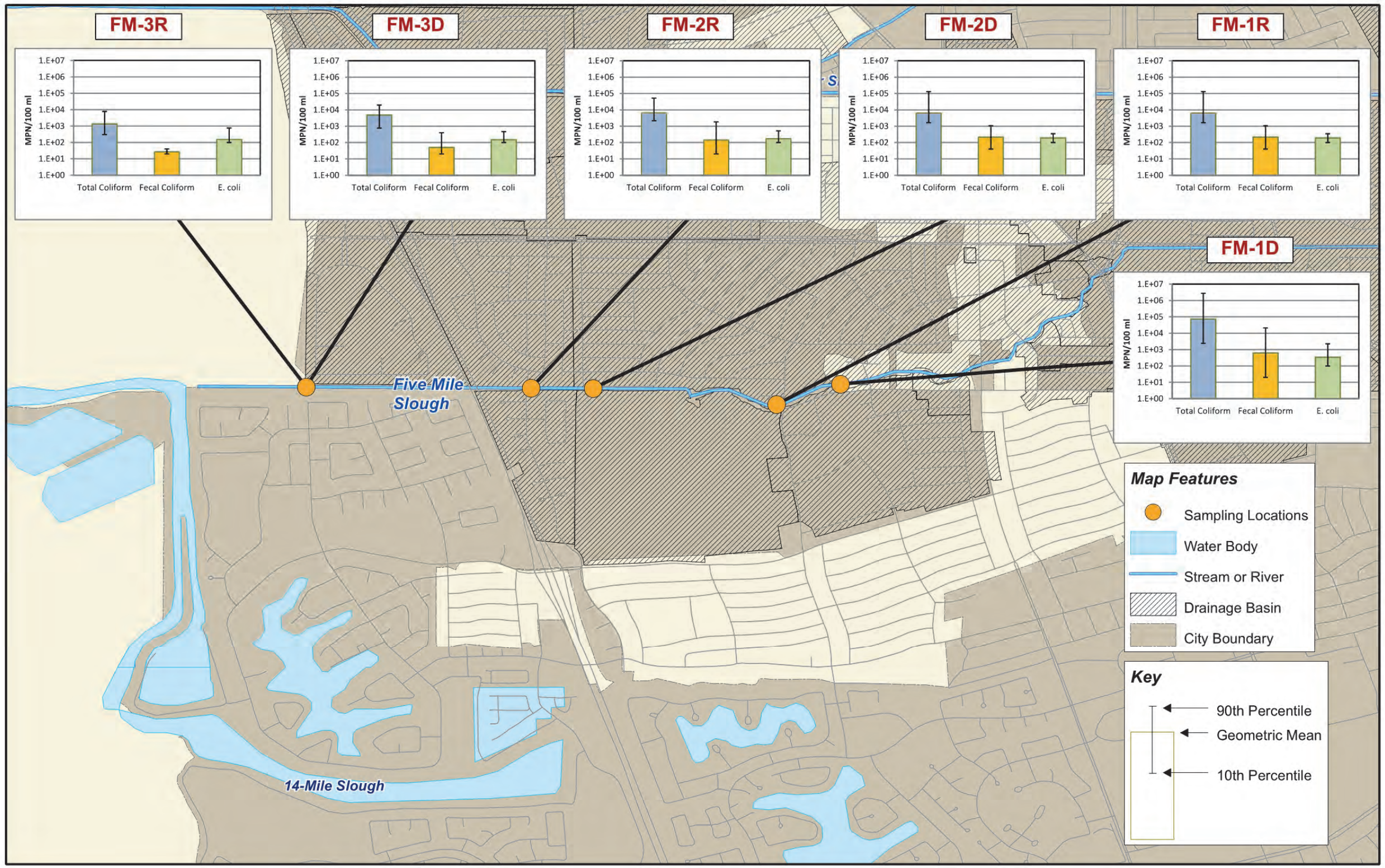

Figure 9-13. Dry Weather Event Phase II Characterization Monitoring Results for Five-Mile Slough (2007-2009).

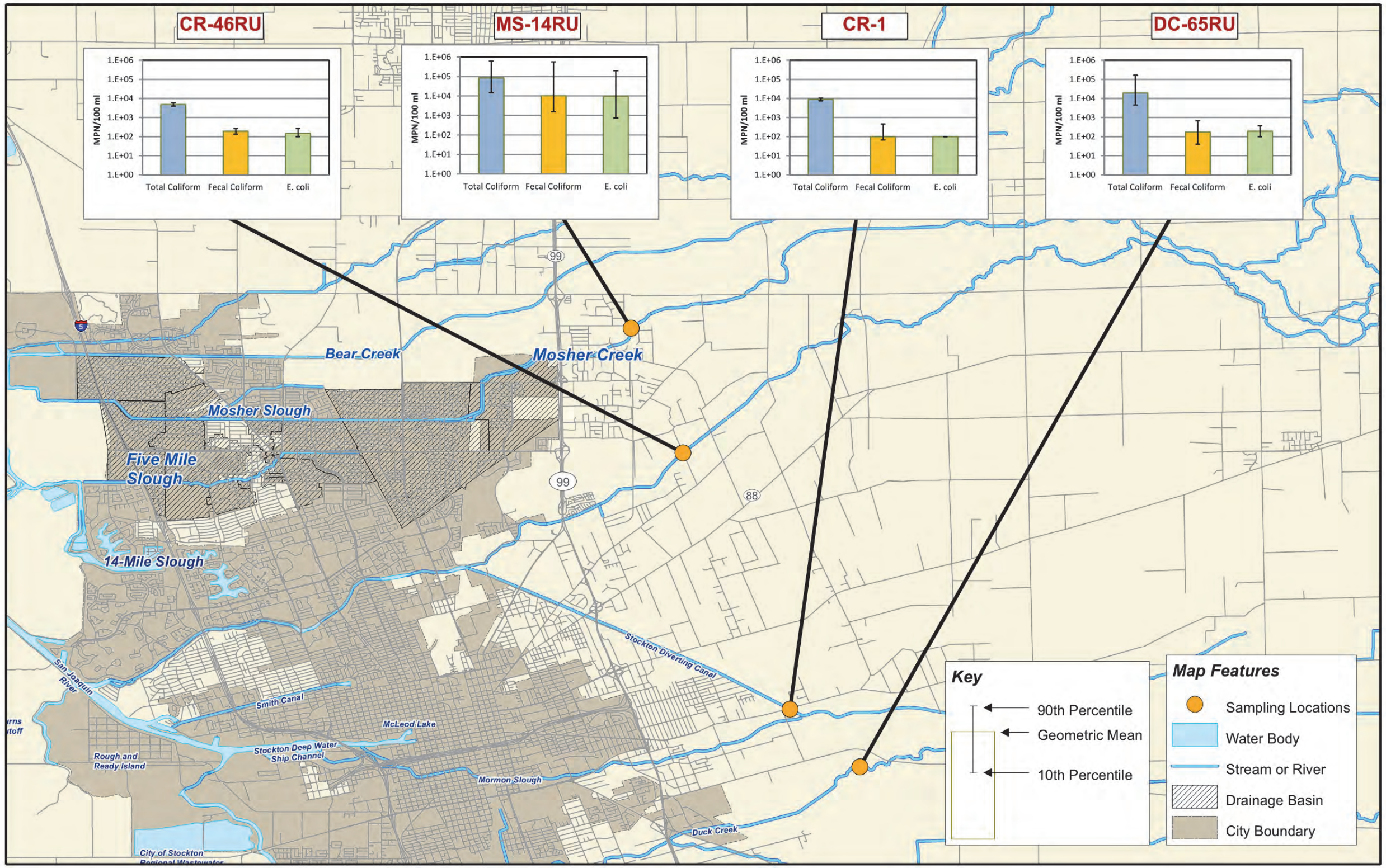

Figure 9-14. Wet Weather Event Phase II Characterization Monitoring Results for Upstream Locations (2007-2009)

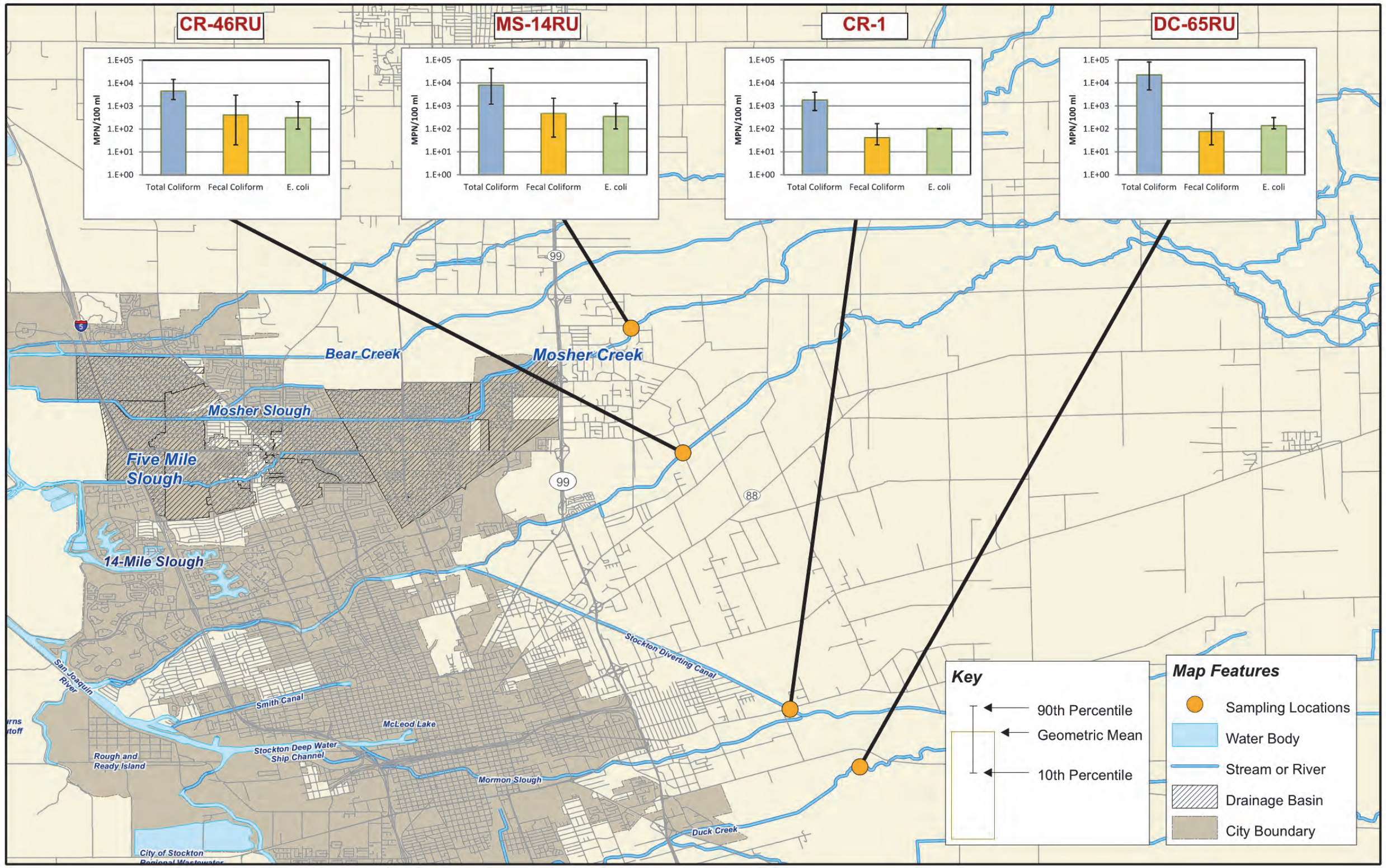

Figure 9-15. Dry Weather Phase II Characterization Monitoring Results for Upstream Locations (2007-2009).

Phase II Source Identification Monitoring

Sites were selected for Phase II Source ID monitoring based on trends in characterization monitoring data. Sites were targeted which had consistent high concentrations of indicator bacteria.

Phase II source identification monitoring began in February 2009 and was completed in June 2010, with a total of five wet weather events and three dry weather events. The schedule of completed monitoring events is shown in **Table 9-12**. A summary of completed source identification monitoring events was submitted to the Regional Water Board in December 2010.

During 2009-2010 Phase II Source Identification Monitoring, the events specified in Table 9-12 were conducted.

Table 9-12. 2009-2010 Phase II Source Identification Monitoring

		Number of Events, by Type	
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**
Mosher Slough	MS-14D	3	5
	MS-4D	3	5
	MS-3D	3	5
	MS-2D	3	5
	MS-14RU	2	5
Five-Mile Slough	FM-1D	3	5
	FM-2D	3	5
	FM-2R	3	5

The results for source-specific *Bacteroidales* markers are shown in **Figure 9-16** and **Figure 9-17**, and are discussed below.

Universal Bacteroidales

Universal *Bacteroidales*, which are representative of inputs by all warm-blooded animals, were detected in nearly every sample. This is typical of studies in other watersheds[22].

- There were no apparent differences between wet weather and dry weather events.
- Concentrations were highest at the Mosher Slough discharge location MS-14D during wet weather events WW02 and WW03, and at Mosher Slough discharge location MS-4D during wet weather event WW01.

Human Bacteroidales

Human *Bacteroidales* are generally present in mixed sources of human contamination. A small proportion of fecal samples from “individual humans” may be non-detect, but the human marker is nearly always detected in mixed sources such as wastewater influent.

[22] Wuertz, S., Bombardelli, F., Sirikanchana, K., Schriewer, A., and Zamani, K. 2009. Quantitative Pathogen Detection and Microbial Source Tracking Combined with Modeling the Fate and Transport of *Bacteroidales* in San Pablo Bay. Final Report submitted to the NOAA/UNH Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET).

- Human *Bacteroidales* were detected more frequently during dry weather events compared to wet weather events. Human markers were detected during two of three dry weather events (DW01 and DW02) at all locations except the upstream Mosher Slough location (MS-14RU) and one Mosher Slough discharge location (MS-4D). Relatively high concentrations of human markers were detected at FM-2D and MS-14D locations during the first dry weather sampling event (DW01).
- Human markers were detected during at least one event at all locations except for the upstream Mosher Slough location (MS-14RU).

Cow/Horse Bacteroidales

Cow/horse *Bacteroidales* are generally present in fecal samples from both cows and horses.

- Cow/horse markers were rarely detected. The only detection occurred during the first dry weather event (DW01) in Five-Mile Slough receiving water (FM-2R), and the concentration of gene copies was relatively low.
- The urban discharge location furthest downstream on Mosher Slough, MS-14D, was specifically selected to screen for possible livestock input to Mosher Slough from the nearby agricultural area. However, cow/horse markers were not detected in any sample from the MS-14D location. Since Universal *Bacteroidales* concentrations were relatively high at that location, it is still possible that other livestock sources contribute to fecal contamination.

Dog Bacteroidales

Dog *Bacteroidales* are generally present in mixed fecal samples from dogs. Some individual fecal samples from dogs will be non-detect, and there is slight overlap with human sequences.

