



CITY OF STOCKTON

DEPARTMENT OF MUNICIPAL UTILITIES

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www.stocktongov.com

September 1, 2011

Municipal Storm Water Permitting Unit
Attention: Ms. Elizabeth Lee, Senior Water Resources Control Engineer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

**CITY OF STOCKTON STORMWATER MANAGEMENT PROGRAM 2010/2011
ANNUAL REPORT, ORDER NO. R5-2007-0173, NPDES PERMIT NO. CAS083470**

Please find attached a copy of the 2010/2011 Annual Report for the City of Stockton Stormwater Management Program. The attached report reflects all stormwater activities conducted during Fiscal Year 2010-2011 required by City's Stormwater NPDES Permit.

If you have any questions regarding the report, please contact Courtney Vasquez at (209) 937-8705.

JEFF WILLETT
INTERIM DIRECTOR OF MUNICIPAL UTILITIES

JW:CDV:ep

Attachments: 2010/2011 Annual Report with Appendixes

cc: Mack Walker, Larry Walker Associates
Karen Ashby, Larry Walker Associates

emc: Courtney D. Vasquez, Stormwater Program Manager





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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 1st day of September 2011, at the City of Stockton.



Jeff Willett
Interim Director of Municipal Utilities



SEPTEMBER 1, 2011

CITY OF STOCKTON

National Pollutant Discharge Elimination System Municipal Stormwater Program *2010-2011 Annual Report*

prepared by

LARRY WALKER ASSOCIATES



**CITY OF STOCKTON
STORMWATER MANAGEMENT PROGRAM
2010-2011 ANNUAL REPORT
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Section 1

Program Management

1.1 OVERVIEW

The Stormwater Management Plan (SWMP) has been developed for and will be implemented within the jurisdictional limits of the City of Stockton (City) and the urbanized areas of San Joaquin County (County) within the Phase I National Pollutant Discharge Elimination System (NPDES) permit area¹. The SWMP, which includes existing and enhanced program control measures, represents the five-year strategy for controlling the discharge of pollutants from the municipal storm drain system to the maximum extent practicable (MEP).

As a result of the third term municipal stormwater permit (Permit) requirements², the SWMP was revised in June 2008 and submitted to the Central Valley Regional Water Quality Control Board (RWQCB or Regional Water Board). The 2008 SWMP was subsequently revised, submitted to the RWQCB on April 15, 2009, and approved by the RWQCB on October 8, 2009.³ The 2009 SWMP includes a wide range of continuing, enhanced, and new Best Management Practices (BMPs) and control measures that will be implemented during the Permit period (2007-2012). It is the intent of the 2009 SWMP to meet all Permit requirements through an iterative process. These BMPs and control measures will assist the City in improving the overall effectiveness of the stormwater program. Where possible, the BMPs and control measures were developed to address specific pollutants of concern or sources to enhance pollution reduction and provide increased environmental benefit.

The City has developed a comprehensive approach for managing the development and implementation of the stormwater program within the Stockton Urbanized Area (SUA). As a part of this effort, the City coordinates the program management activities internally as well as with the County (Section 1 of the 2009 SWMP). Additional information is included within each of the Program Control Measures.

1.2 CONTROL MEASURES

The City has developed several Control Measures to ensure that the program management requirements are effectively developed and implemented. The Program Management Control Measures consist of the following:

Control Measure
Program Coordination
Fiscal Analysis
Legal Authority

The next section of the Annual Report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Program Management Performance Standards and implementation schedules.

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

² Order No. R5-2007-0173

³ Resolution No. R5-2009-0105

1.3 PROGRAM COORDINATION

The implementation of the 2009 SWMP requires a coordinated management effort by the City and County. While named as co-permittees to one permit in accordance with 40 C.F.R. §122.26(b)(4)(iii), the City and County need only comply with permit conditions relating to discharges from the municipal separate storm sewer for which they are operators, pursuant to 40 C.F.R. §122.26(a)(3)(vi). For that reason, the City and the County have separate programs and submit documents and reports separately to the Regional Water Board. However, the programs are very similar, and the Permittees collaborate actively with each other to address common issues, to plan and coordinate common activities, and to ensure consistency in program development and implementation.

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

1.3.1 Review and Revise the SWMP

The City reviewed and revised the proposed, draft SWMP (submitted to the Regional Water Board April 1, 2007 as a part of the Report of Waste Discharge) to ensure it was consistent with the third term Permit that was adopted December 7, 2007. The SWMP was submitted to the Regional Water Board for approval on June 6, 2008. Based on the comments received on the 2008 SWMP in November 2008, the SWMP was revised and was re-submitted for Regional Water Board approval on April 15, 2009. The 2009 SWMP was approved by the RWQCB on October 8, 2009.

1.3.2 Permittees Meet Quarterly

To facilitate the ongoing communication and coordination between the two agencies, Permittee meetings were held at least once per quarter to address common issues and to ensure consistency in program development and implementation. The coordination meetings focused on policy related issues (with the Director and/or Deputy Director) or program implementation such as public education, monitoring, and planning and land development. All meetings included the City's Municipal Utilities Department and the County's Department of Public Works. A summary of the meetings held during 2010-2011 is provided below.

Type/Focus of Meeting	Meeting Date
Monthly Monitoring and Special Studies Conference Call	7/20/2010
Stockton Program Implementation	7/20/2010
DO Field Tour w/ Regional Board	9/14/2010
Monthly Monitoring and Special Studies Conference Call	9/20/2010
Program Implementation and Planning Meetings	9/20/2010
Urban Discharge Monitoring Program Bid Specifications	10/7/2010
Phone Conference Discuss Agenda for Policy Level Meeting	10/7/2010
City/County Policy Level Stormwater Meeting	10/15/2010
TIE Analysis Urban Discharge Program	10/21/2010
RFP Re: Urban Discharge Monitoring SOP's	10/21/2010
Monthly Monitoring and Special Studies Conference Call	11/3/2010
Monthly Monitoring Meeting RFP Scope of Work	11/3/2010

Type/Focus of Meeting	Meeting Date
SJSWQP Agenda – Stormwater Monthly Meeting	11/17/2010
Stormwater Monitoring Program 2010-2012 Work Plan	12/1/2010
Monthly Monitoring and Special Studies Conference Call	12/6/2010
Program Implementation	12/13/2010
Meeting w/Mike Barnes of K/J	12/14/2010
Monthly Monitoring Meeting	1/5/2011
Discuss Policy Level Agenda	1/18/2011
Policy Level Meeting Prep	1/21/2011
Stormwater Policy Level Meeting	1/21/2011
RFP Monitoring Program Review	1/24/2011
RFP Monitoring Program Interviews	1/27/2011
Policy Level Discussion	1/27/2011
Monthly Monitoring Meeting	2/8/2011
Stormwater Issues and Next Policy Level Meetings	3/1/2011
Conference Call Training /Outreach	3/1/2011
Monthly Monitoring Meeting	3/2/2011
Critical Issues/Next Steps	3/7/2011
Policy Level Meeting	3/29/2011
Monitoring/Special Studies	4/14/2011
Delta RMP	5/11/2011
Policy Level Meeting	5/17/2011
Monthly Monitoring Re: Policy Level Meeting Follow-up	5/19/2011
Policy Level Follow-Up	5/19/2011
Delta Regional Monitoring Program	6/7/2011
Monthly Monitoring Meeting	6/16/2011
BMP Opportunity	6/22/2011

1.3.3 Internal Stormwater Program Meetings (City Divisions and Departments)

The City's Municipal Utilities Department (MUD) Stormwater Management Division has primary responsibility for the development and implementation of the 2009 SWMP. The City's designated stormwater program manager oversees the implementation of the 2009 SWMP and the day-to-day operations. The stormwater program manager contact information is provided below.

Primary Stormwater Program Contact	
Name	Courtney D. Vasquez
Title	Stormwater Program Manager Program Manager III
Department/Division	Municipal Utilities Department/Stormwater
Address	2500 Navy Drive, Stockton, CA 95206
Phone Number	(209) 937-8705
E-mail Address	courtney.vasquez@ci.stockton.ca.us

Although administered and principally staffed by MUD, the implementation of the 2009 SWMP requires the assistance of and close coordination with several other City departments. MUD has recently coordinated with the other City departments who have a primary or secondary responsibility under the stormwater program and instituted a series of internal stormwater committees in order to ensure that the program requirements are understood and effectively implemented. The coordination meetings include an overall policy management meeting and a series of subcommittees that focus on planning and land development, inspections and enforcement, public outreach, monitoring and special studies, and municipal operations. Although the structure and focus of the subcommittees may be modified over time, this internal coordination provides a solid foundation for the program and will be continued throughout the permit term. During the 2010-2011 reporting period, internal stormwater committee meetings were suspended due to staffing shortages in all departments. Staff from MUD (Engineering, Stormwater, and Environmental Control) continued to meet as necessary to discuss the program.

A summary of the quarterly internal Stormwater Program Meetings is provided below.

Type/Focus of Meeting	Meeting Date	City Department(s) Participating
Field Inspection Update Meeting	07/06/10	MUD-Environmental Control, Stormwater, Engineering
Annual Expenditures Spreadsheet Status Updates	07/09/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting	07/19/10	MUD-Environmental Control, Stormwater, Engineering
Access & Maintenance Agreement Devices Discuss Charts & Stats for EC Justification	07/23/10	MUD-Environmental Control, Stormwater, Engineering

Type/Focus of Meeting	Meeting Date	City Department(s) Participating
Field Inspection Update Meeting Assessment District Program Updates	08/02/10	MUD-Environmental Control, Stormwater, Engineering
Progressive Enforcement Packet	08/04/10	MUD-Environmental Control, Stormwater, Engineering
Annual Report Review NOV Processing and Appeals Procedures RFP Review	08/06/10	MUD-Environmental Control, Stormwater, Engineering
Annual Report Review	08/11/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates City of Stockton Annual Report Call	08/16/10	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	08/23/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	08/30/10	MUD-Environmental Control, Stormwater, Engineering
Pre-Bid Meeting Maintenance of Stormwater Underground Treatment Devices	09/08/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Program Implementation Meeting and Monitoring Discussion Certification Review	09/20/10	MUD-Environmental Control, Stormwater, Engineering
Assessment Districts Program Update Certification Review	09/23/10	MUD-Environmental Control, Stormwater, Engineering
1st Flush Cost Estimates-Condor	10/14/10	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting 2010-2011 Storm Response Planning Meeting	11/01/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	11/08/10	MUD-Environmental Control, Stormwater, Engineering
Storm Season Mock Exercise	12/01/10	PW,MUD,FIRE,POLICE

Type/Focus of Meeting	Meeting Date	City Department(s) Participating
Field Inspection Update Meeting Assessment District Program Updates	12/06/10	MUD-Environmental Control, Stormwater, Engineering
Evaluation of Legion Park Media Filter Stormwater Treatment System Moss Gardens Phases 2&3	12/10/10	MUD-Environmental Control, Stormwater, Engineering
RFP Deadline for Submittal	12/15/10	MUD-Environmental Control, Stormwater, Engineering
2010-2011 Storm Event Response Exercise Training Event Debrief	12/16/10	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting	12/20/10	MUD-Environmental Control, Stormwater, Engineering
SMARTS LRP Review	12/22/10	MUD-Environmental Control, Stormwater, Engineering
Meeting Access Maintenance Agreement Database Project	02/22/11	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	02/23/11	MUD-Environmental Control, Stormwater, Engineering
Sanitary Sewer Overflow and Backup Field Procedures Training	02/24/11	MUD-Environmental Control, Stormwater, Engineering
Stockton Climate Change Action Plan –Water Conservation Strategies Section	03/09/11	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	03/14/11	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	03/23/11	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	03/28/11	MUD-Environmental Control, Stormwater, Engineering
Port of Stockton Meeting – Jeff Wingfield	03/31/11	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	04/05/11	MUD-Environmental Control, Stormwater, Engineering

Type/Focus of Meeting	Meeting Date	City Department(s) Participating
Corp Yard Tour and Training	04/13/11	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	04/18/11	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	06/06/11	MUD-Environmental Control, Stormwater, Engineering
Field Inspection Update Meeting Assessment District Program Updates	06/15/11	MUD-Environmental Control, Stormwater, Engineering
Stormwater Staff Meeting	06/20/11	MUD-Environmental Control, Stormwater, Engineering

Each of the key Departments has a responsibility for the day-to-day implementation of the 2009 SWMP. A general overview of the Program Elements and responsible City Departments is presented in **Table 1-1**. For specific information regarding each Control Measure and Performance Standard, the appropriate 2009 SWMP section should be consulted.

Table 1-1. City Departments Responsible for Implementing the Stormwater Program¹

Department	Program Management & Reporting	Illicit Discharges	Public Education	Municipal Operations ¹	Industrial/Commercial	Construction	Planning & Land Development	Monitoring	Water Quality Based Programs
MUD – Stormwater Management	P	S	P	S	P	P	S	P	P
MUD – Engineering	S			P			P		
MUD – Environmental Control	S	P	S		S			P	
MUD – O & M				P					
MUD – Stormwater Assessment				S					
Community Development	S	S	S		S	S	P		
Fire							S		
Library							S		
Police							S		
PW – Engineering	S			P		S	S		
PW – Operations & Maintenance				P					
PW – Solid Waste & Recycling				P					
Parks and Recreation	S		S	P					
City Attorney	S	S			S	S	S		

Notes:

1. Multiple departments are listed as having primary responsibility due to differing responsibilities for various control measures.

P – Primary responsibility

S – Provides support to primary department

MUD – Municipal Utilities Department

PW – Public Works

1.3.4 Statewide Stormwater-Related Meetings, Conferences, and Stakeholder Groups

Participation in statewide stormwater-related meetings, conferences, and stakeholder groups serves as training and information-sharing sessions for the participants. A summary of the statewide stormwater-related meetings, conferences, and stakeholder groups in which the City participated during the reporting period is provided below.

Type/Focus of Meeting	Sponsoring Agency/ Group	Meeting Date	City Department(s) Participating
Annual State of California Stormwater Meeting – Webcast	CASQA	01/13/2011	MUD Stormwater
CASQA Meeting /Webcast – Industrial Stormwater	CASQA	03/10/2011	MUD Stormwater

1.3.5 Review and Revise MOUs as Necessary

In 1995, the City and County entered into a Memorandum of Understanding (MOU) for filing as Permittees under one NPDES permit as well as the development of a receiving waters monitoring program. The MOU provided a mechanism for the City and County to continue to work cooperatively on the development and implementation of additional NPDES programs.

The Permittees have reviewed and revised their existing MOU to ensure that it provides for designation of joint responsibilities, decision making, information management of data and reports, cost sharing objectives, and any other collaborative arrangements that are necessary for compliance with the Permit. The MOU was approved by the County Board of Supervisors and the City Council on September 16, 2008. The updated, final MOU was included as Appendix A-1 to the 2009 SWMP and as Appendix A-1 of the 2008-2009 Annual Report.

1.3.6 Establish, Review, and Revise Cooperative Agreements

To help control the contribution of pollutants from one portion of the stormwater system to another, the City may participate in cooperative agreements with other agencies as the need or opportunity arises.

The Stormwater Program participates with numerous community groups, various state agencies, and local Phase II cities on outreach events, regional advertising, and training. Details on meetings, dates, and types of events sponsored are found in more detail in Section 3, Public Education.

1.4 FISCAL ANALYSIS

The Fiscal Analysis includes the following:

- The expenditures for the previous fiscal year;
- The budget for the current fiscal year; and
- A description of the source of funds.

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

1.4.1 Complete a Stormwater Rate Study

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.

1.4.2 Review and Revise the Fiscal Analysis Reporting Format

Pursuant to the Permit, the Permittees reviewed the fiscal analysis reporting format so that expenditures are consistently assessed by SWMP Program Element from year to year. The Fiscal Analysis reporting format was revised during the reporting period to more accurately reflect expenditures for staff salaries. The Fiscal Analysis is provided below, and it will continue to be modified as needed.

1.4.3 Report the Fiscal Analysis within the Annual Report

The City assessed 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 and written explanations where necessary. The summary below also includes a description of the source(s) of the funds, including any legal restrictions on the use of the funds.

Program Element	Expenditures During Fiscal Year 2010-2011	Estimated Budget for Fiscal Year 2011-2012
Program Management: Staff salaries, utility billing, phone charges, computer software/rentals, memberships, permit fees, indirect cost allocations, training, consultant contracts	\$2,321,863	\$2,160,795
Public Outreach: Includes industrial, commercial, residential programs including media and community events	\$101,488	\$102,500
Municipal Operations: Includes CIPs and Storm Drain System Cleaning and Maintenance (includes Illicit Discharges , illegal connections mitigation, and clean-up) ¹	\$2,139,683	\$1,908,240
Industrial and Commercial: Includes consultant contracts and follow-up inspections. Business Outreach included under Public Outreach budget. ²	\$0	TBD
Construction ^{3, 4}	\$ N/A	\$ N/A
Planning and Land Development ³	\$ N/A	\$ N/A
Water Quality Monitoring Programs: Includes Baseline Monitoring Program, Bioassessment Analysis, Dry Weather Field Screening, Smith Canal Bathymetry Study, Detention Basin Monitoring, BMP Effectiveness Study, Sediment Toxicity, Smith Canal/Mosher Slough Low DO13267 Letter Monitoring ⁵	\$376,755	\$700,000
Water Quality Based Programs: Includes Pesticide, Pathogen, Mercury, and DO Work Plans and Implementation	\$267,811	\$300,000
TOTAL	\$5,207,600	\$5,171,535