- Dog *Bacteroidales* were detected at all locations except for the upstream Mosher Slough location (MS-14RU).
- Dog markers were detected at most locations during wet weather events WW01 and WW03, but not during wet weather events WW02, WW04 or WW05. Concentrations were highest at discharge sites on Mosher Slough (MS-14D, MS-3D and MS-4D) during the third wet weather event (WW03 on 12/12/2009).
- Dog markers were detected during one of three dry weather events (DW01). Concentrations were highest at Mosher Slough discharge locations MS-14D and MS-2D.

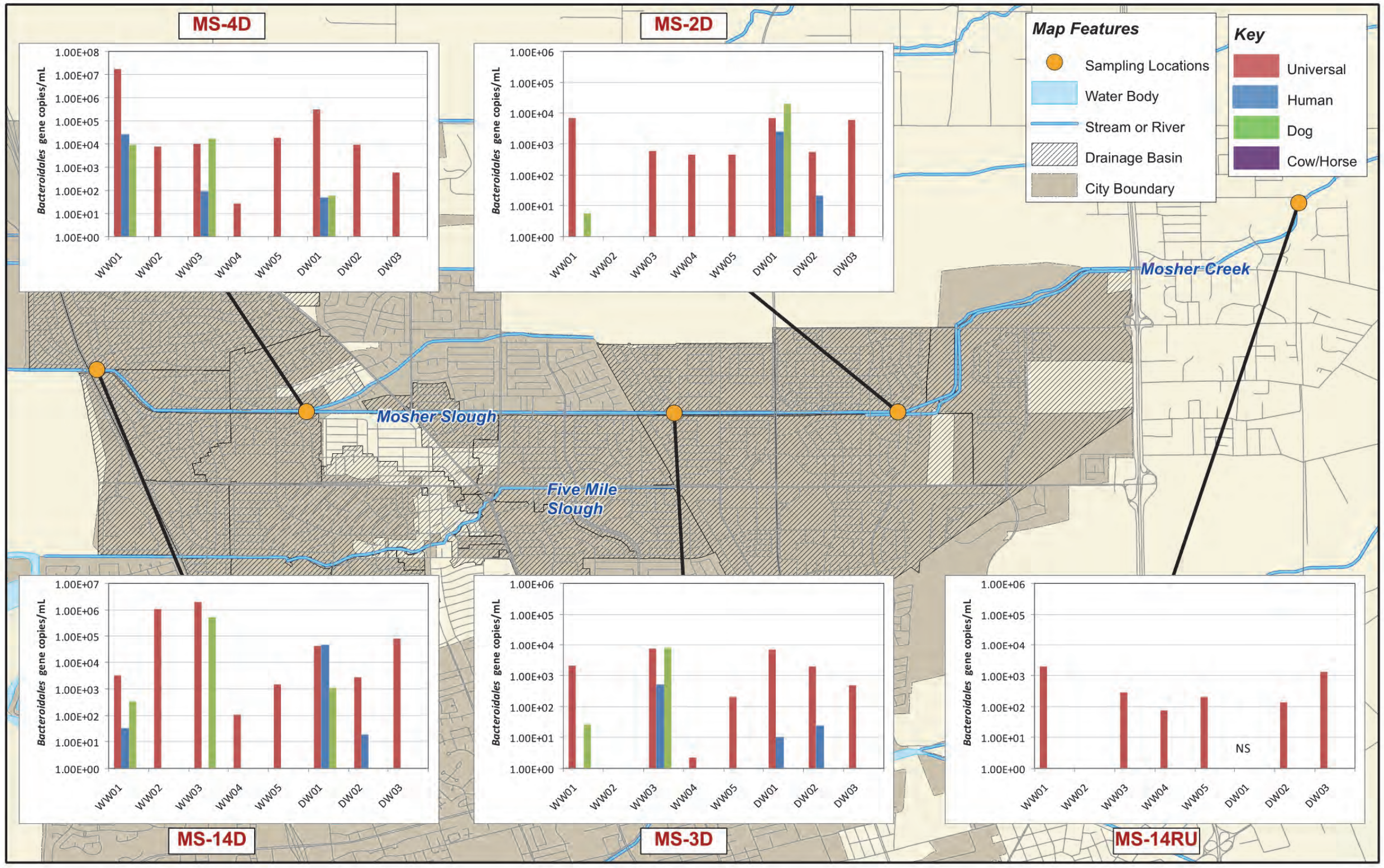

Figure 9-16. Phase II Source-specific *Bacteroidales* concentrations (gene copies/mL) at Source ID locations on Mosher Slough (NS = not sampled) (2009-2010)

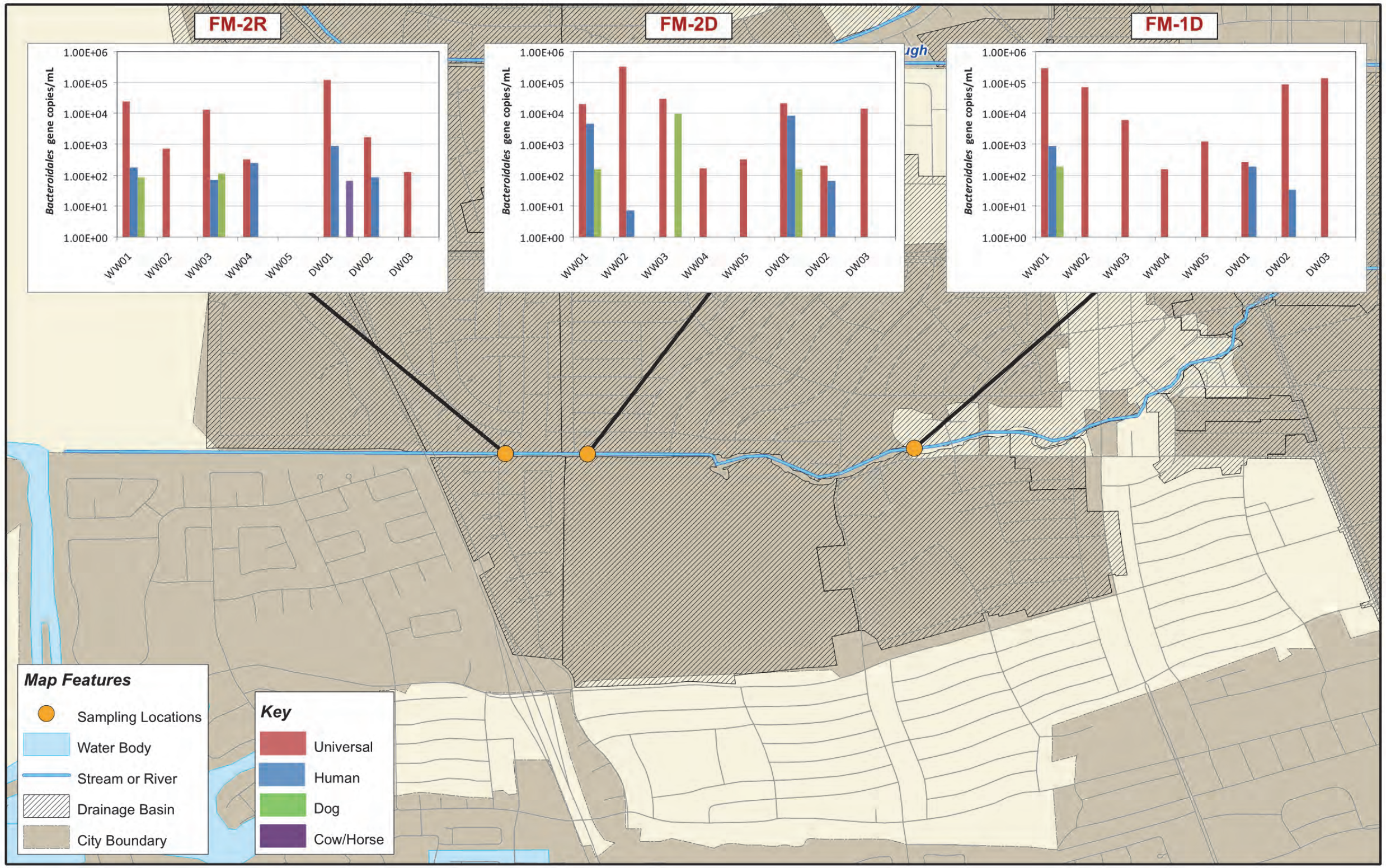

Figure 9-17. Phase II Source-specific *Bacteroidales* concentrations (gene copies/mL) at Source ID locations on Five Mile Slough (NS = not sampled) (2009-2010)

Phase II BMP Implementation

Results from Phase II Source ID monitoring were used to select sources to target with BMP implementation. BMP implementation for the Mosher Slough and Five-Mile Slough watersheds began in 2010-2011, with a focus on pet waste source control though targeted outreach.

Pet Waste Control

Permittee efforts focused on pet waste source control through public outreach and education, including billing inserts, outreach brochures, and newspaper articles, were described in **Section 4**. The Permittees' pet waste control outreach campaign includes pet owners in the Phase II drainage areas.

Human Source Control

Human-derived fecal contamination was identified in Phase II waterbodies through source identification monitoring. Human inputs were primarily present during dry weather events.

The Permittees track SSOs, which are a potential source of human-derived fecal contamination in SUA waterways, as described in Section 4 of the Annual Reports. Additionally, the Permittees' ID program (described in Section 2 of the Annual Reports) incorporates control measures to identify illicit connections (e.g., a sanitary sewer connection to the storm drain). The control measures consist of public reporting, dry weather field screening, and field crew inspections.

The Permittees will continue to track and respond to SSOs and illicit connections as a potential source of human fecal input to Phase II waterways.

Phase II Effectiveness Monitoring

Effectiveness monitoring for Phase II waterbodies will be initiated during the fourth term permit.

Phase III Activities

Phase III, focusing on the Lower Calaveras River and Duck Creek/Walker Slough, began in the fall of 2010 with Characterization Monitoring. Phase III waterbodies and monitoring locations are shown in **Figure 9-18**. Phase III Pathogen Plan components completed during the Permit term are discussed in the following sections.

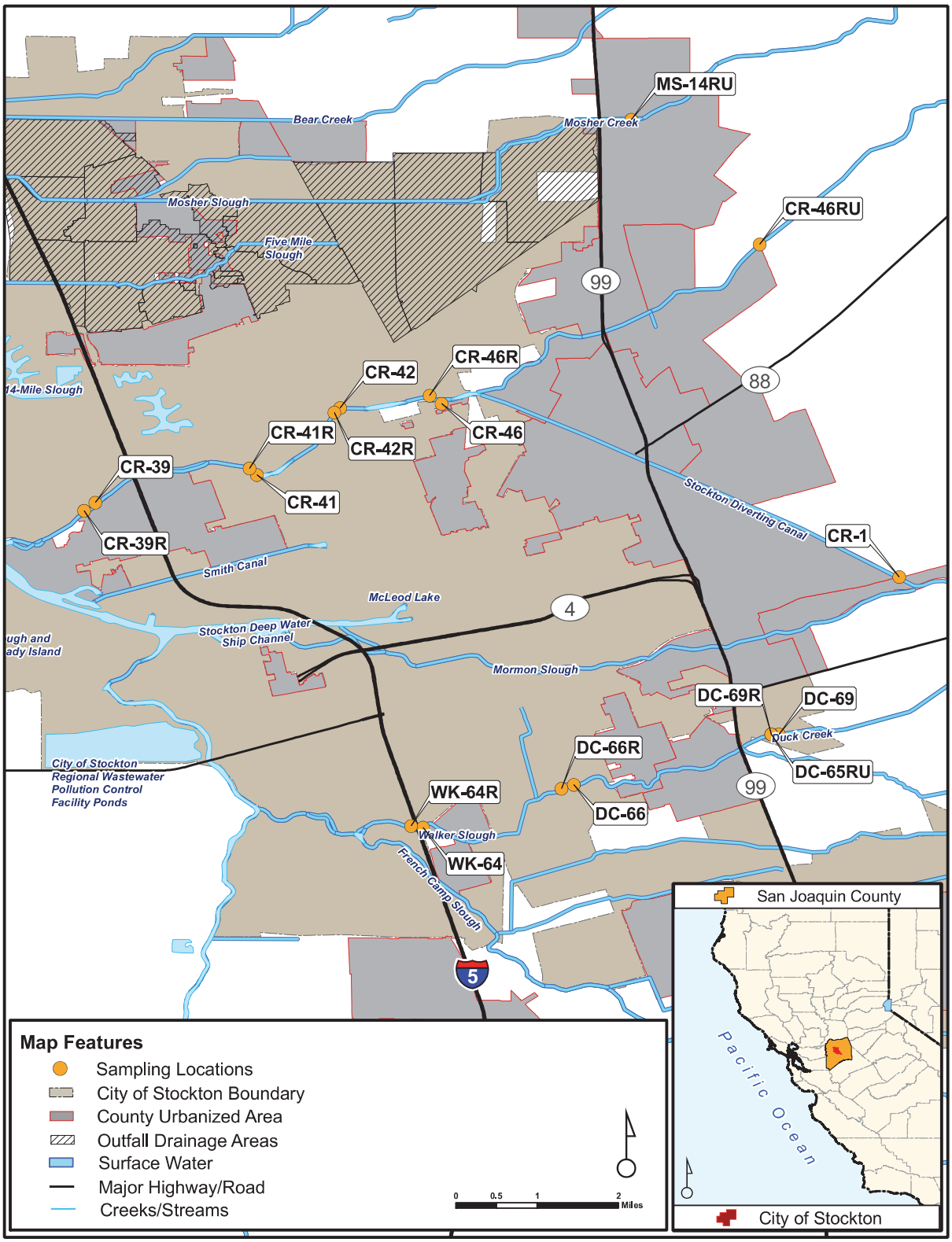

Figure 9-18. Pathogen Plan Phase III Characterization Monitoring Locations

Phase III Characterization Monitoring

Characterization monitoring was initiated for the Phase III sites (Calaveras River and Duck Creek) in November 2010, and is continuing through the 2011-2012 monitoring year.[23] Monitoring locations are shown in **Figure 9-18**. Receiving water sites are denoted with an "R." In addition to the Phase III waterbodies, four locations upstream of the SUA (on Mosher Slough, the Calaveras River, and Duck Creek) were also monitored in order to assess the upstream contribution of indicator bacteria.

During 2010-2012 Phase III Characterization Monitoring, the events specified in **Table 9-13** were conducted:

Table 9-13. 2010-2012 Phase III Characterization Monitoring

		Number of Events, by Type	
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**
Calaveras River	CR-46	12	3
	CR-46R	12	3
	CR-42	12	3
	CR-42R	12	3
	CR-39	12	3
	CR-39R	12	3
	CR-41	12	3
	CR-41R	12	3
	CR-1	10	1
	CR-46RU	5	1
Duck Creek	DC-69	12	3
	DC-69R	12	3
	DC-66	12	3
	DC-66R	12	3
	DC-65RU	10	2
Walker Creek	WK-64	12	3
	WK-64R	12	3
Mosher Slough	MS-14RU	6	1

[23] The 2010-2011 Annual Report identified that the Phase III characterization monitoring efforts would be modified to reduce dry weather monitoring from 24 events to 12 events. It was anticipated that a total of 12 dry weather events will provide sufficient data for the purpose of characterization monitoring, as an analysis of the Phase II characterization monitoring dry weather results confirmed that geometric means are similar whether 12 events are analyzed, or 24 events are analyzed.

E. coli

When compared to single sample WQOs (235 MPN/100 mL), the overall frequency of exceedances was 40%.

- At Calaveras River, 42 of 120 samples (35%) were above single sample WQOs.
- At Duck Creek, 43 of 90 samples (50%) were above single sample WQOs.
- At upstream locations, 13 of 37 samples (35%) were above single sample WQOs.

Sites where 50% or more samples exceeded single sample WQOs include the following:

- CR-46 (73%)
- CR-42 (73%)
- CR-41 (53%)
- DC-66 (80%)
- WK-64 (53%)
- CR-46 (57%)
- MS-14RU (86%)

Dry Weather

Dry weather *E. coli* exceedances for each waterbody are broken down as follows:

- At Calaveras River, 26 of 96 samples (27%) were above single sample WQOs.
- At Duck Creek, 29 of 72 samples (40%) were above single sample WQOs.
- At upstream locations, 10 of 32 samples (31%) were above single sample WQOs.

Wet Weather

Wet weather *E. coli* exceedances for each waterbody are broken down as follows:

- At Calaveras River, 16 of 24 samples (67%) were above single sample WQOs.
- At Duck Creek, 6 of 18 samples (33%) were above single sample WQOs.
- At upstream locations, 3 of 5 samples (60%) were above single sample WQOs.

When compared to Phase II characterization monitoring (presented in the 2008-2009 Annual Report), Phase III waterbodies had a similar frequency of exceedances of *E. coli* WQOs—33% of dry weather and 49% of wet weather Phase II samples exceeded single sample WQOs compared to 33% of dry weather and 53% of wet weather for Phase III . There appears to be a consistent pattern of a greater frequency of exceedances during wet weather events than dry weather events in all waterbodies.

Fecal Coliform

When compared to single sample WQOs (400 MPN/100 mL) the frequency of exceedances was 45% overall.

- At Calaveras River, 52 of 120 samples (43%) were above single sample WQOs.
- At Duck Creek, 53 of 90 samples (59%) were above single sample WQOs.
- At upstream locations, 7 of 37 samples (19%) were above single sample WQOs.

Sites where 50% or more samples exceeded single sample WQOs include the following:

- CR-46
- (73%)
- CR-42 (73%)
- CR-41 (80%)
- DC-69 (60%)
- DC-66 (80%)
- DC-66R (67%)
- WK-64 (73%)

Dry Weather

Dry weather fecal coliform exceedances for each waterbody are broken down as follows:

- At Calaveras River, 35 of 96 samples (36%) were above single sample WQOs.
- At Duck Creek, 15 of 24 samples (63%) were above single sample WQOs.
- At upstream locations, 5 of 32 samples (16%) were above single sample WQOs.

Wet Weather

Wet weather fecal coliform exceedances for each waterbody are broken down as follows:

- At Calaveras River, 15 of 35 samples (41%) were above single sample WQOs.
- At Duck Creek, 15 of 18 samples (83%) were above single sample WQOs.
- At upstream locations, 2 of 5 samples (40%) were above single sample WQOs.

When compared to Phase II characterization monitoring (presented in the 2008-2009 Annual Report), Phase III waterbodies had a similar frequency of exceedances of fecal coliform WQOs—37% of dry weather and 63% of wet weather Phase II samples exceeded single sample WQOs compared to 36% of dry weather and 68% of wet weather for Phase III. There appears to be a consistent pattern of a greater frequency of exceedances during wet weather events than during dry weather events for all waterbodies.

To highlight the spatial and temporal patterns of fecal indicator bacteria concentrations in the Smith Canal and Mormon Slough watersheds, indicator data collected during characterization monitoring were entered into a GIS decision-support tool. The GIS tool allows the indicator data to be easily compared among sites and types of monitoring events (dry and wet weather). The GIS-tool was used to display the dry and wet weather indicator data collected from the lower Calaveras River, as shown in **Figure 9-19** and **Figure 9-20**, respectively. Similarly, the data from Duck Creek are shown in **Figure 9-21** and **Figure 9-22**. Data from the upstream locations are shown in **Figure 9-23** and **Figure 9-24**. The statistics of total coliform, fecal coliform, and E. coli data are displayed on a log-scale: the geometric mean, 10th percentile, and 90th percentile values. Also shown are the number of samples (e.g., n = 7) at each site.

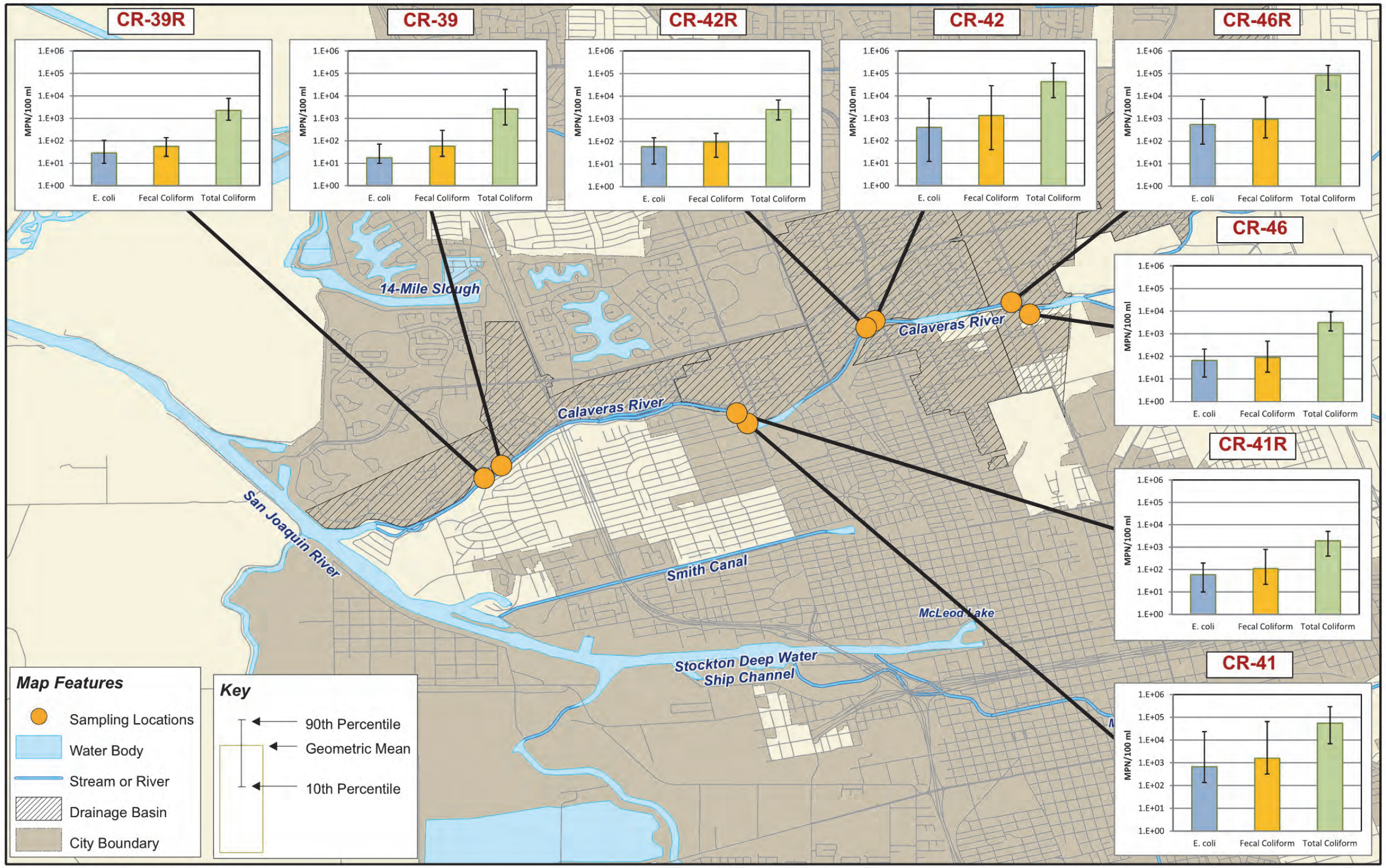

Figure 9-19. Dry Weather Phase III Characterization Monitoring Results for the Lower Calaveras River (2011-2012)

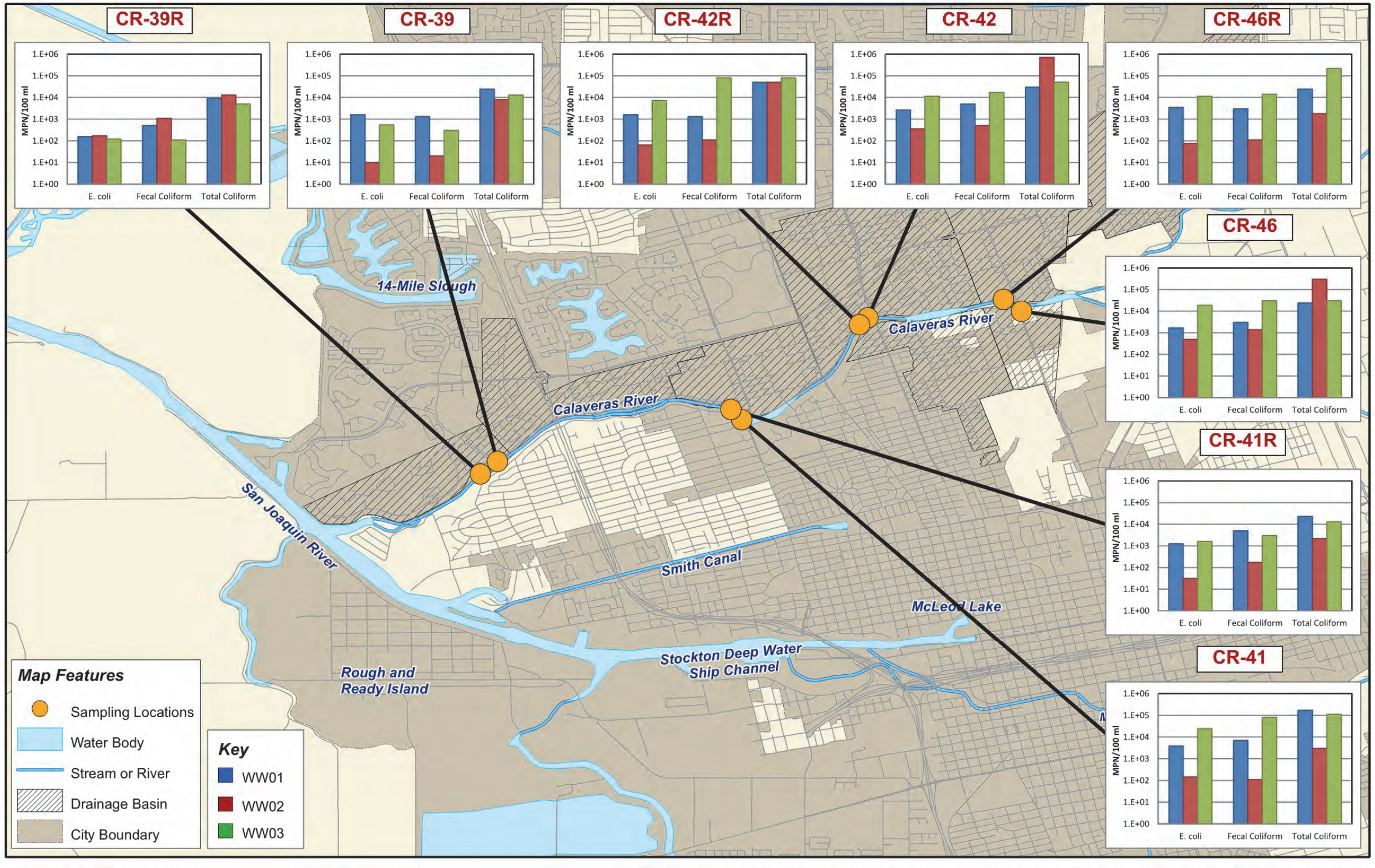

Figure 9-20. Wet Weather Event Phase III Characterization Monitoring Results for the Lower Calaveras River (2010-2011)

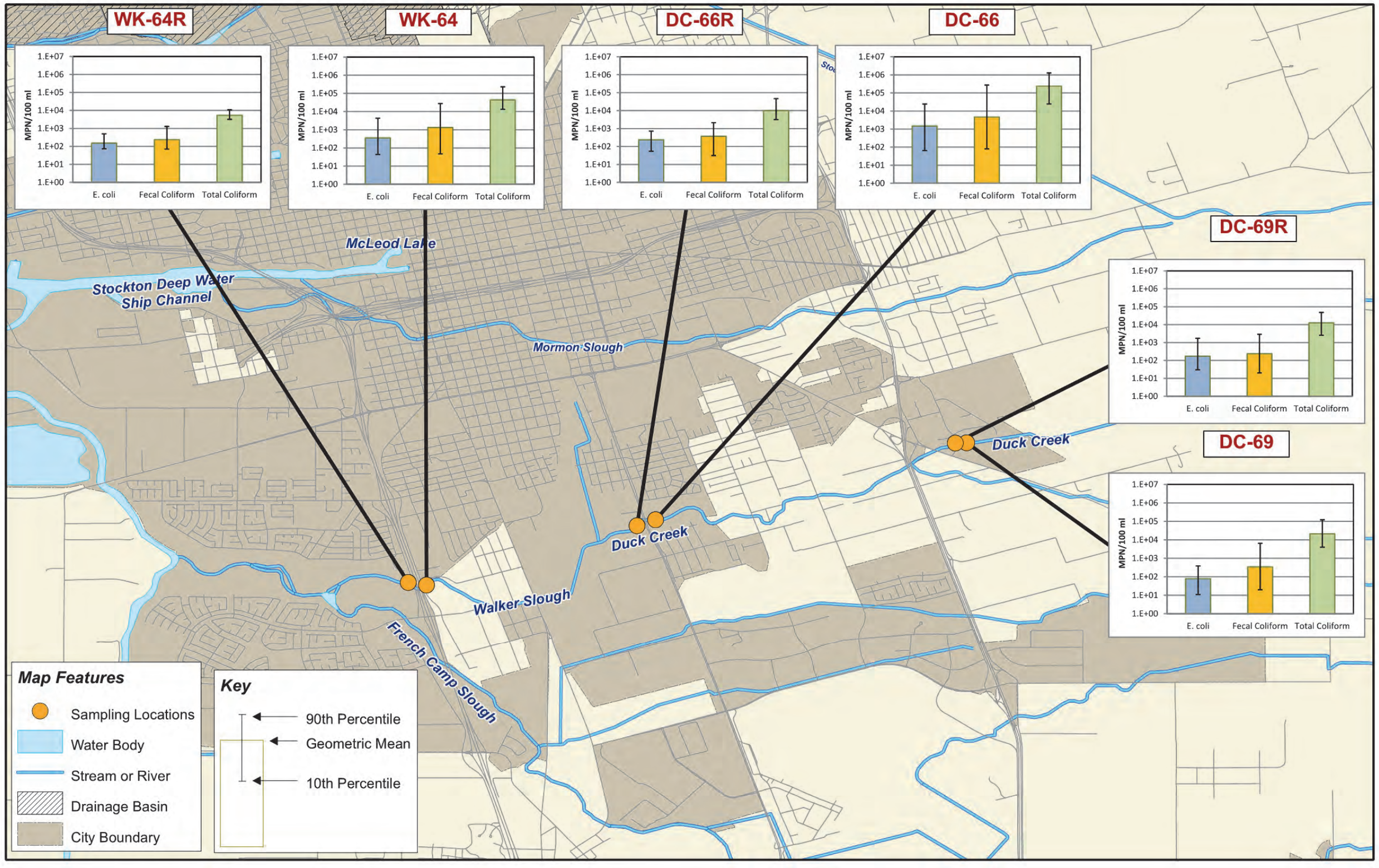

Figure 9-21. Dry Weather Phase III Characterization Monitoring Results for Walker Slough and Duck Creek (2011-2012)