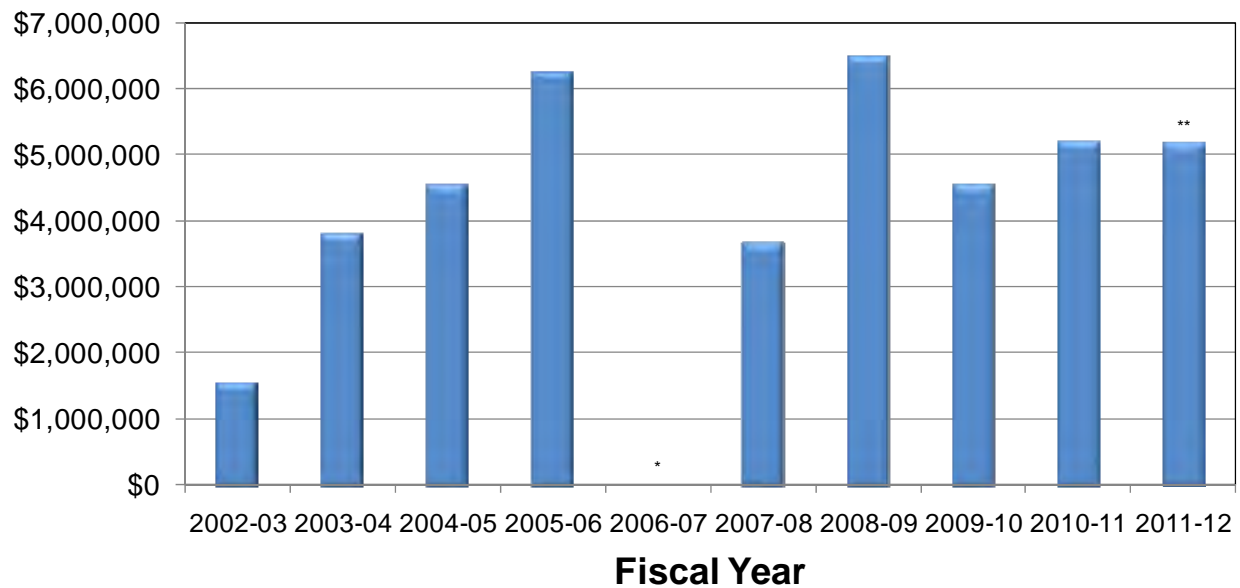
Note:

1. FPPP is paid for out of Public Works budget and is not a Stormwater Expense
2. Industrial and Commercial Inspection Program will resume in 2011-2012. No funds were spent in 2010-2011 for this program, although inspections were conducted by City staff. The budget for 2011-2012 is not yet set, as the City must go out to bid for this service. Final expenditures will be reported in the 2011-2012 Annual Report.
3. Staff salaries are included in Program Management budget.
4. Construction outreach is included under Public Outreach budget.
5. The expenditures during 2010-2011 are smaller than the estimated budget for 2011-2012 because the actual expense, not the budget, is reported. What is reported in FY 10-11 had carry over budget from the prior year, as no new contracts were awarded.

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.

Stormwater Program Annual Expenditures

2002-2012 Fiscal Years



■ Expenditures by 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 City's stormwater program is funded solely by a storm drain maintenance or user fee. The fee/equivalent residential unit is \$2.10/month per Equivalent Residential Unit.

1.5 LEGAL AUTHORITY

The Permit requires that the 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 Permittees have adequate legal authority to regulate the discharge of pollutants to the storm drain system.

The City enacted a Stormwater Management and Discharge Control Ordinance (Chapter 13.16 of the recodified Stockton Municipal Code⁴) in 1995 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 Clean Water Act.

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

1.5.1 Review the Legal Authority

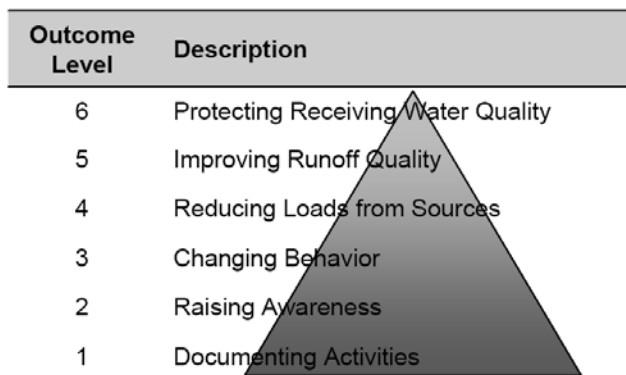
The City Attorney has reviewed the existing legal authority to ensure that the City has adequate legal authority to implement and enforce each of the requirements within Order No. R5-2007-0173. The legal authority will continue to be reviewed as needed.

⁴ Available online at: <http://qcode.us/codes/stockton/>

1.6 PROGRAM EFFECTIVENESS ASSESSMENT

The City has adopted a method for assessing program effectiveness based on an approach developed by the California Stormwater Quality Association™ (CASQA). The effectiveness assessment is more comprehensive than past assessments and addresses the major stormwater program areas and activities.

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 categorized into six levels, as shown in **Figure 1-1**. The outcome levels represent ways in which the effectiveness of the program can be determined, even if it is intermediate.⁵



Outcome Level	Description
6	Protecting Receiving Water Quality
5	Improving Runoff Quality
4	Reducing Loads from Sources
3	Changing Behavior
2	Raising Awareness
1	Documenting Activities

Figure 1-1. Effectiveness Assessment Outcome Levels

Within each individual section (starting with Section 2), the effectiveness assessment identifies the outcome level(s) achieved, as well as any program modifications that have been identified because of the assessment.

Some important points to remember about these effectiveness assessments include:

- The ability of a stormwater program to assess an outcome level tends to become progressively more difficult as you assess higher outcome levels (levels 4-6). 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.

In future annual reports, the effectiveness assessment will be expanded and modified as necessary in order to report out on key items.

⁵ California Stormwater Quality Association, *Municipal Program Effectiveness Assessment Guidance*, May 2007.

1.7 PROGRAM MANAGEMENT MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Program Management Element. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary in order to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

No program modifications for Program Management were identified for 2011-2012.

Section 2

Illicit Discharges (ID)

2.1 OVERVIEW

An illicit discharge is defined as any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. Illicit discharges include the disposal of materials such as paint, spa water, or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain. Illegal connections are a subset of illicit discharges. Illegal connections 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 illicit discharges and illegal connections 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 program for detecting, responding to, investigating and eliminating these types of discharges and connections in an efficient and effective manner.

2.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that the illicit discharge-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Illicit Discharges Program Control Measures consist of the following:

ID	Control Measure
ID1	Detection of Illicit Discharges and Illegal Connections <ul style="list-style-type: none">• Public Reporting (Hotline)• Dry Weather Field Screening• Field Crew Inspections
ID2	Illegal Connection Identification and Elimination <ul style="list-style-type: none">• Investigation and Elimination
ID3	Investigation/Inspection and Follow Up <ul style="list-style-type: none">• Response and Investigation• Cleanup• Recordkeeping and Tracking
ID4	Enforcement
ID5	Training
ID6	Effectiveness Assessment

The next section of the Annual Report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Illicit Discharges Performance Standards and implementation schedules.

2.3 ID1 – DETECTION OF ILLICIT DISCHARGES AND ILLEGAL CONNECTIONS

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

2.3.1 Spill Response Procedures

The City addresses 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.

During 2009-2010, the City developed a document, *Spill Response Procedures for Non-Hazardous Materials and Wastes*, that includes a responsibility flow chart and outlines a timeline and response steps to address emergency and non-emergency spills of non-hazardous materials and wastes. The *Spill Response Procedures for Non-Hazardous Materials and Wastes* were included as Appendix B-1 to the 2009-2010 Annual Report.


2.3.2 Public Reporting

Maintain and Advertise Hotline/Ask Stockton

The City has established and maintains a 24-hour Hotline (**209-937-8341**) to encourage the public to report water pollution problems. The reporting program is based on a published directory that lists the telephone numbers of all City staff and departments. The directory is designed to facilitate the public's access to the City government by giving every City employee the ability to direct initial inquiries to the appropriate department or person.


- Business Hours – During normal business hours, City personnel are available to answer and direct calls to the appropriate department.
- Evenings and Weekends – After hours, calls are automatically deferred to 911 and the Fire Department dispatcher.

Each complaint or spill is investigated within two business days and tracked to ensure that information is not lost. Internal communication between departments has been established through a series of notification flowcharts for particular types of incidents to ensure response, adequate tracking and corrective actions. Each incident is documented using the incident response form included in the City's Emergency Spill Response Plan.



[Stockton Homepage](#)
[For Residents](#)
[For Visitors](#)
[For Businesses](#)
[Helpful Resources](#)
[Contact Us](#)
[SEARCH](#)

Municipal Utilities Department: 2500 Navy Drive • Stockton, CA • 95206 • (209) 937-8750 • (209) 937-8708 (fax) • [Send an E-Mail](#)



Municipal Utilities Department


General Info

REPORT A PROBLEM

RWCF Office Hours

Monday - Thursday
7 am - 6 pm

Friday
7 am - 5 pm
(209) 937-8700
On alternate Fridays, offices are closed.



When a problem arises, MUD is here to help.

Service Center and 24-hour Emergency Phone Number
(209) 937-8341

You know it's an emergency if...

1. Raw sewage is backing up onto your property or into the gutter. ([more info](#))
2. Your street is flooded due to clogged storm drains. ([more info](#))
3. A water pipe is broken and water is running out into the street. ([more info](#))
4. Paint, oil, swimming pool water, or other types of hazardous waste are being dumped or washed into the gutter or storm drain. ([more info](#))
5. A maintenance-hole cover is missing or not sitting correctly on the opening. ([more info](#))

If it is NOT an emergency, please send us an [email](#) or call during regular RWCF office hours.

Municipal Utilities (MUD)

General Info

- Utility Services
 - Water
 - Waste water
 - Stormwater
 - Water Conservation
- Billing / Account Info
- City or County?
- Fee Schedule (pdf)
- Report A Problem
- Service Area
- About MUD
- FAQ
- Project Info /Updates
- Regulatory Info
- Staff
- Contact us

Business

- Getting Started
- Permits / Fees
- Reports / Forms
- Inspection Program
- Bids / RFPs
- Helpful Resources

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 of Stockton's web site, utility bill inserts, and various outreach materials created throughout the City.

The City facilitated the reporting of illicit discharges by maintaining the Hotline/Ask Stockton and advertising them:

- In the public/business education materials
- On the City Web site
- In the telephone book – Government pages
- In all printed material

The number of water pollution complaints received and verified and the source of the complaints are listed below.

	Source	Total Number of Calls/ Forms Submitted	Total Number of Water Pollution Complaints Received	Total Number of Water Pollution Complaints Verified
Last Year 2009-2010	Hotline	Not Tracked	23	20
	Ask Stockton	Not Tracked	0	N/A
This Year 2010-2011	Hotline	2,036	Not tracked ¹	91
	Ask Stockton	Not Tracked	0	N/A

Note:

1. This level of information was not tracked for the hotline calls in 2010-2011.

Coordinate with Other Departments and Agencies

During the reporting period, the City coordinated with other departments and agencies to ensure that all reports of water pollution problems are appropriately received, routed, tracked, and investigated.

The City continued to coordinate throughout the year by:

- Advertising the hotline number internally
- Conducting internal meetings/training
- Providing telephone numbers/flow charts
- Including the hotline number in all printed material

Review Complaint Documentation Form

During 2009-2010, the City reviewed and revised the Stormwater Program Illicit Discharge Complaint Form that is used to document the complaints received. The revised Stormwater Program Illicit Discharge Complaint Form was included as Appendix B-2 to the 2009-2010 Annual Report.

2.3.3 Dry Weather Field Screening

Conduct Dry Weather Field Screening

The City has established an annual dry weather field screening program (see also Section 8 of this Annual Report). The field screening program identifies new dry weather flows and provides a check on the effectiveness of the ID Program and supports this Program by identifying “hot spots” and conducting the appropriate follow-up action(s). All outfalls are sampled and tested for temperature, pH, chlorine, copper, phenols, dissolved oxygen, electrical conductivity and detergents/surfactants. The results of the dry weather field screening and information regarding the source identification studies is provided in Section 8 of the Annual Report. A brief summary of the program is provided below.

The number of outfalls monitored and the number of problem areas identified are listed below.

	Total Number of Outfalls Monitored	Total Number of Dry Weather Discharges Exceeding Action Levels
Last Year 2009-2010	22	0
This Year 2010-2011	20	1

Of the 20 outfall locations investigated during the 2010-2011 monitoring program, two contained sufficient flow for field screening analysis. One site exceeded action levels for electrical conductivity. It is suspected that the high EC concentrations were the result of residential landscaping activities and possibly pool maintenance activities, although chlorine levels were well below the action level. Field analytical results indicated that all other constituent concentrations were below action levels. More detail is provided in Section 8.

Evaluate Effectiveness of Dry Weather Field Screening Program

The City will evaluate the effectiveness of the dry weather field screening program in identifying Illicit Discharges/Illegal Connections (ID/IC) issues and revise the program as needed by June 30, 2012.

2.3.4 Field Crew Inspections

Field staff are trained to recognize illicit 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 for follow-up investigation. The City’s primary spill response investigator conducts follow-up inspections and accompanies field crews during cleanup to ensure that reported spills are properly cleaned up and identified illicit connections are corrected. During 2010-2011, the City field staff observed and reported illicit discharges.

The number of water pollution issues identified by field staff is listed below.

	Source	Total Number of Illicit Discharges Identified	Total Number of Sources Verified
Last Year 2009-2010	Field Staff	63	57
This Year 2010-2011	Field Staff	48	47

For illicit discharges identified by field staff, information from the Illicit Discharges Database (i.e., 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 investigated within two business days) is provided in **Appendix B-1**.

2.4 ID2 – ILLEGAL CONNECTION IDENTIFICATION AND ELIMINATION

In parallel with the City's efforts to detect and eliminate illicit discharges (see ID1), the City proactively detects illegal connections to the storm drain system. Upon identification of an illegal connection, the City investigates and eliminates illegal connections through a variety of mechanisms including, but not limited to, permitting or plugging the connection.

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

2.4.1 Investigate/Eliminate Illegal Connections

As a part of their normal maintenance activities, City field staff identifies signs of illegal connections to the storm drain system. Once they are discovered, the illegal connections are addressed and corrected/eliminated.

- Did the City field staff continue to identify illegal connections?
Yes, illegal connections identified ☒
Yes, but no illegal connections identified ☐
No ☐
- Did the responsible MUD staff investigate the potential illegal connections 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?
Yes ☒
No, no illegal connections identified ☐
- Did the responsible MUD staff eliminate identified illegal connections?
Yes ☒
No, no illegal connections identified ☐

The table below summarizes the illegal connections investigation/elimination efforts.

	Source	Total Number of Illegal Connections Reported	Total Number of Illegal Connections Verified	Total Number of Illegal Connections Eliminated
Last Year 2009-2010	Hotline	0	0	0
	Ask Stockton	0	0	0
	Field Staff	3	3	3
This Year 2010-2011	Hotline	0	0	0
	Ask Stockton	0	0	0
	Field Staff	0	0	0

2.4.2 Coordinate with Planning and Land Development Program

The City requires that tentative parcel maps be reviewed to ensure that they are consistent with the City standards, including the storm drain standards. Plan reviews ensure that no illegal connections 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.

The number of illegal connections identified through Planning and Land Development plan reviews is listed below.

	Source	Total Number of Plans Reviewed	Total Number of Illegal Connections Identified
Last Year 2009-2010	Planning/Land Development Plan Review	75	0
This Year 2010-2011	Planning/Land Development Plan Review	80	0

2.4.3 Coordinate with Construction Program

Municipal Utilities Department Engineering (Permit Center) staff coordinated with the Planning Division throughout the year to identify illegal connections during the Plan Review Stage. Information on all approved projects is communicated to Municipal Utilities Department'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.

The number of illegal connections identified through Construction project inspections is listed below.

	Source	Total Number of Illegal Connections Identified
Last Year 2009-2010	Project Construction Inspections	0
This year 2010-2011	Project Construction Inspections	0

2.5 ID3 – INVESTIGATION/INSPECTION AND FOLLOW UP

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

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

2.5.1 Response and Investigation

When a notification or complaint is received, the Municipal Utilities Department (MUD) provides an on-site assessment to determine the conditions of the discharge within two (2) business days (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.

The City developed *Spill Response Procedures for Non-Hazardous Materials and Wastes* that include a responsibility flow chart and outlined timeline and response steps to address emergency and non-emergency spills of non-hazardous materials and waste. The *Spill Response Procedures for Non-Hazardous Materials and Wastes* was attached as Appendix B-1 of the 2009-2010 Annual Report.

The City completes a detailed description of each report, action taken, and final resolution. A Stormwater Program Illicit Discharge Complaint Form has been developed to ensure all pertinent information is gathered, and this form was revised during the 2009-2010 reporting period (Appendix B-2 of the 2009-2010 Annual Report).

Respond to Illicit Discharges

A table summarizing the responses is provided below. For illicit discharges identified via the Hotline, Ask Stockton, and MUD Environmental Control Staff, information from the Illicit Discharges Database (i.e., facility type; activity type; 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 investigated within two business days) is provided in **Appendix B-1**.

	Total Number of Complaints/Notifications Reported (All Sources) ¹	Total Number of Illicit Discharges Verified (All Sources)	Total Number of Complaints/Notifications Investigated within Two (2) Business Days
Last Year 2009-2010	92	84	92
This year 2010-2011	89	88	89

Note:

1. Sources include the Hotline, Ask Stockton, Field Staff, and Other.

Develop an Investigative Guidance Manual

During 2009-2010, the City developed an Investigative Guidance Manual to ensure that inspections of ID/IC are conducted in a uniform manner (Appendix B-4 in the 2009-2010 Annual Report). The Investigative Guidance Manual establishes general guidelines that may be utilized to ensure that the procedures followed and information obtained during an investigation are defensible. 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.