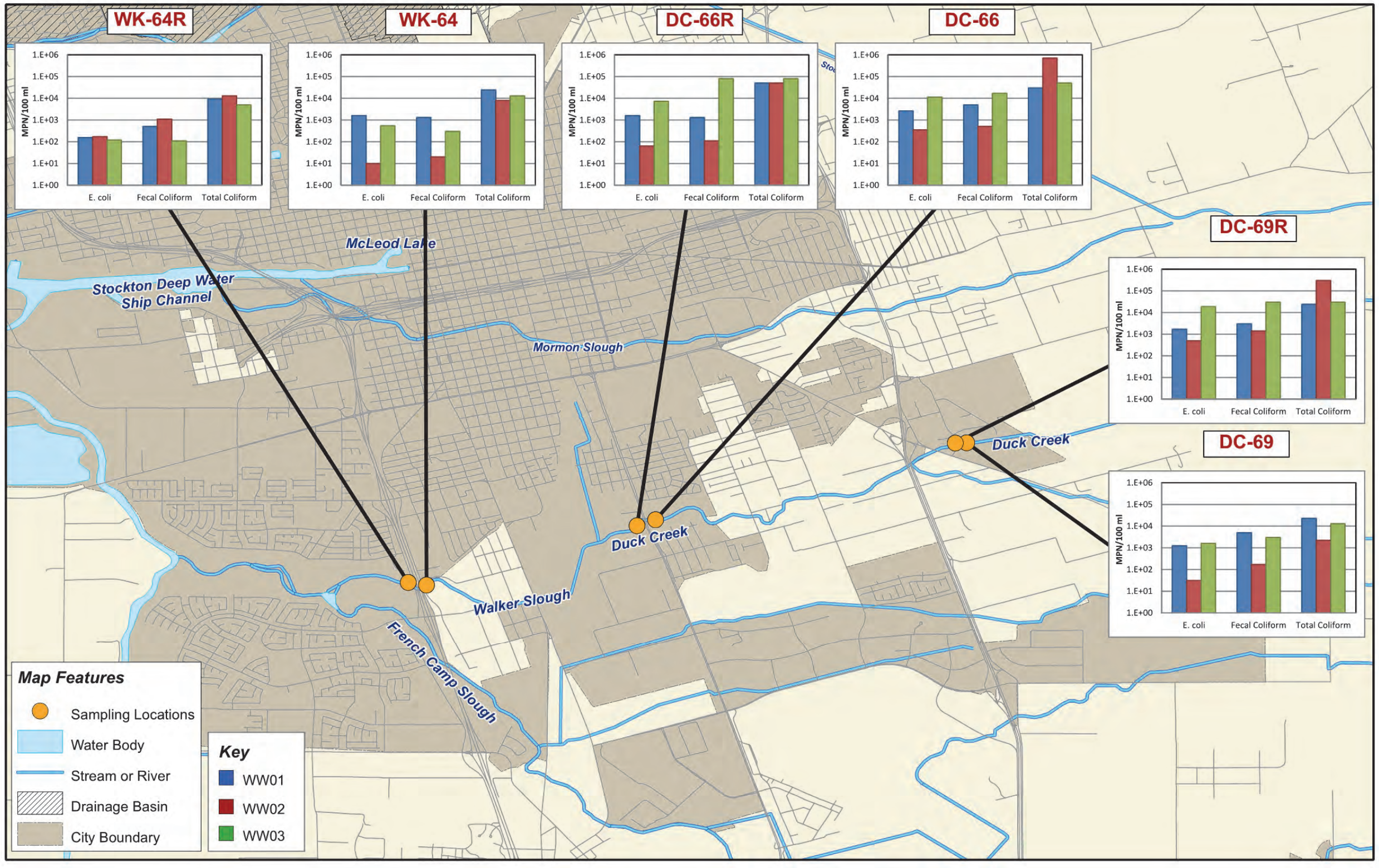

Figure 9-22. Wet Weather Event Phase III Characterization Monitoring Results for Walker Slough and Duck Creek (2010-2011)

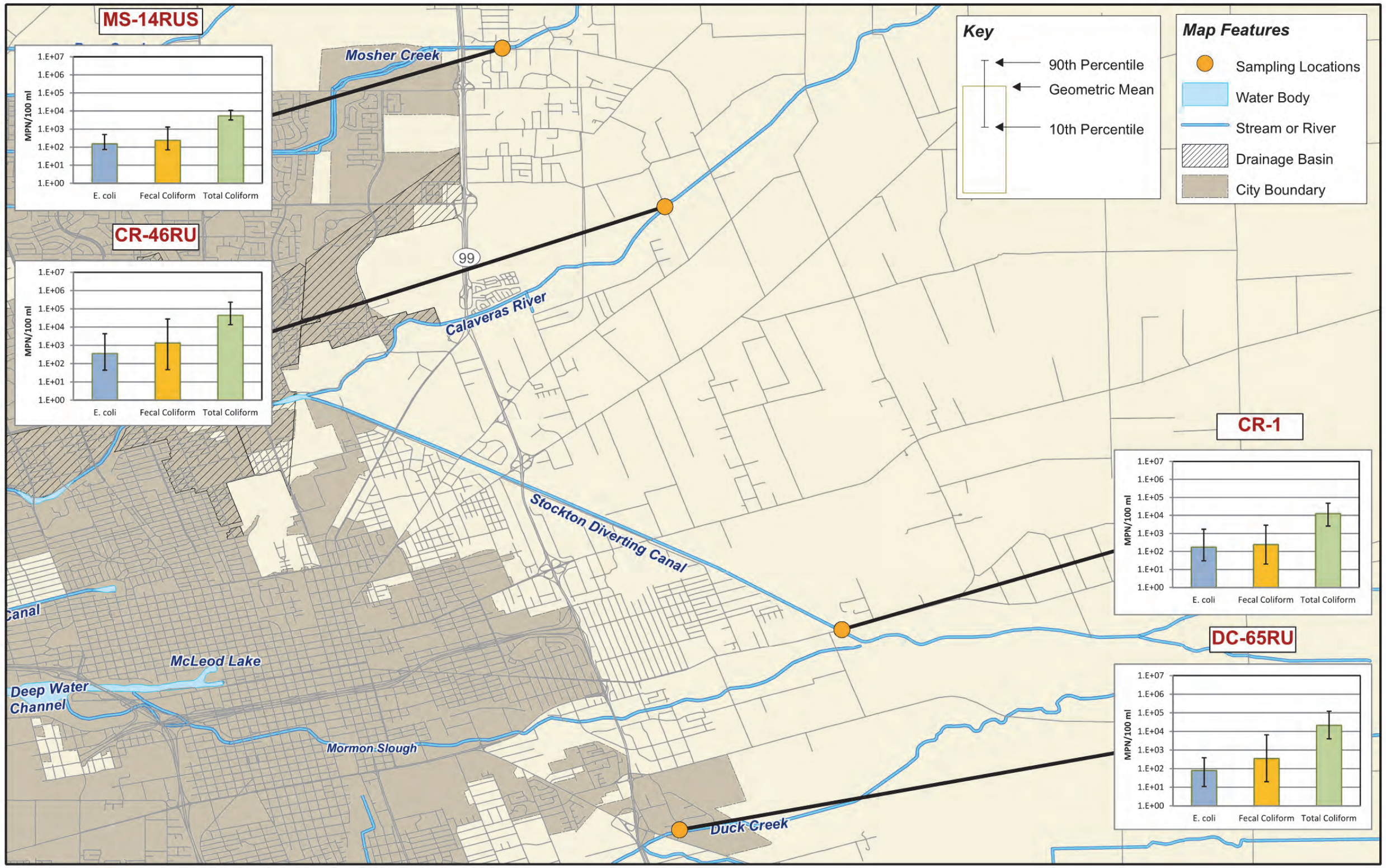

Figure 9-23. Dry Weather Phase III Characterization Monitoring Results for Upstream Locations (2011-2012)

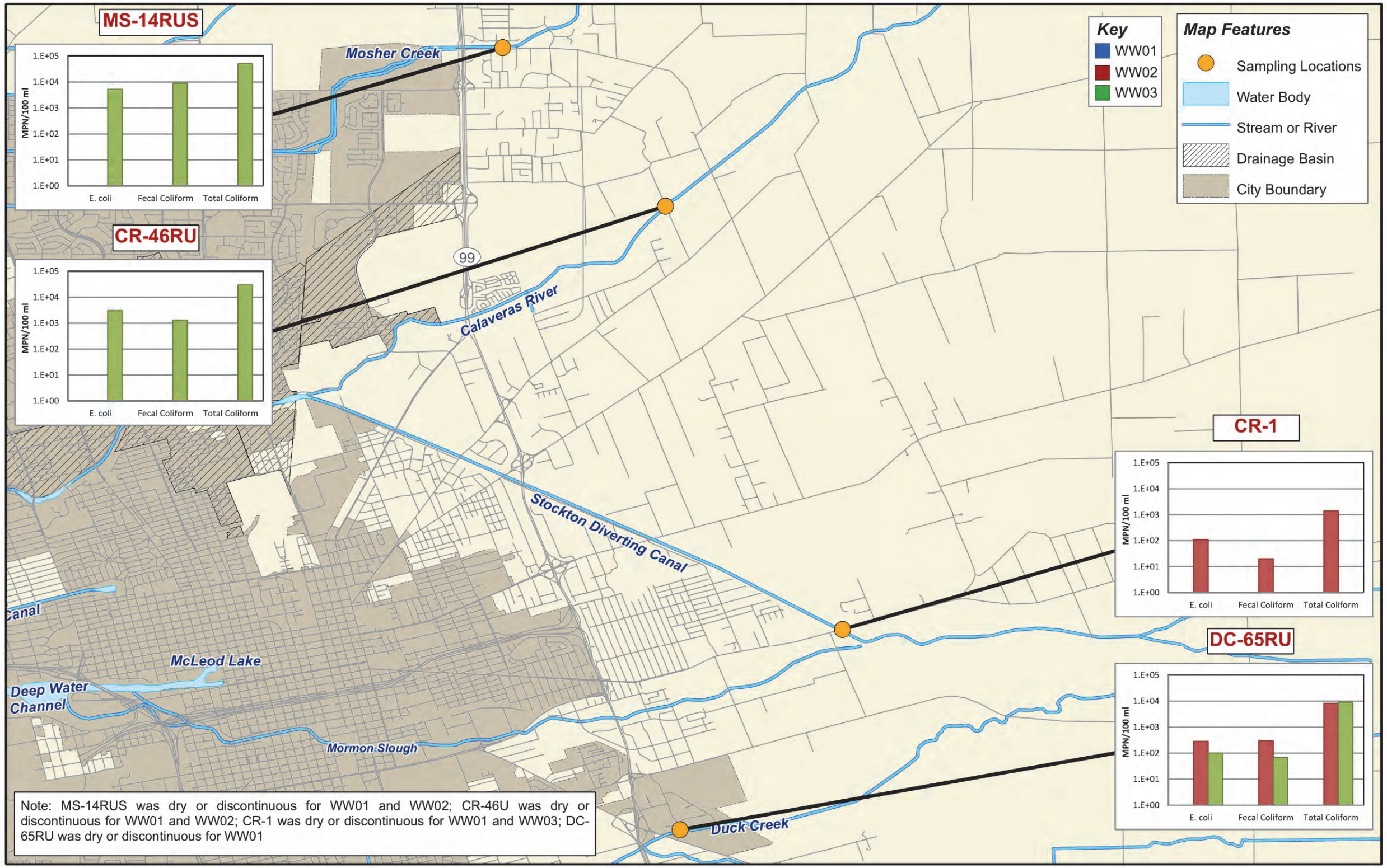

Figure 9-24. Wet Weather Event Phase III Characterization Monitoring Results for Upstream Locations (2010-2011)

Conclusions

The following general conclusions can be drawn based on the overall results of Pathogen Plan monitoring as of December 31, 2011:

- Discharge locations exhibited higher indicator bacteria concentrations than receiving water locations.
- No distinct pattern was apparent with regard to identification of indicator bacteria “hot spots” (i.e., specific outfalls).
- Receiving water locations closest to the San Joaquin River had the lowest indicator bacteria concentrations, most likely due to mixing and dilution.
- Receiving water locations typically had higher indicator bacteria concentrations during wet weather events than during dry weather events.

2012-2017 PROPOSED PROGRAM

Under the proposed program, the WQBP-related Performance Standards will be completed as efforts under other Program Elements. All continuing WQBP-related monitoring efforts are captured in Section 2. The monitoring program will be revised as needed to address any additional monitoring needs that may be identified during the upcoming permit term.

The proposed performance standards, as outlined in Sections 1 and 3 through 8, are summarized in the following table.

2012-2017 Proposed Program: Pathogen Plan

Key Performance Standards with Focus on Pathogens	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit	N	Program Coordination						
Track legislative and regulatory efforts related to the WQBPs	N	Program Coordination						
Continue field observations for ID/IC and document/ report evidence of non-stormwater discharges/ connections or illegal dumping	C		ID1					
Investigate and eliminate ICs	C		ID2					
Respond to IDs	C		ID3					
Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response	E		ID3					
Map reported ID incidents and locations	C		ID3					
Organize, support, and/or participate in stream cleanup events once annually, at a minimum	C			PO1				
Conduct follow-up Public Opinion Survey(s) during the permit term and re-evaluate the questions as needed to address the POCs	C			PO3				
Identify and/or create, revise, and distribute educational materials with information on POCs, as needed	C			PO3				
Implement pet waste outreach program at kennels and other pet-related businesses, events, or organizations.	C			PO3				

Key Performance Standards with Focus on Pathogens	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Coordinate with the City Animal Control and Pet Licensing or County Agricultural Commissioner's Office for Pet Licensing to provide outreach and literature on the proper disposal of pet waste to pet owners and animal adoption agencies	C			PO3				
Update website with information on POCs, as needed	E			PO3				
Conduct Mixed Media Campaigns focused on the POCs	E			PO3				
Participate in three (3) community-wide events throughout the year	C			PO3				
Work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children	N			PO4				
Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children	C			PO4				
Implement the SSOERP	C				MO1			
Prioritize Facilities based on POCs	E					IC2		
Inspect Facilities with POCs Annually	E					IC2		
Conduct Follow-up Inspections, As Needed	C					IC2		
Review/ Revise BMP Fact Sheets, As Needed	E					IC3		
Distribute BMP Information	C					IC3		

Key Performance Standards with Focus on Pathogens	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Require Priority Projects to Comply with 2009 SWQCCP	C							LD2
Conduct Inspections of Post-Construction BMPs During Construction	C							LD3

Notes:
1. C = Continue; E = Enhance; N = New

The proposed monitoring program for pathogens is summarized for each water body in the tables below. Please refer to Section 2.7 for more information.