2.5.2 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. Depending on the incident, the City may serve the owner or occupant of the property with an invoice for the cleanup cost.

The City maintained contractual services for the cleanup and removal of hazardous materials. The number of illicit discharges requiring contractor clean-up is listed below.

	Total Number of Illicit Discharges Requiring Clean-Up
Last Year 2009-2010	17
This Year 2010-2011	38

2.5.3 Recordkeeping and Tracking

The City developed an Illicit Discharge Database and utilizes the information to identify and respond to areas that require focused attention. The City also maps the locations of the illicit discharges and illegal connections on a GIS-based map and uses the information to evaluate patterns and trends with the objective of identifying priority areas and tracking repeat offenders.

Maintain Illicit Discharges Database

The City maintained the Illicit Discharges database. Information related to the illicit discharges, 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 investigated within two business days is provided as **Appendix B-1**.

Evaluate, Optimize, and Incorporate Waste Categories

During 2009-2010, the City evaluated and optimized the waste categories it uses to categorize illicit discharges in order to minimize the number of illicit discharges described as miscellaneous or unidentified and more accurately characterize the pollutants and activities involved (see the Waste Categories Memorandum, Appendix B-5 of the 2009-2010 Annual Report). This will allow the City to effectively focus resources on the more prevalent types of incidents. By targeting pollutants and associated activities for additional outreach efforts, the City may be able to eliminate a large portion of the incidents that occur, thereby resulting in a more effective Illicit Discharge program.

Under the new system, each illicit discharge is tracked by facility type, activity causing the illicit discharge, and updated waste categories that are a hybrid of categories previously used by the City and categories recommended by CASQA. These waste categories have been incorporated into the illicit discharge database and, as of 2010-2011, are used to track illicit discharges.

Identify Reported Illicit Discharges on a Map

The City mapped the identified illicit discharges. The Illicit Discharges Location Map is provided as **Appendix B-2**.

In the past, the City has observed that clusters of sanitary sewer overflow (SSO) incidents tend to occur in areas of the City where the sewage infrastructure is older. The City will continue to monitor these areas for discharges and provide appropriate outreach that targets these areas.

2.6 ID4 – ENFORCEMENT

The Enforcement Control Measure establishes policies and procedures and outlines the progressive levels of enforcement applied to responsible parties not complying with City ordinances. By adopting and implementing a progressive enforcement policy, the City will ensure that the program is effective at reducing illicit discharges and illegal connections.

The performance standards for this control measure and the activities that have been initiated and/or completed during this reporting period are summarized below.

2.6.1 Implement Progressive Enforcement Policy

The City has a progressive enforcement and referral policy so that the enforcement actions match the severity of the violation and include distinct, progressive steps. Enforcement actions are taken in accordance with the *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* (MUD Directive, Appendix B-8 of the 2009-2010 Annual Report). 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 through the issuance of administrative citations, notices of non-compliance, cease and desist orders, and criminal enforcement, depending upon the compliance history of the facility. Corrective actions are taken in every instance where a responsible party is identified.

2.6.2 Review/Revise Illicit Discharges Database to Incorporate Enforcement-Related Information

The Illicit Discharges Database has been updated to incorporate enforcement-related information (**Appendix B-1**). All enforcement actions associated with an incident are tracked. The database is supported by records kept by MUD Environmental Control and MUD Stormwater for all citations written and enforcement actions taken.

2.6.3 Track Enforcement Actions in the Illicit Discharges Database

The City used the Illicit Discharges Database to track enforcement actions. The number and types of enforcement actions taken for illicit discharges and illegal connections are summarized below.

Type of Enforcement Action	Number ¹
Verbal Warning	26
Administrative Enforcement	
Notice of Violation	32
Notice to Clean	14
Correction Order	21
Cease and Desist Order	1
Violation Warning Notice	0
Stop Work Order	0
Criminal Enforcement	
Misdemeanor	0
Infraction	0

Note:

1. The total number of enforcement actions taken is greater than the number of verified sources due to multiple enforcement actions for a single discharge.

Total number of complaints/problems referred to the Regional Board: 0

Number of repeat offenders identified: 6

Note: Repeat offenders were identified by responsible parties who received more than one enforcement action.

2.7 ID5 – TRAINING

Training is important for the implementation of the Illicit Discharges Program Element. An effective training program 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.

Areas of Focus for the Illicit Discharge Detection and Elimination Program Training

Target Audience	Format	Subject Material	Comments
<ul style="list-style-type: none">• Hotline staff• Public Works maintenance crews• Industrial/Commercial inspectors• Building and construction inspectors• Police Dept.• Fire Dept.• Environmental Control Officers	<ul style="list-style-type: none">• Classroom• Field Demos	<ul style="list-style-type: none">• Overview of stormwater management program• Stormwater ordinance and enforcement policy• Identification and elimination• Conducting field inspections• Response and notification• Database tracking	<ul style="list-style-type: none">• Training seminars or workshops related to ID/ICs may be made available by other organizations

2.7.1 Conduct Training

Although the City did not develop and provide Illicit Discharges training workshops, staff attended training sessions related to illicit discharges during the 2010-2011 reporting period.

A summary of the training sessions held is provided below.

Date of Training	Title of Training Module	Number of Attendees	Staff Positions Trained	Trainee City Departments or Divisions
Not tracked	SOP for SSO Cause Determination	5	Collection System Operators	MUD – Collections
Not tracked	Stormwater Regulations Responding to Illicit Discharges	5	Collection System Operators	MUD – Collections

2.8 ID6 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Illicit Discharges Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Illicit Discharge Program, the assessment primarily focused on Outcome Levels 1-2.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the 2009 SWMP?
- Outcome Level 2 (L2) answers the question: Can the City demonstrate that the control measure/performance standard significantly increased the awareness of a target audience?

The table below summarizes the effectiveness assessment that was conducted for the Illicit Discharges Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Illicit Discharges

Illicit Discharges	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
ID1 - Detection of Illicit Discharges and Illegal Connections	C – Maintained and Advertised Hotline C – Coordination with Other Dept and Agencies C – Review of Internal Forms C – Implemented Dry Weather Field Screening	C- Hotline Calls	C – Identification of Illicit Discharges by Field Crews	N/A
ID2 - Illegal Connections Identification and Elimination	C – Identification and Elimination	N/A	N/A	N/A
ID3 - Investigation/Inspection and Follow Up	C – Response Activities C – Developed Spill Response Procedures C -- Evaluated, Optimized, and Incorporated Waste Categories	C – Reports of Verified Illicit Discharges	A	A
ID4 - Enforcement	C – Enforcement Action	N/A	N/A	N/A
ID5 - Training	C – Staff Attended Training	A	N/A	N/A

C – An effectiveness assessment was conducted during fiscal year 2010-2011

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

N/A – This outcome level is not applicable for this control measure

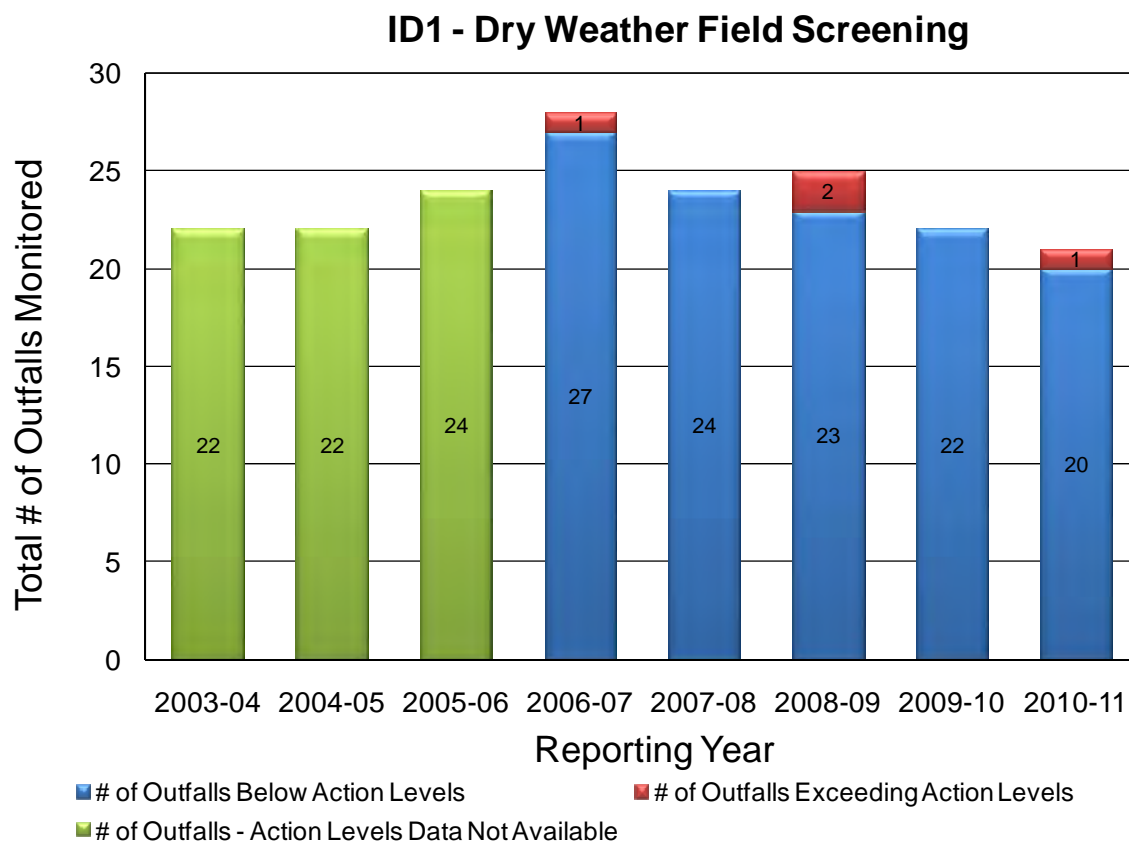
Following is an assessment regarding the effectiveness of the Illicit Discharges Program.