Proposed Pathogen Monitoring Program: Mosher Slough

Constituents Monitored	Type of Monitoring	Sites Monitored						
		MS-14RUS	MS-2D	MS-2R	MS-4D	MS-14	MS-14R	MS-13
E. coli and fecal coliform	Water quality BMP effectiveness monitoring	G	G	G	G	G	G	G

Notes:
G = Grab

Proposed Pathogen Monitoring Program: Calaveras River

Constituents Monitored	Type of Monitoring	Sites Monitored							
		CR-1R	CR-46	CR-46R	CR-42	CR-41	CR-41R	CR-39	CR-39R
E. coli and fecal coliform	Source ID water quality monitoring	G	G	G	G	G	G	G	G

Notes:
G = Grab

Proposed Pathogen Monitoring Program: Smith Canal

Constituents Monitored	Type of Monitoring	Sites Monitored					
		SC-1	SC-1R	SC-2D	SC-2R	SC-4D	SC-4R
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G	G	G

Notes:
G = Grab

Proposed Pathogen Monitoring Program: Duck Creek

Constituents Monitored	Type of Monitoring	Sites Monitored							
		DC-65RUS	DC-69	DC-66[1]	DC-66R[1]	DC-65[2]	DC-65R[2]	WK-64	WK-64R
E. coli and fecal coliform	Source ID water quality monitoring	G	G	G	G	G	G	G	G

Notes:
1. These sites will be monitored during dry weather only
2. These sites will be monitored during wet weather only
G = Grab

Proposed Pathogen Monitoring Program: Mormon Slough

Constituents Monitored	Type of Monitoring	Sites Monitored			
		MM-142	MR-2D	MR-2R	MR-4R
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G

Notes:
G = Grab

Proposed Pathogen Monitoring Program: Five-Mile Slough

Constituents Monitored	Type of Monitoring	Sites Monitored					
		5M-28	5M-28R	5M-26	5M-26R	5M-25	5M-25R
E. coli and fecal coliform	Water quality effectiveness monitoring	G	G	G	G	G	G

Notes:
G = Grab

ASSESSMENT

The Permittees' PEA strategy builds upon the results of the initial PEAs included as a part of the Annual Reports and addresses the stormwater program in terms of achieving both programmatic goals (i.e., raising awareness, changing behavior) and environmental goals (i.e., reducing pollutant discharges, improving environmental conditions). The PEA strategy is described in detail in Section 1 and will continue to evolve over the next permit term.

Management questions and associated goals have been identified for the POC-based implementation of the stormwater program. The management questions and goals will be evaluated as part of the annual effectiveness assessment during the Annual Reporting process and will be re-evaluated as needed. The goals are established by the Permittees as a way to gauge the success of their efforts. However, the numeric goals may be increased or decreased as needed by the Permittees and based on the implementation of the program.

The POC-Based management questions outlined below provide valuable feedback regarding the WQBPs. The CASQA Outcome Level is identified within the brackets.

Pathogen Plan Management Questions[24]

1. Are the impacted waterways meeting the TMDL targets for fecal coliform and E. Coli, as specified in the *Stockton Urban Waterways Pathogen TMDL*? **[Environmental – OL6]**
2. Are the urban stormwater dischargers a significant source of pathogens to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
3. Are the Permittees meeting the LAs for fecal coliform and E. Coli, as specified in the *Stockton Urban Waterways Pathogen TMDL*?[25] **[Environmental – OL5]**
4. Are the Permittees effectively implementing BMPs that target pathogens? **[Programmatic – OL2-4]**
5. Is the general public aware of the need to properly dispose of pet waste, and are they doing so? **[P03]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of pet waste.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of pet waste correctly.
        i. Identify the source(s) of information for the residents (pet waste signs, PSAs, brochures, community events, dog tag licensing, etc.)
6. Are the houseboat owners aware of the need to properly dispose of sump waste, and are they doing so? **[PO3]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the houseboat owners are aware of the need to properly dispose of sump waste.
    b. Based on the results of the Public Opinion Survey, 80-100% of the houseboat owners are reporting that they are disposing of sump waste correctly.

[24] For the Pathogen TMDL the targets = WLA = LA = WQO

[25] Each waterbody has its own specific allocations; however, they must all meet the objectives.

7. Are the industrial and commercial sites that use, store, or could generate pathogens aware of the BMPs that they should be implementing on site, and are they implemented and maintained? **[IC2]**
    a. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs are doing so.
8. Are the reported sanitary sewer overflows (SSOs) potentially impacting the storm drains and/or receiving waters? **[MO1]**
    a. Based on the SSOs, <25% of the SSOs are reaching the storm drains or receiving waters.
        i. Evaluate the estimated gallons and locations of impacts compared to monitoring data

Mercury Plan

OVERVIEW

Mercury is primarily a concern because of the highly toxic and bioaccumulative nature of methylmercury. In the environment, mercury naturally cycles among its elemental, ionic, and methylated forms (**Figure 9-25**). Once mercury is released in the environment, local environmental conditions determine its transformations. Bacteria that process sulfate in the environment can take up mercury in its inorganic form and, through metabolic processes, convert it to methylmercury. Factors such as DO, pH, nutrient, sulfide, and sulfate concentrations affect methylation rates.[26] Concentrations of methylmercury increase as it traverses the food web—from primary producers to higher trophic level fish to wildlife and humans—thereby causing a greater risk to consumers at the highest trophic level. Methylmercury is a neurotoxin that affects the brain and central nervous system, with long term exposure leading to loss of physical coordination and mental deficiencies. Developing fetuses and young children are most susceptible to its toxic effects.

In the past decade, studies have focused on the bioaccumulative effects of mercury concentration in fish in Delta waterways. A 1998 study examined fish tissue concentrations of mercury in the Delta region, identifying elevated tissue mercury concentrations in sport fish along with regional variation in mercury concentrations -- with higher concentrations in tributaries (including the Feather, Sacramento, American, and San Joaquin Rivers) and lower concentrations in the Central Delta.[27] A recently published study systematically evaluated mercury concentrations in Delta sport fish, to determine baseline levels of mercury in fish and evaluate spatial patterns of mercury accumulation.[28] The report underscored the complexity of mercury dynamics in the Delta, reporting variations in methylmercury levels among fish species, along with correlations between fish tissue and water column methylmercury but no relationship between fish tissue and sediment methylmercury.

[26] U.S. EPA (1997) Mercury Study Report to Congress, Volumes I through VIII. In: Office of Air Quality Planning and Standards and ORD. EPA/452/R-97-001. December.

[27] Davis, J.A., May, M.D., Ichikawa, G., and Crane, D. (2000) Contaminant concentrations in fish from the Sacramento-San Joaquin Delta and Lower San Joaquin River, 1998. In. Richmond, CA: SFEI, p. 52 pp. http://sfei.org/cmr/deltafish/dfc.pdf.

[28] Davis, J.A., Greenfield, B.K., Ichikawa, G., and Stephenson, M. (2008) Mercury in sport fish from the Sacramento-San Joaquin Delta region, California, USA. Science of the Total Environment 391: 66-75.

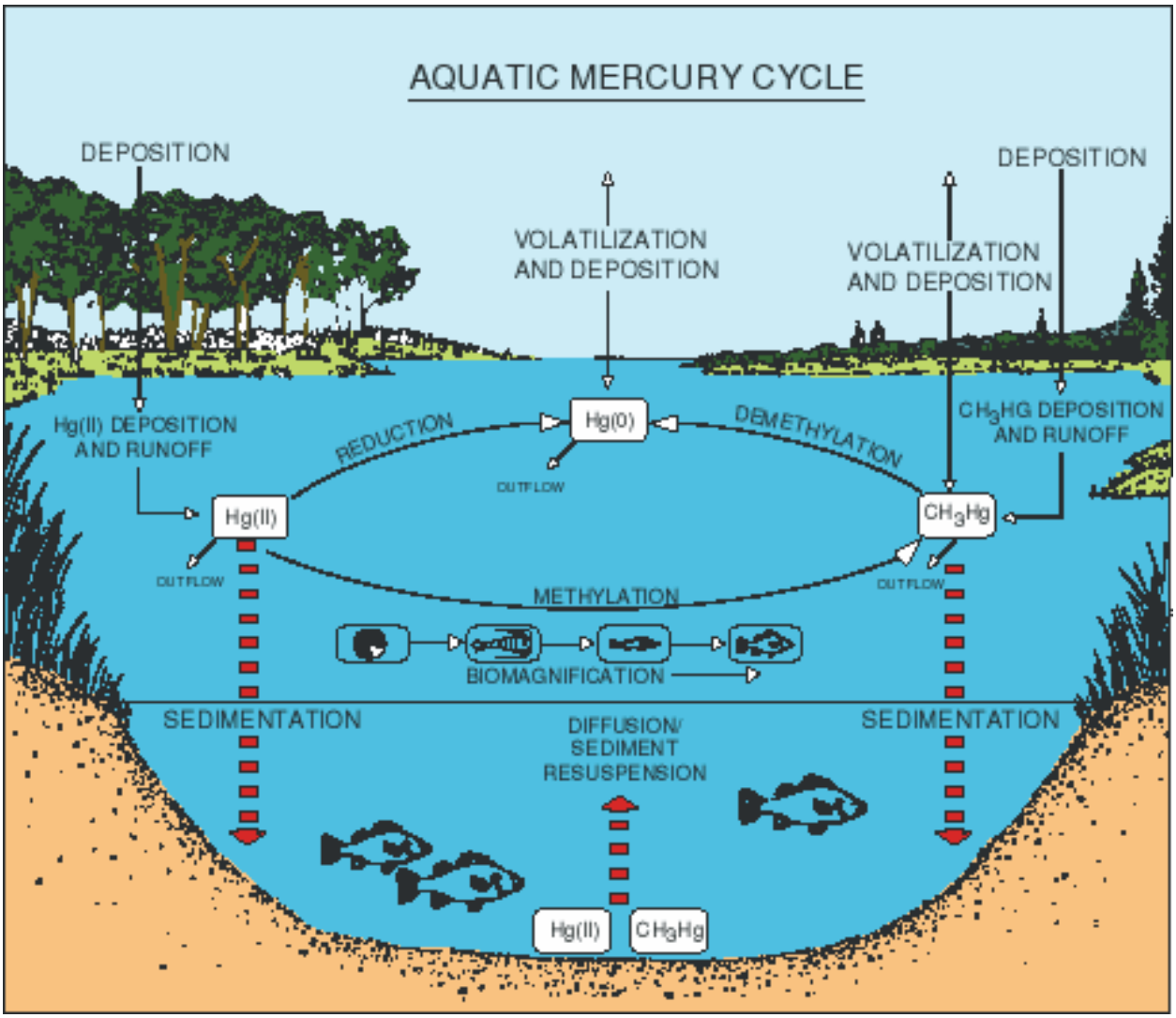

Figure 9-25. The Aquatic Mercury Cycle[29]

Sources of Mercury

Mercury enters the environment through natural sources, such as the natural breakdown of minerals in rocks and soils, as well as human activities such as mining, burning fossil fuels, and consumer product use. Mercury from these sources enters waterways through atmospheric deposition and direct contamination of water entering waterways.

Atmospheric Deposition

Vapor released from mercury sources is transported in the atmosphere and deposited on land and water, either directly or through precipitation. The U.S. EPA estimates that combustion of mercury-containing material accounts for 86% of atmospheric mercury emissions in the U.S., with coal-fired electric utility boilers, municipal waste combustion, and coal and oil-fired commercial/industrial boilers being the

[29] From: *Mercury Pollution: Integration and Synthesis*. Copyright Lewis Publishers, an imprint of CRC Press., reprinted with permission at http://wi.water.usgs.gov/mercury/mercury-cycling.html

primary contributors.[30] Atmospheric deposition is the primary source of mercury in most locations, and can contaminate even pristine watersheds.[31] A study by the San Francisco Estuary Institute (SFEI) found total mercury in ambient air samples in the San Francisco Bay Area ranged from 1.5 to 4.2 ng/m^3, with an average concentration of 2.1 ng/m^3, which is twice the global background concentration.[32] They concluded that direct atmospheric deposition contributed 27 kg of total mercury to the San Francisco Bay Estuary, with direct wet deposition contributing 18% of the total atmospheric deposition.

Sediment-Associated Mercury

In areas where gold and mercury have been mined extensively, watersheds contain elevated mercury levels. Sediment-associated elemental mercury from historic mining activity is likely the most prevalent mercury source within the Central Valley.[33]

Mercury-Containing Products

Mercury has useful properties which have been applied in many products and applications historically, and is still widely used (**Table 9-14**). Thermometers, barometers and other scientific instruments can contain mercury. Its electrical conductivity has been utilized in silent, position-dependent switches. Mercury vapor is used in streetlights, fluorescent light bulbs, computer equipment and advertising signs. Its ability to easily form amalgams with other metals such as gold, silver, zinc and cadmium led to use of mercury in dental fillings and dry cell batteries. Mercury can form compounds with other elements, to create cleaning chemicals, disinfectants, and paints. Improper disposal of these chemicals can contribute mercury directly to wastewater, stormwater, and the atmosphere.

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[30] U.S. EPA (2001) Air Pollution and Water Quality: Air Deposition Initiative. In: U.S. Environmental Protection Agency.

[31] Fitzgerald, W.F., Engstrom, D.R., Mason, R.P., and Nater, E.A. (1998) The case for atmospheric mercury contamination in remote areas. *Environmental Science & Technology* **32**: 1-7.

[32] SFEI (2001) San Francisco Bay Atmospheric Deposition Pilot Study Part 1: Mercury. In. Richmond, CA: San Francisco Estuary Regional Monitoring Program for Trace Substances.

[33] Domagalski, J. (2001) Mercury and methylmercury in water and sediment of the Sacramento River Basin, California. *Applied Geochemistry* **16**: 1677-1691.