ID1 - Detection of Illicit Discharges and Illegal Connections

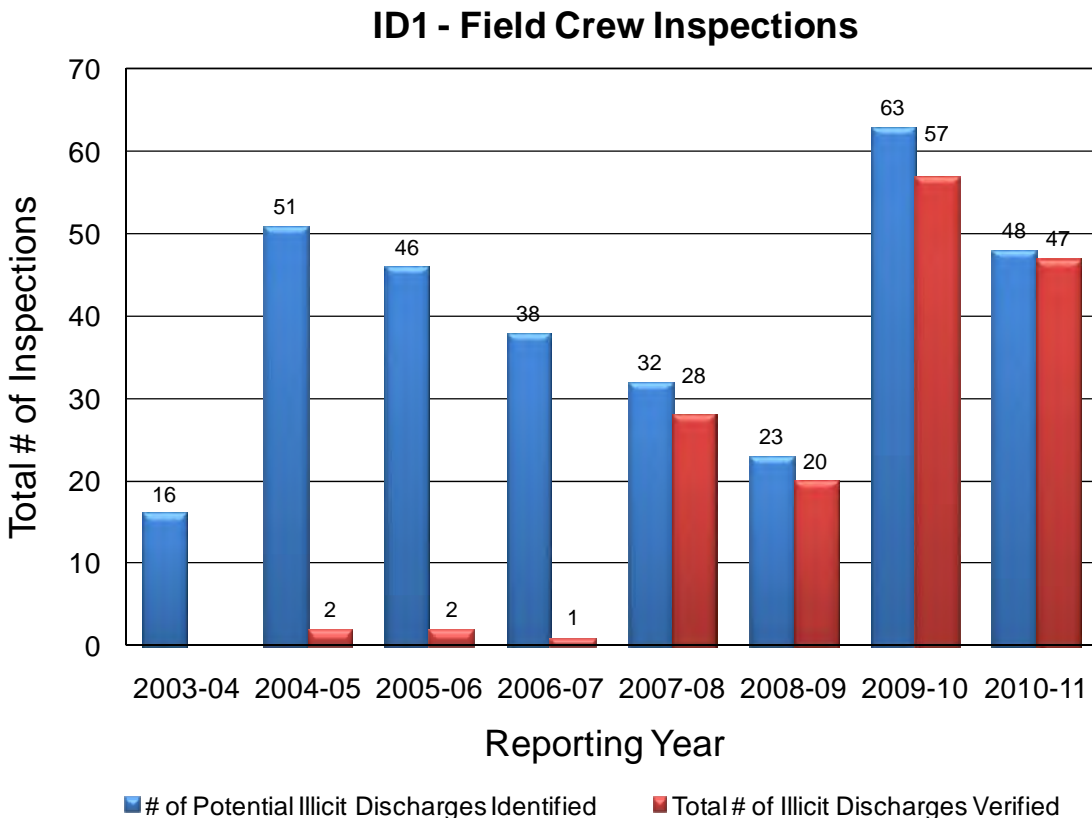
The City has facilitated the reporting of illicit discharges by establishing and maintaining a hotline number, a general stormwater information number, and a web-based public reporting system (Ask Stockton) and then widely advertising them as part of the public outreach program. This has been accomplished 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 illicit discharges 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. Since 2006-2007, four (4) outfalls have exceeded the established action levels for triggering source identification studies. Three (3) of the electrical conductivity (EC) exceedances were determined to be due to water treatment by a Homeowner's Association to a residential lake or groundwater infiltration. One (1) EC exceedance was suspected to be caused by residential landscaping activities and possibly pool maintenance activities. Out of 116 total outfalls monitored since 2006-2007, only 3% have exceeded action levels. **(L1)**



City field crews have been trained to identify potential illicit discharges while conducting routine maintenance activities in the field. Since 2003, 317 potential illicit discharges have been identified. Of the 48 potential illicit discharges identified in 2010-2011, 47 were verified as illicit discharges and appropriately addressed. Since 2003-2004, the field crews have become more aware of what constitutes an illicit discharge and have progressed from reporting incidents that may not have been problematic to reporting illicit discharges that have been verified in the field and followed up on in an appropriate manner. The success rate of the field inspectors has increased in recent years (87% in 2008-2009, 91% in 2009-2010, and 98% in 2010-2011). **(L3)**



ID2 - Illegal Connection Identification and Elimination

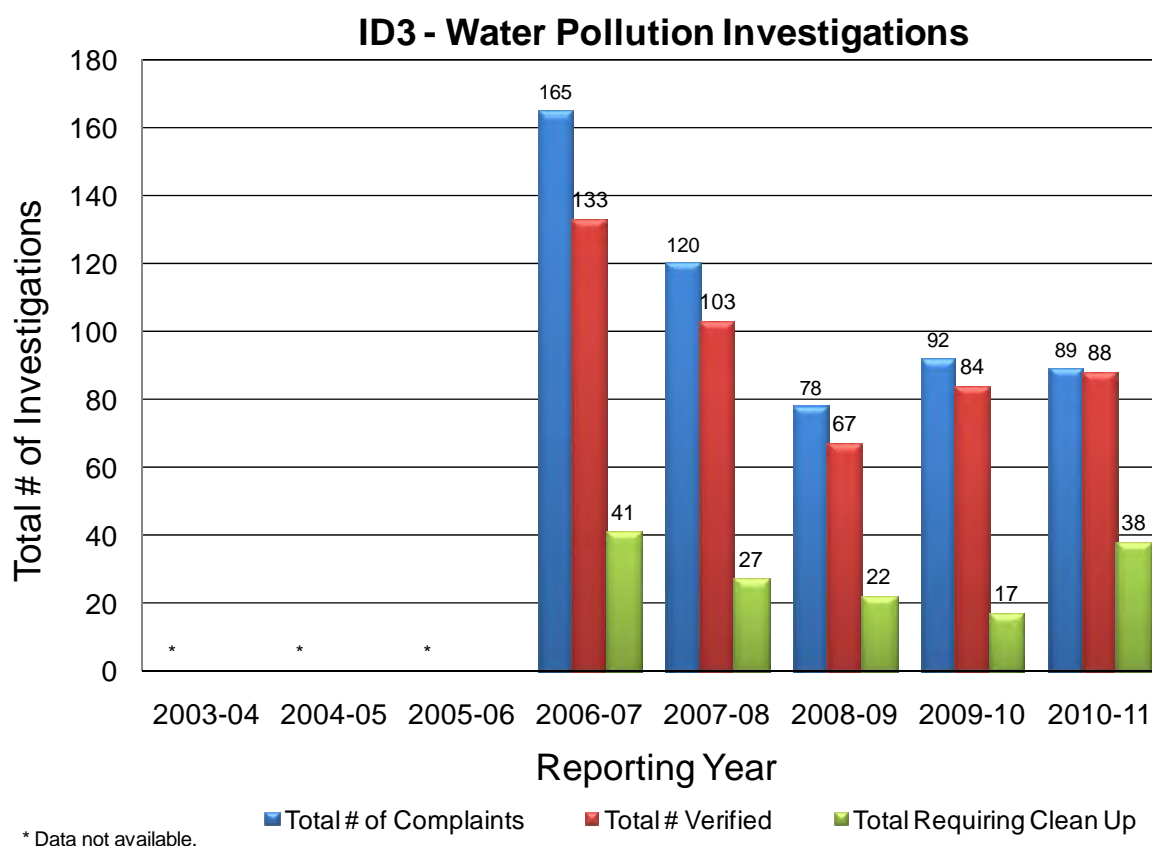
The City has a number of provisions that effectively prevent illicit discharges and illegal connections. First, all new development plans are reviewed for possible illegal connections, and it is also verified that no such connections exist during the construction phase (see Section 6). Second, City staff have been trained to identify illegal connections and illicit discharges in the field. To date, the City has identified and addressed 7 illegal connections (2 in 2004-2005, 1 in 2006-2007, 1 in 2008-2009, 3 in 2009-2010, and none in 2010-2011). **(L1)**