Table 9-14. Common Mercury-Containing Products for Consumer and Commercial Uses

Product Type	Mercury-containing Products
Consumer Products	
Household Items	Airflow/thermostat controls, antique instruments (barometers, mirrors, organs), appliances, button cell batteries, clothes irons, light switches, latex paint, tilt switches, fluorescent light bulbs
Medical Pharmaceutical Products	Thimerosal (preservative in vaccines, antibiotics), contact lens solution, dental amalgam, thermometers, ear and eye drops, skin cream
Automotive Parts	Switches in pre-2003 cars: light switches, heated car rear windows, acceleration sensors, school bus braking systems; switches in new cars' navigation screens and high-intensity discharge headlights
Commercial Products	
Medical Products	Antibiotics, batteries, alarms, blood pressure cuffs, hearing aids, pacemakers, scales, ultrasound, tubes, vaccines
Electrical Products	Tilt switches, security systems, pressure controls, silent light switches, temperature control, thermometers, laptop computers, computer monitors
Manufacturing Products	Laboratory reagents (i.e., mercury chloride, mercury iodide, mercury nitrate, Hitachi Chem Analyzer reagent, Golgi's, Takata's reagent)

NPDES Permit Requirements

The Sacramento-San Joaquin Delta Estuary (the Delta) is on the CWA Section 303(d) List of Impaired Water Bodies due to elevated concentrations of methylmercury in fish. The third term Permit, Provision 28.d, required the Permittees to develop a Mercury Plan. The Permit identified the following key components which needed to be addressed as a part of the Mercury Plan:

- Identification and incorporation of BMPs into the SWMP;
- The reduction, to the maximum extent practicable, of mercury from controllable sources in stormwater, including the identification of mercury-containing products used by the Permittees and a schedule for their timely control;
- Study the feasibility and benefits to local stormwater quality of residential and commercial programs for diverting mercury-containing waste products (potentially including thermometers and gauges, batteries, fluorescent and other lamps, switches, relays, sensors, and thermostats) from the waste stream;
- Coordination with Regional Water Board staff, to the extent appropriate, to assess the contribution of air pollution sources to mercury in stormwater;
- Public education, outreach and participation program designed to reach residential, commercial and industrial users or sources of mercury-containing products or emissions;
- Participation with other organizations to develop programs to reduce or eliminate sources of mercury within the SUA; and
- Development and adoption of policies, procedures and/or ordinances to implement the Mercury Plan.

The Permittees developed a Mercury Plan that included a mercury monitoring program (Methylmercury Monitoring Plan). Together, these plans identified the Permittees' strategy to reduce methylmercury exposure to humans and wildlife in the Delta. This Plan was submitted to and approved by the Regional Water Board in 2009. The focus of the Mercury Plan is to reduce the mercury concentrations and loads in urban runoff. The Mercury Plan identifies the potential sources of mercury to urban runoff and describes public outreach and education strategies to mitigate the controllable sources of mercury. The approach for addressing mercury in urban runoff includes the following:

- Identify mercury-related BMPs
- Conduct public outreach to promote the proper use and disposal of products containing mercury, including coordination with HHW facilities and commercial and industrial outreach
- Assess and reduce municipal use of mercury-containing products
- Promote and implement sediment and erosion control practices
- Characterize the total mercury and methylmercury in Stockton waterbodies and stormwater discharges in order to identify areas that may need additional focus

The Mercury Plan has been implemented since 2008, and these efforts will be continued into the next permit term as outlined in the proposed program in Section 2. The activities completed during the Permit term are described in the following sections.

Other Regulatory Considerations

Delta Methylmercury TMDL (In Effect)

In April 2010, the Central Valley Regional Water Board approved *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary* (Resolution No. R5-2010-0043) (Mercury BPA). The Delta Mercury Control Program is designed to protect people eating one meal/week (32 g/day) of trophic levels 3 and 4 Delta fish, plus some non-Delta (commercial market) fish.

The TMDL allocates methylmercury loads among in-Delta dischargers and major tributaries and specifies implementation requirements (in two phases) for dischargers. The first phase of the TMDL began October 20, 2011, and is scheduled to continue through October 20, 2020. The first phase focuses on control studies and pilot projects to develop and evaluate management practices to control methylmercury. At the conclusion of Phase 1, the Regional Water Board plans to evaluate the fish tissue objectives, the linkage analysis, and attainability of the allocations and adjust the objectives, allocations, linkage analysis, and time schedule if appropriate. The second phase will begin after review of Phase I and will end in 2030. During the second phase, Dischargers will implement methylmercury control programs and continue inorganic mercury reduction programs. Compliance monitoring will occur during Phase 2.

During Phase I, dischargers of methylmercury are required to conduct studies to identify potential methylmercury control methods and to evaluate the effectiveness, cost, and potential environmental effects of the control methods. Point source dischargers are also required to implement pollution minimization programs. The Permittees are named as NPDES permitted urban runoff dischargers within the Mercury BPA.

The fish tissue objectives for the Sacramento-San Joaquin Delta and Yolo Bypass waterways as presented in the Mercury BPA are included in **Table 9-15**.

Table 9-15. Fish Tissue Objectives for the Sacramento-San Joaquin Delta and Yolo Bypass Waterways as Presented in the Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary

Matrix	Methylmercury Objective
(wet weight, muscle tissue)	
Trophic level 3 (large) fish tissue (150-500 mm length)	≤ 0.08 mg MeHg/kg (Avg.)
Trophic level 4 (large) fish tissue (150-500 mm length)	≤ 0.24 mg MeHg/kg (Avg.)
(wet weight, whole fish)	
Trophic level 2 and 3 (small) fish (<50 mm length)	≤ 0.03 mg MeHg/kg (Avg.)

The fish tissue objectives will be re-evaluated during the Phase 1 Delta Mercury Control Program Review and later program reviews.

The TMDL also specifies methylmercury WLAs which apply to runoff from urban areas within MS4 service areas within the Delta and Yolo Bypass (**Table 9-16**).[34]

[34] As presented in Table C for "MS4 MeHg WLAs for Urban Runoff Within each Delta Subarea" in Attachment 1 to Resolution No. R5-2010-0043

Table 9-16. MS4 Methylmercury WLAs for Urban Runoff from the Stockton Area MS4 as Presented in the Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary

Delta Subarea	Permittee	NPDES Permit No.	MeHg WLA[a,b] (g/yr)
Central Delta	Stockton Area MS4	CAS083470	3.6
San Joaquin River	Stockton Area MS4	CAS083470	0.18

Notes:

a. The allocated methylmercury loads for all MS4s are based on the average methylmercury concentrations observed in runoff from urban areas in or near the Delta during water years 2000 through 2003, a relatively dry period. Annual loads are expected to fluctuate with water volume and other factors. As a result, attainment of these allocations shall be assessed as a five-year average annual load. Allocations may be revised during review of the Delta Mercury Control Program to include available wet year data.

b. The methylmercury WLAs include all current and future permitted urban discharges not otherwise addressed by another allocation within the geographic boundaries of urban runoff management agencies within the Delta and Yolo Bypass, including but not limited to Caltrans facilities and rights-of-way (NPDES No. CAS000003), public facilities, properties proximate to banks of waterways, industrial facilities, and construction sites.

Additional Legislative and Regulatory Efforts

Additional legislative and regulatory efforts to reduce mercury loading to the Delta and San Francisco Bay and to control mercury-containing products include the following:

- Bay Protection and Toxic Cleanup Program and Consolidated Toxic Hot Spots Cleanup Plan, which identified mercury in the Delta as a toxic hot spot;
- Mercury control program for San Francisco Bay, which assigned mercury reductions to Central Valley outflows to the Bay to address the Bay's mercury impairment;
- California Mercury Reduction Act of 2001 (Senate Bill 633), which limits or prohibits the sale and/or use of several types of mercury-containing products in California;
- California Department of Toxic Substances Control's 2002 Universal Waste Rule (UWR), which established special management standards for three types of hazardous waste called "universal wastes" (batteries [except automotive lead acid type]; thermostats containing mercury, and lamps such as fluorescent tubes and mercury vapor lamps); and
- Energy Independence and Security Act of 2007, which requires the most common screw base incandescent household bulbs to be phased out in the United States over the next six years.

These legislative and regulatory efforts will be tracked by the Permittees to provide context to and benefit their local mercury control program. In particular, the UWR and Mercury Reduction Act will serve as guidelines for promoting proper use and handling of mercury-containing products by the Permittees.

2007-2012 IMPLEMENTATION

During the Permit term, several efforts were implemented, as follows:

- Promoted proper handling and disposal of mercury-containing products through public education and outreach, including outreach to Permittee staff and industrial and commercial facilities
- Implemented BMPs to minimize erosion, and transport of sediment-associated mercury
- Monitored total mercury and methylmercury over a period of three years, during three wet weather events and two dry weather sampling events each year

These efforts are discussed in more detail in the following sections, Stormwater Program Activities and Water Quality Monitoring Results.

Stormwater Program Activities

The Permittees conduct a number of activities under other Program Elements that support the Mercury WQBP. The performance standards are part of the Public Outreach, Municipal Operations, Industrial and Commercial, and Construction Programs.

Public Outreach

- **HHW Program:** The Mercury Plan supports the HHW program to encourage proper disposal of products containing mercury. During the Permit term, the HHW Program, a joint effort of the Permittees, collected mercury-containing products. The County operates a HHW Facility that accepts mercury-containing products. The facility is open to the public Thursday-Saturday. Their outreach brochure lists accepted products, including fluorescent bulbs, mercury thermometers, mercury thermostats and other devices containing mercury. Information about HHW collection is made available by the Permittees to the public through the County website[35] and HHW Facility brochures. Within the County, Onsite Electronics Recycling operates a free electronic waste collection event on a regular basis at various locations.[36]
- **Public Outreach Implementation:** The goal of public outreach is to promote public awareness about mercury pollution prevention, as well as inform the public of the health risk of mercury contamination in fish and DHS fish consumption advisories. The County provides this information on its website and communicates the information in person at community outreach events.[37] A major component is to inform the public about common products that contain mercury and safe disposal options using various media. The Permittees jointly conduct an annual mixed media campaign, consisting of radio and government access cable channel public service announcements.

Municipal Operations

- **Municipal Mercury Use Survey Report:** The Permittees are required to identify the extent of their use of mercury containing products. This was accomplished through a mercury use survey, administered to municipal departments during 2009-2010 and summarized the Municipal Mercury Use Survey Report, which was included as an appendix to the 2009-2010 Annual Report. The purpose of the survey is to identify mercury-containing products used by the Permittees to develop guidelines for a mercury policy to require elimination of mercury from municipal operations when possible, and to ensure the proper management of mercury-containing products. The survey was completed by at least one representative from each municipal department during fall and winter of 2009-2010. The survey included a list of commonly used mercury containing products, and representatives were asked to identify which products are used, quantities used, and how products are disposed. Supplemental questions were included to identify whether procedures conform to DTSC guidance for Universal Waste handling and disposal, under the California UWR.

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[35] http://www.sjgov.org/solidwaste/pdf%20folder/HHW%20brochure.pdf and http://www.stocktongov.com/government/departments/publicWorks/garbHWHouse.html

[36] http://www.onsiteelectronicsrecycling.com/events.aspx

[37] http://www.sjcleanwater.org/Mercury.htm

- For the City, the most commonly used mercury-containing products included fluorescent lamps, button cell batteries, thermostats, and compact fluorescent lamps. The majority of City respondents (70%) were not aware of the UWR. Despite limited awareness of the UWR, no mercury-containing products are disposed of as solid waste. Since City departments conform to UWR procedures, it was determined that a specific policy specifying conformance with the UWR is not necessary at this time. However, increased awareness of the UWR should be promoted through outreach to municipal departments.
- For the County, the most commonly used mercury-containing products included fluorescent lamps, button cell batteries, thermostats, and compact fluorescent lamps. The majority of County respondents (81%) were aware of the UWR, and no mercury-containing products are disposed of as solid waste. Since County departments are aware of the UWR and conform to UWR procedures, it was determined that a specific policy specifying conformance with the UWR is not necessary at this time.

- **Storm Drain System Maintenance:** The Permittees continue to implement a Storm Drain System Maintenance Control Measure. The Permittees prioritize catch basins for cleaning based on the required level of maintenance, label all catch basins with a storm drain message, and implement special event requirements to prevent debris accumulation in catch basins and storm drains. This Control Measure is described further in Section 5.

Industrial and Commercial

- **Prioritization and Inspection:** The Permittees conduct inspections of industrial and commercial facilities with the purpose of helping local businesses become better aware of what can be done to reduce or eliminate stormwater pollutants. These inspections include discussions about mercury-containing products, along with proper handling and disposal procedures (see Section 6). Inspectors specifically inquire about and review the mercury management plan of each of the businesses inspected. Outreach information is provided during inspections.
- **Industrial and Commercial Outreach:** The Permittees provide commercial and industrial outreach that, as a component of the Mercury Plan, focuses on hazardous waste disposal and mercury-specific outreach. BMP fact sheets listing products that contain mercury and addressing proper handling and disposal of mercury are available on the County's Stormwater Web site. The County's Environmental Health Department also offers Hazardous Waste Disposal training to business owners and operators. The Certified Unified Program Agency classes consist of a 4-hour training addressing hazardous waste such as mercury and are available year-round.[38]

Construction

- **BMP Implementation:** Sediment-associated elemental mercury from historic mining activity is a prevalent mercury source within the Central Valley. Erosion control and sediment control BMPs are implemented at construction sites within the SUA to avoid increased erosion and transport of mercury-contaminated soil into receiving waters via runoff. The Permittees implement the Construction Program Element to coordinate programs and resources to effectively reduce pollutants in runoff from construction sites during all construction phases. The Program provides inspections to ensure proper BMP implementation and specific practices that minimize sediment

[38] http://www.sjgov.org/ehd/programs/Others/unified.htm

http://www.sjgov.org/EHD/docs/CUPA%20Flyer%20Jan-Jun%202012.pdf

runoff from construction sites and the potential for erosion from new development construction. Efforts conducted during the Permit term are described in Section 7.

WATER QUALITY MONITORING RESULTS[39]

Mercury Characterization Monitoring

The Permit requires monitoring to characterize the concentrations and loads of methylmercury entering the Delta from Stockton urban runoff. The primary objective of Mercury Plan monitoring is to determine the extent to which the SUA municipal stormwater discharges contribute methylmercury and total mercury to the Delta. Baseline characterization monitoring was conducted at ten locations from 2008-2011 for total mercury, methylmercury, and suspended sediment concentrations. Based on the characterization monitoring results, estimates of the annual mercury loading from the municipal stormwater discharges within the SUA to the Delta were calculated. The mercury monitoring efforts, results, and annual loading estimates are discussed in the following sections.

The specific monitoring activities are outlined below:

- A combination of discharge outfalls, major upstream tributaries of the SUA, and/or downstream locations were monitored for total mercury, methylmercury, and suspended sediment;
- Three wet weather events and two dry weather events were monitored each year for three years, including a range of storm intensities; and
- The annual discharge volumes were estimated from the Stockton area within each watershed.

In addition, detention basin monitoring was conducted at La Morada Basin, as follows:

- Influent and effluent water samples were monitored during two wet weather events during 2008-2009 and one wet weather event in 2010-2011[40] for total mercury and methylmercury.
- Sediment chemistry monitoring was conducted during one dry weather event in 2008-2009 and one dry weather event in 2010-2011 and included analyses for total mercury.

Monitoring locations were selected so that they would be representative of conditions in the SUA. The Permittees used the following criteria to select the sites – the locations had to be:

- Representative of land uses and activities in the SUA;
- Accessible for monitoring;
- Spatially representative of the waterbodies in the SUA; and
- Coordinated with ongoing and/or proposed studies whenever possible.

Monitoring locations are shown in **Table 9-17** and **Figure 9-26**.

Table 9-17. Mercury Plan Monitoring Locations

Waterbody	Monitoring Location	Monitoring Sites	
		Discharge Site ID	Receiving Water Site ID
Smith Canal	Legion Park pump station at	SC-1	SC-5R

[39] Data are included as **Appendix I-1**.

[40] Only one wet weather event was monitored due to a lack of qualifying storm events.

	Yosemite Lake		
Mosher Slough	Morada Basin	MS-1D	MS-5R
Calaveras River	Upstream receiving location at Solari Ranch Road		CR-46RU
	West Lane (South side of river)	CR-46D	
	Downstream discharge and receiving location, at Brookside	CR-39D	CR-39R
Mormon Slough	Weber Avenue Overpass		MR-4R
	Lift station wet well at Commerce Street	MR-2D	

Receiving water and paired outfall discharges were monitored for total mercury, methylmercury, and suspended sediment concentrations (SSC). Characterization monitoring was conducted for three years, capturing two dry-weather events and three wet-weather events per year for a total of 15 events.

During 2008-2011 Mercury Characterization Monitoring, the events specified in **Table 9-18** were conducted.

Table 9-18. 2008-2011 Mercury Characterization Monitoring

		Number of Events, by Type	
Waterbody	**Site ID**	**Dry Weather**	**Wet Weather**
Smith Canal	SC-1	6	9
	SC-5R	6	9
Mosher Slough	MS-1D	6	9
	MS-5R	5	7
Calaveras River	CR-46RU	2	6
	CR-46D	6	9
	CR-39D	6	9
	CR-39R	6	9
Mormon Slough	MR-2D	5	9
	MR-4R	6	9

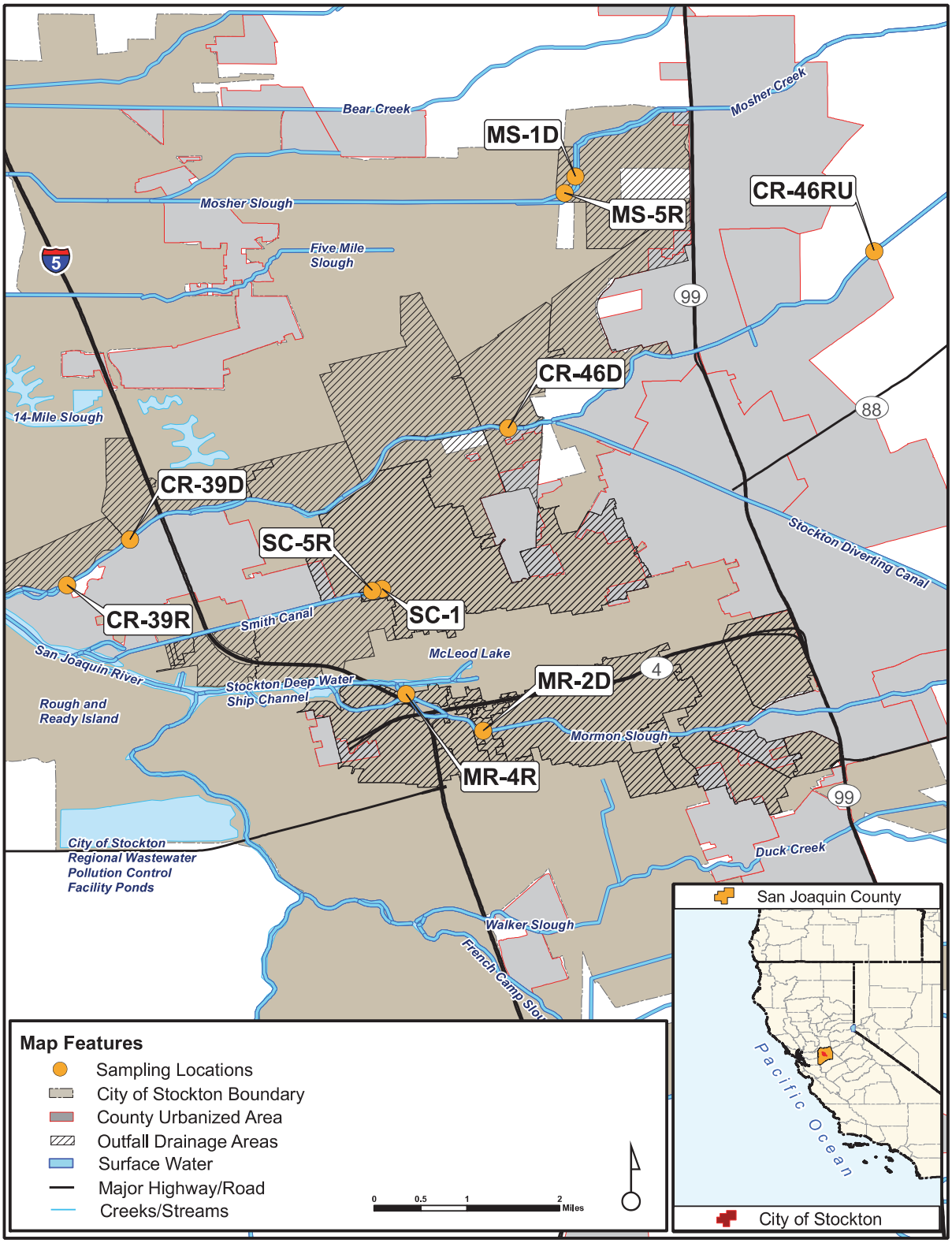

Figure 9-26. Mercury Plan Monitoring Locations

As discussed in previous Annual Reports, total mercury, methylmercury, and TSS (2008-2009 monitoring year) or SSC (2009-2011 monitoring years) were monitored during the Permit term. Although there are no applicable WQOs for mercury or methylmercury in the monitored waterbodies, total mercury results can be compared to the CTR criterion of 0.05 µg/L for total recoverable mercury for freshwater sources of drinking water[41], and methylmercury results can be compared to the Delta Methylmercury TMDL implementation goal of 0.06 ng/L for unfiltered ambient water.[42]

To display the spatial and seasonal variation of the total mercury, methylmercury, and SSC data collected, a GIS tool was utilized, as shown in **Figure 9-27**. Median values for total mercury, methylmercury, and SSC are presented for wet and dry weather events, with error bars spanning the 10th to 90th percentiles to show the range of data.

For measurements less than the MDL, regression on order statistics (ROS) were used to calculate values below the MDL. In cases where there are non-detect values, the ROS method (Helsel, 2005) uses the non-detect values to calculate the order statistic value, but fits the curve only to the order statistics and concentrations of detected values. This statistical approach is considered superior to arbitrarily assuming one-half the detection limit because it distributes non-detect values below the detection limit according to the observed distribution.

A comprehensive analysis of mercury monitoring results was presented in the Baseline Characterization Report in December 2011. A summary of the information presented in the Baseline Characterization Report is presented below.

Total Mercury

There are no applicable WQOs for mercury in the SUA waterways; however, total mercury concentrations were relatively low, and were consistently below the CTR criterion of 0.05 µg/L. Results by monitoring year are noted below:

- Generally, mercury concentrations were more variable and somewhat higher during wet weather events.
- There were no trends apparent between wet weather versus dry weather event total mercury concentrations.
- The concentrations of total mercury were not significantly different between receiving water and urban discharge sampling locations.
- During 2008-2009 monitoring, the highest total mercury concentration was observed at the Smith Canal receiving water site by Legion Park (SC-5R) during the first wet weather event (2/5/2009).
- During 2009-2010 monitoring, the highest total mercury concentrations were observed at the Calaveras River CR-46D discharge location and the Mormon Slough MR-2D discharge location during the second wet weather event (1/17/2010).
- During 2010-2011 monitoring, the highest total mercury concentrations were observed at the Mormon Slough MR-2D discharge location and the upstream Calaveras River CR-46RU location during the first dry weather event (8/16/2010).

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[41] The CTR does not specify duration or frequency; however, the Regional Water Board has previously employed a 30-day averaging period with an allowable exceedance frequency of once every three years. Although mercury in urban runoff can be compared to CTR standards, there may be too little urban runoff and receiving water concentration data to fully compare the results with the CTR.

[42] The Delta Methylmercury TMDL notes that the implementation goal of 0.06 ng/L would be applied as an annual average methylmercury concentration in ambient waters of the Delta.

Methylmercury

Methylmercury was detected in low concentrations at all locations during most sampling events. Methylmercury results can be compared to the Delta Methylmercury TMDL implementation goal of 0.06 ng/L for unfiltered ambient water. Results by monitoring year are discussed below:

- For all monitoring years, concentrations did not vary substantially among urban discharge and receiving water locations, or between the upstream location and locations within the urban area. Methylmercury concentrations were generally higher than the TMDL implementation goal, including the upstream location.
- During 2008-2009 monitoring, methylmercury was detected at all locations except for the Mormon Slough receiving water location MR-4R. It was detected in all wet weather event samples in the other locations, with non-detects during dry weather events on the Calaveras River discharge and receiving locations, and at the Smith Canal receiving water location.
- During 2009-2010 monitoring, methylmercury was detected in very low concentrations at all locations except for the Mormon Slough receiving water location MR-4R and the detention basin effluent MS-1D during the first wet weather event (10/13/09).
- During 2010-2011 monitoring, concentrations were highest in the Mosher Slough detention basin effluent (MS-1D) and Mormon Slough discharge location (MR-2D) during the first dry weather event.

Suspended Sediment Concentration

Suspended sediment and total suspended solids concentrations appeared to show similar trends to total mercury and methylmercury data; however, trends were not statistically significant. The correlation between SSC and mercury concentrations is expected, as sediments have been identified as a source of mercury and methylmercury.[43] High concentrations of SSC corresponded with high methylmercury concentrations at the Mormon Slough discharge location (MR-2D) and Mosher Slough detention basin effluent (MS-1D) during the first dry weather event. Concentrations of SSC or TSS were generally less than 100 mg/L, with the following exceptions:

- During 2008-2009 monitoring, concentrations of TSS were above 100 mg/L at sites CR-39R during the first wet weather event and MS-5R during the third wet weather event.
- During 2009-2010 monitoring, concentrations of SSC were above 100 mg/L at site MS-1D during the second dry weather event, and at sites CR-46D and MR-2D during the second wet weather event.
- During 2010-2011 monitoring, concentrations of SSC were above 100 mg/L at MR-2D and MS-1D during the first dry weather event, and at site CR-46D during the second wet weather event.

Monitoring data from 2008-2010 indicated that most locations appeared to have elevated TSS or SSC concentrations during wet weather events compared to dry weather. However, there was no trend apparent during 2010-2011 for SSC concentrations for wet versus dry weather events.

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[43] Central Valley Regional Water Quality Control Board and California EPA, 2010. Sacramento - San Joaquin Delta Estuary TMDL for Methylmercury, Staff Report, April 2010.

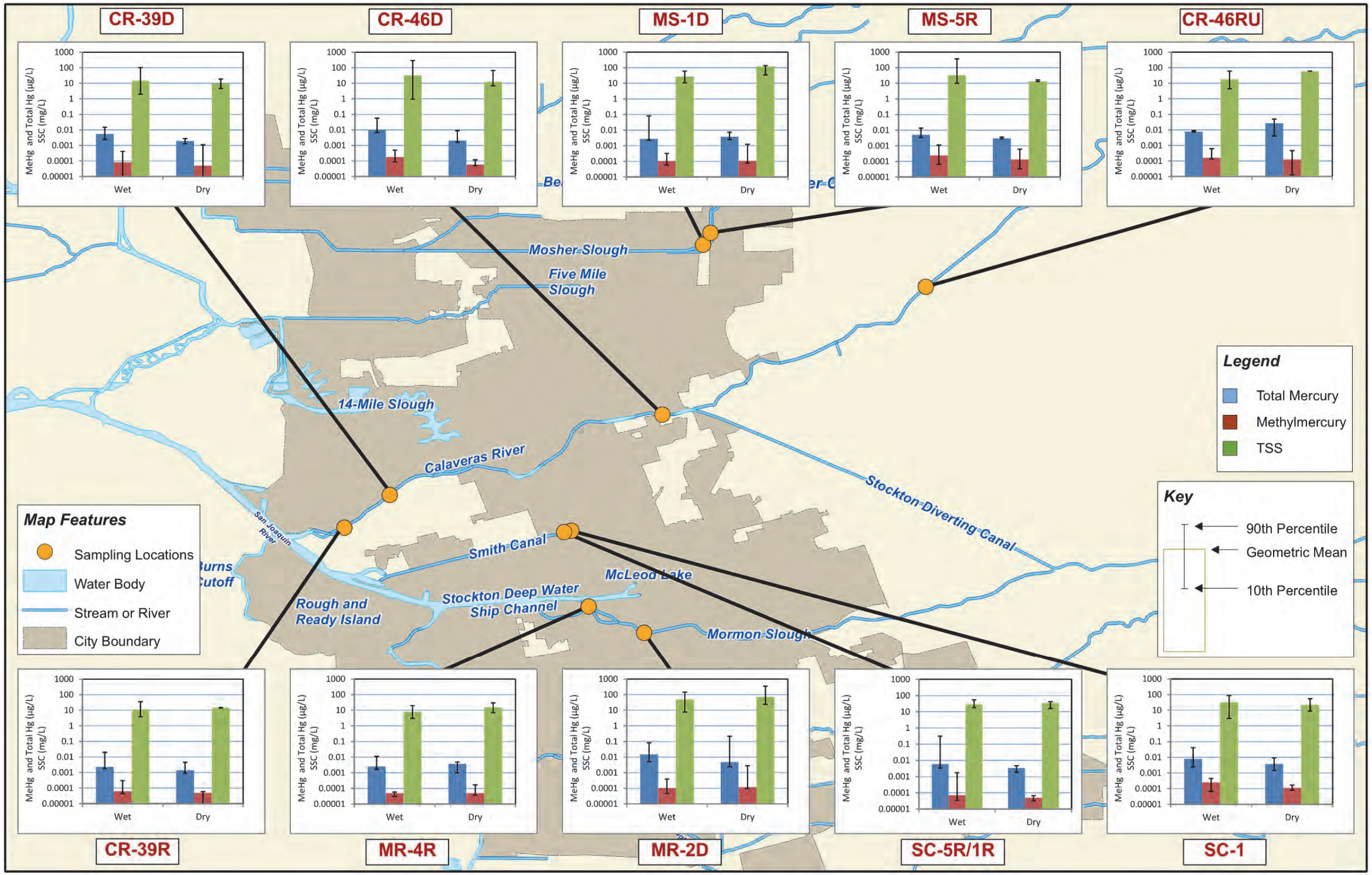

Figure 9-27. Mercury Characterization Monitoring Results for 2008-2011 (Wet and Dry Weather Events)

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Mercury Loading Estimates

The data from the characterization monitoring was used to derive mercury loading estimates, as described in the *Baseline Mercury Monitoring Report*. Annual total mercury and methylmercury loads from the SUA were calculated by multiplying monitored concentrations[44] by estimated runoff volumes during the following periods: 1) Wet Weather, 2) Dry Weather (May – September) and 3) Inter-storm Weather (October – April).

Dry and inter-storm loading estimates were calculated by multiplying the median concentrations for each period by the runoff estimates. Total annual loads were obtained by summing the wet-weather, dry-weather and inter-storm weather loads (**Table 9-19**).