ID3 - Investigation/Inspection and Follow Up

The City developed and maintained an Illicit Discharge Database. The City also maps the locations of the illicit discharges and illegal connections on a GIS-based map. (L1)

The City has responded to illicit discharges by establishing spill response procedures for non-hazardous materials and wastes, responding to the incidents within two business days, and 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)

Between 2006-2007 and 2010-2011, the total number of complaints has decreased by 46% (from 165 to 89), and 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)



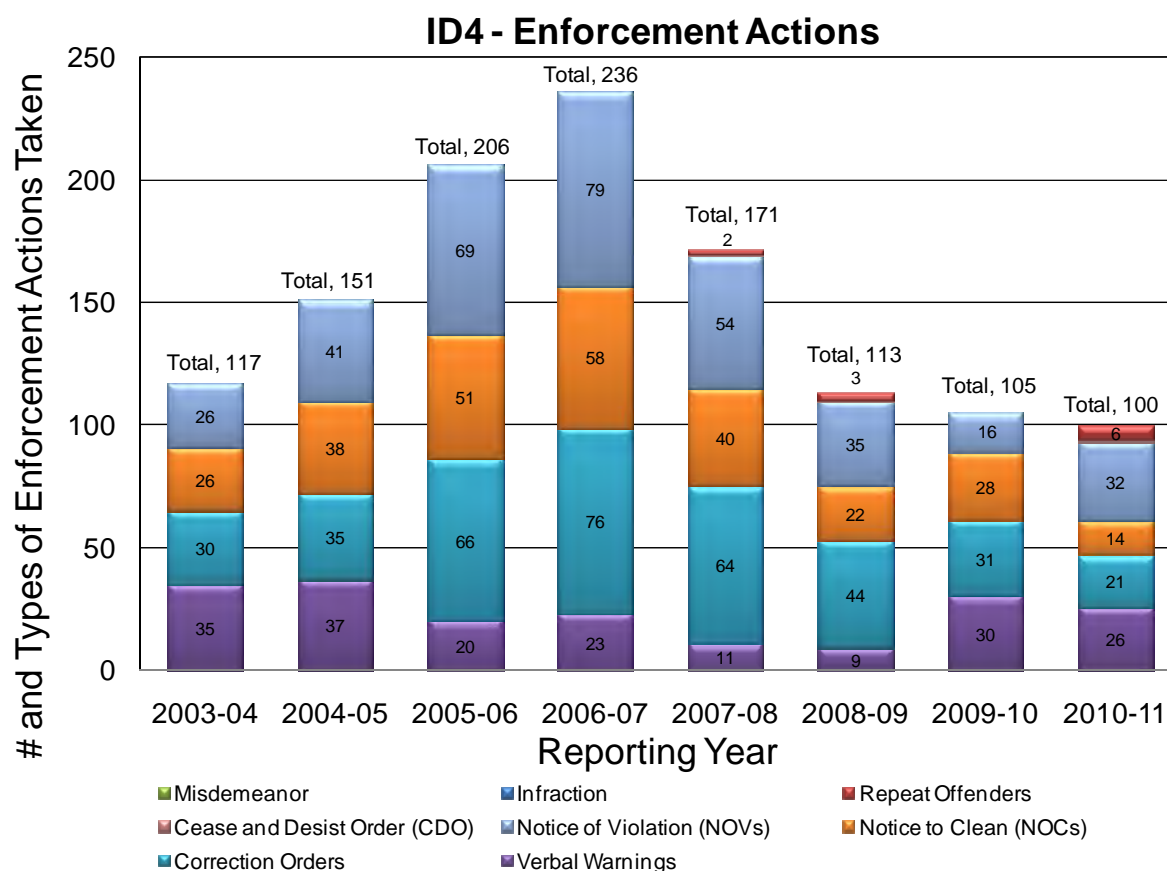
In addition to verifying water pollution complaints, since 2003-2004, City staff have worked to identify the types of materials involved in the illicit discharges or illegal connections. During the 2009-2010 reporting period, the City evaluated and optimized the waste categories it uses to categorize illicit discharges in order to minimize the number of illicit discharges described as miscellaneous or unidentified and more accurately characterize the pollutants and activities involved. These waste categories were used to characterize water pollution incidents in 2010-2011. (L1)

ID4 - Enforcement

The City enforced against illicit discharges/illegal connections and utilized progressive enforcement when necessary. Since 2003, the City has pursued 1,199 enforcement actions. The enforcement actions have included the following (L1):

- 191 verbal warnings
- 367 correction orders
- 352 notices of violation
- 277 notices to clean
- 1 cease and desist order

Since 2006-2007, there have been 725 enforcement actions in response to 544 notifications/complaints of illicit discharges and illegal connections that have been received from all sources. To date, no criminal enforcement has occurred.



ID5 - Training

In 2010-2011, a total of 10 City staff attended two training sessions that covered SSO cause determination, stormwater regulations, and responding to illicit discharges. (L1)

2.9 ILLICIT DISCHARGES PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Illicit Discharges Program. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary in order to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

There were no program modifications identified for the Illicit Discharges Program for 2011-2012.

Section 3

Public Outreach (PO)

3.1 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 a comprehensive short- and long-term public education campaign that will inform the community about how our actions may adversely impact urban stormwater discharges and, subsequently, our local water bodies.

3.2 CONTROL MEASURES

The City has developed several Control Measures to ensure that the public outreach-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Public Outreach Program Control Measures consist of the following:

PO	Control Measure
PO1	Public Participation
PO2	Hotline
PO3	Public Outreach Implementation
PO4	Public School Education
PO5	Business Outreach
PO6	Effectiveness Assessment

The next section of the Annual Report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Public Outreach Program Performance Standards and implementation schedules.

3.3 PO1 – PUBLIC PARTICIPATION

The participation of the public in the implementation of the City's Stormwater Management Program is critical to a successful effort to protect the water resources. Therefore, active public participation is encouraged and supported by the City through a variety of mechanisms which are described in additional detail below.

3.3.1 Implement Storm Drain Marker Program

For the Storm Drain Marker Program, the City loans the supplies to volunteers and coordinates the stenciling activities for the citywide Make A Difference Day. By working with the citizen volunteers the City has been able to mark storm drain catch basins throughout the community

The City continued implementation of the Storm Drain Marker Program by soliciting volunteers to mark the storm drain catch basins throughout the year. The City solicited the volunteers through the following mechanisms:

- Local college contacts
- City Web site
- Newsletters
- Community events
- Community contacts

All of the catch basins installed since 2003-2004 have been required to be permanently imprinted in the sidewalk with the message "No Dumping – Flows to River" or "No Dumping – Flows to Delta". The City has 16,217 catch basins, all of which are stenciled or imprinted with the storm drain message. During 2010-2011, 2,254 catch basins were inspected and 855 were re-stenciled by Collections crew, and 152 catch basins were re-stenciled by volunteers.



City of Stockton Storm Drain Catch Basin Stencil

The total number of storm drain catch basins re-stenciled by volunteers is summarized in the table below (see also MO5).

Date	Volunteer Organization	Number of Volunteers	Number of Catch Basins Re-Stenciled
8/10/10	Rio Las Palmas	1	17
11/2/10	Manuel Bantilan	1	20
11/30/10	Melita Kautz & Javier Castro	2	53
12/6/10	Yesenia Rodriguez	1	44
12/14/10	Sutter Gould	1	2
1/21/11	El Señor	1	1
6/27/11	Zack Farms	1	11
6/28/11	Interstate Truck	1	4
Total		9	152

3.3.2 Organize, Support, and/or Participate in Stream Cleanup Events

The City's stormwater program routinely partners with several groups for community stream cleanup events throughout the year. During the 2010-2011 reporting period, the program participated in California Coastal Cleanup Day, held on September 25, 2010. The City and County stormwater staff worked as resources for the various volunteer groups to help provide supplies (e.g., dumpsters, boots, gloves, trash bags) and community awareness for active participation from local residents' participation. The event resulted in 1,172 volunteers in San Joaquin County removing more than 4.86 tons of trash and debris from the following Stockton waterways: Calaveras River, Duck Creek, Walker Slough, San Joaquin River, Mosher Slough, and Mormon Slough.

These events are made even more successful by the fact that additional City Departments are now involved. Firefighter, Public Works, and Community Services crews now regularly work side-by-side with volunteers at these cleanup events.

A summary of the stream clean up event(s), the types of volunteer organizations and number of volunteers involved in these efforts is provided below:

Date	Clean-Up Location/Event	City's Role in Event	Volunteer Organization/Community Partner	Number of Volunteers Involved
9/25/2010	2010 California Coastal Clean-Up Day	Sponsored	N/A	1,172
Total				1,172

Notes:

1. Since 1999, the County has been the California Coastal Commission's Inland Region Representative and has assisted in coordinating the annual California Coastal Cleanup Day.