Table 9-19. Annual Runoff Volumes and Mercury Load Estimates

Time Period	Runoff Volume	Total Mercury Load (g/yr)	Methylmercury Load (g/yr)
Wet Weather	22,410	228	3.18
Dry Weather (May – Sept)	3,325	16.1	1.36
Inter-Storm (Oct – Apr)	4,384	16.3	0.45
Total	**30,119**	**260**	**4.99**

2012-2017 PROPOSED PROGRAM

The focus of the 2012 Mercury Plan is to protect water quality by implementing appropriate mercury-related BMPs in order to reduce the mercury concentrations and loads in pesticides in stormwater runoff and to monitor the MS4 discharges and receiving waters in order to assess the progress of the program. The 2012 Mercury Plan identifies the potential sources of mercury to urban runoff and describes public outreach and education strategies to mitigate the controllable sources of mercury.

The 2012 Mercury Plan includes control measures and/or performance standards that are focused on:

- Identifying mercury-related BMPs;
- Conducting public outreach to promote the proper use and disposal of products containing mercury, including coordination with HHW facilities and industrial and commercial outreach;
- Promotion and implementation of sediment and erosion control practices; and
- Characterization of the total mercury and methylmercury concentrations in Stockton waterbodies and stormwater discharges in order to identify areas that may need additional focus.

Under the proposed program, the WQBP-related Performance Standards will be completed as efforts under other Program Elements. All continuing WQBP-related monitoring efforts are captured in Section 2. The monitoring program will be revised as needed to address any additional monitoring needs that may be identified during the upcoming permit term.

The proposed performance standards, as outlined in Sections 1 and 3 through 8, are summarized in the following table.

[44] See Table 14 and Table 16 of the *Baseline Mercury Monitoring Report* (December 2011).

2012-2017 Proposed Program: Mercury Plan

Key Performance Standards with Focus on Mercury	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Review/revise the Proposed SWMP to ensure consistency with the adopted 2012-2017 Permit	N	Program Coordination						
Track legislative and regulatory efforts related to the WQBPs	N	Program Coordination						
Continue field observations for ID/IC and document/ report evidence of non-stormwater discharges/ connections or illegal dumping	C		ID1					
Investigate and eliminate ICs	C		ID2					
Respond to IDs	C		ID3					
Incorporate and implement the optimized waste categories used to characterize materials present in the discharges requiring a response	E		ID3					
Map reported ID incidents and locations	C		ID3					
Promote Used Oil and HHW Programs	C			PO1				
Coordinate with HHW program for mercury disposal	C			PO1				
Conduct follow-up Public Opinion Survey(s) during the permit term and re-evaluate the questions as needed to address the POCs	C			PO3				
Identify and/or create, revise, and distribute educational materials with information on POCs, as needed	C			PO3				
Update website with information on POCs, as needed	E			PO3				
Conduct Mixed Media Campaigns focused on the POCs	E			PO3				

Key Performance Standards with Focus on Mercury	Type of Standard[1]	Applicable Control Measure and Performance Standard(s)						
		Section 1 Program Management	Section 3 Illicit Discharge	Section 4 Public Outreach	Section 5 Municipal Operations	Section 6 Industrial/ Commercial	Section 7 Construction	Section 8 Planning & Land Development
Participate in three (3) community-wide events throughout the year	C			PO3				
Work with non-traditional Phase II entities, once they obtain coverage under the Phase II Small MS4 General Permit, to evaluate and identify collaborative opportunities to provide outreach to school-age children	N			PO4				
Identify opportunities, such as partnering with SAWS, to provide POC-focused stormwater outreach to school-age children	C			PO4				
Implement detention basin maintenance program	C				MO5			
Implement the street sweeping program	C				MO6			
Prioritize Facilities based on POCs	E					IC2		
Inspect Facilities with POCs Annually	E					IC2		
Conduct Follow-up Inspections, As Needed	C					IC2		
Review/ Revise BMP Fact Sheets, As Needed	E					IC3		
Distribute BMP Information	C					IC3		
Inspect construction sites ≥1 acre once per month	E						CO5	
Require Priority Projects to Comply with 2009 SWQCCP	C							LD2
Conduct Inspections of Post-Construction BMPs During Construction	C							LD3

Notes:
1. C = Continue; E = Enhance; N = New

The proposed monitoring program for mercury is summarized for each water body in the tables below. Please refer to Section 2.7 for more information.

Proposed Mercury Monitoring Program: Mosher Slough

Constituents Monitored	Type of Monitoring	Sites Monitored						
		MS-14RUS	MS-2D	MS-2R	MS-4D	MS-14	MS-14R	MS-13
Mercury (and methylmercury)	Water quality	G	G	G	G	G	G	G

Notes:
G = Grab

Proposed Mercury Monitoring Program: Calaveras River

Constituents Monitored	Type of Monitoring	Sites Monitored							
		CR-1R	CR-46	CR-46R	CR-42	CR-41	CR-41R	CR-39	CR-39R
Mercury (and methylmercury)	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G

Notes:
G = Grab

Proposed Mercury Monitoring Program: Duck Creek

Constituents Monitored	Type of Monitoring	Sites Monitored							
		DC-65RUS	DC-69	DC-66[1]	DC-66R[1]	DC-65[2]	DC-65R[2]	WK-64	WK-64R
Mercury (and methylmercury)	Water quality and atmospheric deposition	G	G	G	G	G	G	G	G

Notes:
1. These sites will be monitored during dry weather only
2. These sites will be monitored during wet weather only
G = Grab

ASSESSMENT

The Permittees' PEA strategy builds upon the results of the initial PEAs included as a part of the Annual Reports and addresses the stormwater program in terms of achieving both programmatic goals (i.e., raising awareness, changing behavior) and environmental goals (i.e., reducing pollutant discharges, improving environmental conditions). The PEA strategy is described in detail in Section 1 and will continue to evolve over the next permit term.

Management questions and associated goals have been identified for the POC-based implementation of the stormwater program. The management questions and goals will be evaluated as part of the annual effectiveness assessment during the Annual Reporting process and will be re-evaluated as needed. The goals are established by the Permittees as a way to gauge the success of their efforts. However, the numeric goals may be increased or decreased as needed by the Permittees and based on the implementation of the program.

The POC-Based management questions outlined below provide valuable feedback regarding the WQBPs. The CASQA Outcome Level is identified within the brackets.

Mercury Plan Management Questions

1. Are the impacted waterways meeting the TMDL targets for methylmercury as specified in the *Sacramento-San Joaquin Delta Methylmercury TMDL*[45]? **[Environmental – OL6]**
2. Are the urban stormwater dischargers a significant source of total and/or methylmercury to the receiving waters? Are there other sources that are major contributors? **[Environmental – OL5]**
3. Are the Permittees meeting the LAs for methylmercury as specified in the *Sacramento-San Joaquin Delta Methylmercury TMDL*? **[Environmental – OL5]**
4. Are the Permittees effectively implementing BMPs that target mercury and/or prevent the creation of methylmercury? **[Programmatic – OL2-4]**
5. Is the general public aware of the need to properly dispose of mercury-containing products at the County HHW Facility, and are they doing so? **[P01]**
    a. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are aware of the need to properly dispose of mercury-containing products at the County HHW Facility.
    b. Based on the results of the Public Opinion Survey, 80-100% of the residents of the SUA are reporting that they are disposing of mercury-containing products at the County HHW Facility. Examples of such products include thermometers and other gauges, batteries, fluorescent and other lamps, switches, relays, sensors and thermostats.
        i. How much mercury containing products are turned in on an annual basis to the HHW collection center? What is the breakdown of the types of items collected at the centers?
        ii. Identify the source(s) of information for the residents (PSAs, brochures, community events, HHW, etc.)
6. Is the general public improperly disposing of mercury-related trash? **[P01]**

[45] The TMDL target is a fish-tissue based target for methylmercury

a. How much of the trash/debris that was collectively removed from the SUA as a part of the stream cleanup events was debris that contains mercury (thermometers, fluorescent lights, oil-based paints, appliances with mercury switches)?

7. Are the industrial and commercial sites that use, store, or could generate mercury aware of the BMPs that they should be implementing on site – and are they implemented and maintained? **[IC2]**

    a. Based on the results of the inspections, 90-100% of the facilities are aware of the need to implement the necessary BMPs are doing so.

Low DO Plan

EXECUTIVE SUMMARY

Periodic depletions of DO levels below Basin Plan WQOs have resulted in the designation of six SUA waterways as 303(d)-impaired for DO. Provision D.28.b.i/ii of the Permit directs the Permittees to develop and implement a work plan to assess potential impacts from urban runoff on receiving water quality with respect to DO. The 2008 Low DO Plan was provided for public and regulatory review, and a revised Low DO Plan was submitted to the Regional Water Board on April 15, 2009. Monitoring in accordance with the Low DO Plan commenced in December 2008. The Low DO Plan section is included as **Appendix I-3** and provides a review of the data collected for the Low DO Plan from the following list of target waterways from 2008 through December 31, 2011:

- Smith Canal (entirety)
- Stockton Deep Water Ship Channel (DWSC near McLeod Lake – Stockton Channel)
- Mormon Slough (Commerce Street to Stockton DWSC)
- Five-Mile Slough (Alexandria Place to Fourteen Mile Slough)
- Calaveras River (lower)
- Mosher Slough (Downstream of Interstate 5)

Associated laboratory analytical reports and field forms are included in **Appendix I-4**.

Sediment and water quality data were compiled, discussed and presented in graphical format and used to evaluate primary impacts on DO in the receiving waters. Results of sediment sampling show high potential in some areas for sediments, if re-suspended, to exert an immediate draw on oxygen demand. While the sample size is small relative to the potential spatial and temporal variability, general conclusions about seasonal organic matter transport and decay in specific waterways are described. The area of highest potential sediment impact is Yosemite Lake, upstream of the zone of tidal mixing.

Results from water quality monitoring of DO with depth demonstrate trends of lower DO with depth, particularly in summer months, as well as of low DO associated with warm shallow reaches. Continuous monitoring of DO, temperature, and turbidity at specific locations shows complex relationships between rainfall (runoff), turbidity, and DO, indicating multiple mechanisms for DO impacts. These mechanisms include first flush events, prolonged periods of summer day and night biological activity, and turbidity associated with recreational activities.

Water quality grab samples for nutrients and oxygen demanding substances (ODS) analyses show variable influences in different waterways and provide a basis for understanding the contributions of nutrients from different discharge points, as well as if those nutrients are assimilated in downstream flows. It is concluded that the data set is a useful basis for analysis of the primary mechanism of DO impairment at the monitoring locations.

The 2012-2017 Proposed Program for the Low DO Plan, as well as management questions and goals to be used for assessment, are also provided in **Appendix I-3**.

Section 10

Program Implementation, Assessment, and Reporting

2007-2012 IMPLEMENTATION

The Permittees are actively and adaptively managing the SWMP through the implementation, assessment, and reporting of the Program Elements, as outlined below.

- **Annual Work Plan:** An Annual Work Plan was submitted by each Permittee to the Regional Water Board by April 1 of each year. The Annual Work Plans summarized the proposed activities that the Permittees would undertake during the next fiscal year (July 1 – June 30).
- **Effectiveness Assessment:** Paramount to the success of the stormwater program is the need for the Permittees to evaluate the effectiveness of its program by compiling and reviewing program data. The Permittees collaborated to develop a long-term effectiveness assessment strategy by identifying the key metrics that were tracked each year. This allowed the Permittees to conduct a comprehensive, annual effectiveness assessment of the stormwater program.
- **Reporting:** The Permittees coordinated their efforts in developing standardized formats for all reports that are required pursuant to the Permit. This included annual reports, fiscal analysis reports, and PEAs.
    - **Annual Report:** An annual report was submitted by each Permittee in both electronic and hard copy to the Regional Water Board by September 1 of every year. The Annual Reports documented the status of the SWMP implementation, presented results from activities implemented, provided a compilation of deliverables and milestones reached during the previous fiscal year (July 1 – June 30), and reported on the overall status and effectiveness of the SWMP. Updates, improvements, or revisions to the SWMP were also proposed in the Annual Reports.
    - **Report of Waste Discharge:** The municipal stormwater Permit expires on December 6, 2012. As a result, the Permittees are required to submit a ROWD to the Board 180 days prior to its expiration (June 6, 2012). The ROWD contained herein serves as the application for the re-issuance of the Permit.

2012-2017 Proposed Program

As part of the ROWD process, the Permittees have evaluated the effectiveness of program implementation during the Permit term, as well as the experience that staff has had in implementing the program, to identify the performance standards for this Control Measure for the next permit term.

In addition, the Permittees have determined if any additional program modifications are necessary in order to comply with the CWA requirement to reduce the discharge of pollutants to the MEP. The program modifications that have been identified for this Control Measure for the upcoming Permit term are discussed below.

- The primary modification to the Program Implementation, Assessment, and Reporting Program is for the Permittees to incorporate the Annual Work Plan (currently submitted by April 1 of each year) into the Annual Report that is submitted on September 1 of each year. Submitting the Annual Work Plan in September for the next fiscal year is more efficient for the Permittees. During the development of each Annual Report, the Permittees assess what has been completed, what program modifications should be proposed, and what activities will be conducted during the next fiscal year. By incorporating the Annual Work Plan into the Annual Report, the program will have continuity from year to year, allowing the Permittees to maximize their efforts.

OBJECTIVES

The objectives address the key components of the Program Implementation, Assessment, and Reporting Program Element and identify that, in order to be effective, the program must:

- Implement the MRP, including submittal of work plans and annual reports, in order to determine the effectiveness of the stormwater program.

This objective will be met through implementation of specific performance standards, as detailed below.

PERFORMANCE STANDARDS

The Performance Standards listed below establish the level of effort required for this Control Measure. Implementation schedules for each Permittee are included at the end of this section.

- Submit Annual Report and Work Plan by September 1 of each year
- Submit ROWD 180 days prior to the expiration date of the 2012-2017 permit

2012-2017 PROPOSED PERFORMANCE STANDARDS AND IMPLEMENTATION SCHEDULES

The proposed performance standards and implementation schedules for each of the Permittees are provided on the following pages.

Proposed Performance Standards and Implementation Schedule (City)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	City Attorney	City Manager	MUD	Public Works	MUD Collections	MUD Engineering	MUD Environmental Control	MUD Stormwater	MUD Water Field
Submit Annual Report and Work Plan by September 1 of each year	C	X	X	X	X						X							X	
Submit ROWD 180 days prior to the expiration date of the 2012-2017 permit	C					X					X							X	

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
MUD = Municipal Utilities Department

Proposed Performance Standards and Implementation Schedule (County)

Control Measure and Performance Standards	Type of Type Sandard[1]	Implementation Schedule[2]					POCs Addressed				Responsibilities								
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Pesticide	Pathogen	Mercury	Low DO	Community Development	County Counsel	Environmental Health	General Services - Facilities	General Services – OES	General Services - Parks	PW – Engineering	PW – Maintenance	PW – Water Resources
Submit Annual Report and Work Plan by September 1 of each year	C	X	X	X	X							X							X
Submit ROWD 180 days prior to the expiration date of the 2012-2017 permit	C					X						X							X

Notes:
1. C = Continue; E = Enhance; N = New
2. This schedule assumes 2012-2017 Permit adoption by December 2012.
X = Performance Standard will be completed during this fiscal year.
OES = Office of Emergency Services
PW = Public Works