Total Volume of Trash/Debris Removed: 4.86 tons

A summary of the large items removed from the stream clean up events is provided below:

Large Items	Estimated #
Passenger tires	17
Tractor tire	1
Refrigerator	1
Monitor	1
Rocking Chair	1
HD TV Frame 40"	1
Toilet	1
Tricycle	1

3.3.3 Promote Used Oil and Household Hazardous Waste Programs

The City promotes the Used Oil and Household Hazardous Waste Programs on the City Web site, through distribution of Waste Reduction and Recycling Guides, the media, and the utility billing newsletter. The City directs its residents to the permanent household hazardous waste collection center operated by the County and advertises the center using a variety of mechanisms including the following:

- Web site
- Flyers
- Newsletter
- Television Ads
- Radio Ads
- Print Ads
- Utility Billing Inserts

The City promotes the County's used oil program on its Web site, through the distribution of Household Hazardous Waste Facility brochures, and in the City's utility billing newsletter.

A summary of the wastes that have been collected is provided below:

Type of Waste	Waste Collected 2009-2010	Waste Collected 2010-2011
Used Oil¹		
Certified Used Oil Collection Center	571,796	547,457
Household Hazardous Waste Facility	2,900 ³	4,458
Total (gallons)	574,696	551,915
Used Filters²		
Household Hazardous Waste Facility	4,172	3,000
Certified Used Oil Collection Center	155,770 ⁴	189,840
Total (units of filters)	159,942	192,840

Notes:

1. With the City's three-bin waste collection system, curbside used oil is now collected.
2. The filters were quantified in units, not pounds.
3. This value was converted from 23,205 pounds using the conversion of 8 pounds/gallon.
4. The number of used filters collected significantly increased in 09-10 for several reasons, including: a) San Joaquin County's Solid Waste initiated a used oil filter recycling campaign to incentivize and educate people that these materials could be recycled. b) there were more certified collection centers available in 09-10; and c) all of the collection centers are reporting the number of filters turned into their sites.

A summary of types of wastes that were collected through local events (City and County) or through the permanent collection site (City) is provided below. The reporting period is from July 1, 2010 – June 30, 2011 and reflects wastes collected from both the City and the County.

Category	Type of Waste	Total Amount Collected 2009-2010 (lbs)	Total Amount Collected 2010-2011 (lbs)
Reuse	Reusable items	123,086	116,065
Reuse Subtotal		123,086	116,065
Recyclables	Latex paint	128,086	216,421
	Motor oil	23,205	37,893
	Oil filters	4,172	4,500
	Antifreeze	1,913	6,690
	NiCd batteries	1	4,900
	Household batteries	13,769	36,522
	Lead acid batteries (automotive)	23,440	13,780
	Propane (BBQ size)	3,114	837
	Fluorescent light tubes	20,613	19,266
	HID lamps	203	1,813
	Empty drums	8,905	7,136
	Mercury	32	222
	Oil based paint	258,782	174,383
	Flammable liquids (bulk)	95,135	34,888
Recyclables Subtotal		581,370	559,251
Incineration	Flammable liquids	7,040	1,238
	Flammable solids	53,724	12,861
	Pesticide liquids	11,675	14,189
	Pesticide solids	7,185	10,491
	Inorganic acids	1,183	1,178
	Organic acids	1,365	4,648
	Inorganic bases	2,845	2,624
	Organic bases	3,671	1,150
	Neutral oxidizers	325	237
	Oxidizing bases	80	708
	Oxidizing acids	0	0
	Organic peroxides	228	111
	Aerosols	7,010	6,204
	PCB containing paints	0	0
	PCBs	2,670	6,134
	Reactives	0	69
	Compressed gasses	0	166
	Ammonium nitrate fertilizers	110	0
	Medical sharps	3,534	3,253
	Sulfur	0	0
	Fuses	419	148
	Other	991	21,565
Incineration Subtotal		104,055	86,974
Landfill	Asbestos	2,080	7,080
	Treated Wood	6,000	26,860
Landfill Subtotal		8,080	33,940
Grand Total Collected (lbs)		816,591	796,230

Note: Reporting is from July 1, 2010 - June 30, 2011, and reflects wastes collected from both City and County.

Note: HHW facility is now an official Certified Collection Center so total gallons include oil collected at the HHW facility.

3.3.4 Coordinate with Household Hazardous Waste Program for Pesticide Disposal

As part of the Water Quality Based Programs, the Pesticide Plan aims to reduce pesticides entering urban runoff by implementing BMPs and Integrated Pest Management (IPM) to minimize pesticide use. In support of its Pesticide Plan, the City coordinates with the Household Hazardous Waste Program to ensure that pesticides are safely and properly disposed. The City distributes information on the Household Hazardous Waste (HHW) Facility at all City-sponsored events. In addition to providing printed materials, staff members advise the public of proper disposal options and services offered by the HHW Facility.

3.3.5 Update City Web site

One of the mechanisms through which the City supports active public participation is the City's Web site, which includes general stormwater information, pesticide disposal information, and stormwater information specific to summer activities and the rainy season. Web site materials updated during this reporting period are attached as **Appendix C-1** (Stormwater Outreach Materials) and included the following:

- The City updated the Web site with general stormwater information and media pieces.¹
- The City updated the Web site with pesticide disposal, IPM, and irrigation runoff information (Water Quality Based Programs Performance Standard). The City's Web site and cable television station both had separate media campaigns running ads. In summer and fall 2010, advertisements ran on the topic of the proposed New Clean Water Fee ballot measure with information about the Stormwater Program's mission and activities. In fall 2010, the ads were on the City's Green Car Wash Program. In winter 2011, the ads were focused on the topic of street flooding and possible pollution impacts to the storm drain system.

As an additional component of the Water Quality Based Program, the City maintains and updates pesticide disposal information on the City Web site to inform the public of proper pesticide handling and disposal procedures.² The Web site also links to the San Joaquin County Household Hazardous Waste Facility. Links for pollution prevention regarding specific activities are listed, including: In Your Home, In Your Garden, In Your Garage, On Your Boat, and Paints and Solvents.

- The City updated the Web site with outreach and messaging on summer activities (i.e., swimming pool/irrigation discharge, disposal of motor oil). In late summer and early fall 2010, a full media campaign regarding the Green Car Wash Program was implemented. The intent was to minimize the number and impact of traditional car washes by school fundraising and booster clubs, which often concentrate their efforts during the fall. The campaign involved theater, radio and print ads, as well as postings on the City's Web site and ads on the City's cable television station.
- The City updated the Web site with rainy season information. A full media campaign ran in fall 2010 and winter 2011 on the topic of street flooding and preventing pollution from entering the storm drainage system during seasonal rains. The campaign involved theater, radio and print ads, as well as postings on the City's Web site and ads on the City's cable television station.

¹ <http://www.stocktongov.com/government/departments/municipalUtilities/utilStormOut.html>

² <http://www.stocktongov.com/government/departments/municipalUtilities/utilStormOut.html> (Tips for Residents) and <http://www.sjgov.org/solidwaste/howdoi.htm>

3.4 PO2 – HOTLINE

The purpose of this Control Measure is to operate a public hotline number to facilitate public reporting of illicit discharges, 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.

3.4.1 Maintain Hotline

The City maintains a hotline number (**209-937-8341**) that allows the public to report illegal dumping or illicit discharges into the storm drain system. Once a complaint is received, staff responds using the processes described within Section 2 of the 2009 SWMP. Additional summary information regarding the hotline is provided in Section 2 of this Annual Report.

The Stormwater Program also maintains a general program informational number (**209-937-5143**). The public is encouraged to use this number to report missing/faded catch basins, to inquire about such activities as volunteering opportunities, stream clean-up efforts, and the City's Green Car Wash Program, and to request school and/or community presentations. The City received a total of 17 calls on this line, of which one (1) was to report a clogged catch basin and one (1) was to inquire about volunteering to stencil catch basins. The remaining 15 calls were general program information inquiries.

A summary of the hotline calls received and verified is provided below:

Type of Problem/Request	Total Number of Calls Received (Hotline)	Total Number of Calls Received (General Number)
Clogged Catch Basins	Not tracked	1
Illegal Dumping or Illicit Discharges	23	0
Faded or Missing Catch Basin Stencils	Not tracked	1
General Stormwater Information	N/A	15
Total	23	17

3.4.2 Promote/Publicize Hotline

The City promotes the 24-hour hotline by including it within public/business education materials, listing it on the Web site and including it within the government pages of the telephone book. Additional summary information regarding the promotion of the hotline number is provided in Section 2 of the Annual Report. Additionally, the hotline was publicized in each edition of the *Stockton Water News*, the monthly water utility billing newsletter insert, during 2010-2011 (see **Appendix C-1**, Stormwater Outreach Materials).

Also, in summer and fall 2010, in advance of a Proposition 218 ballot measure, the City informed the public about the Stormwater Program and the need to increase funds for the Program with a new "Clean Water Fee". A temporary public hotline (209-487-0788) was set up specifically for the public to call in regarding the ballot measure. Approximately 600 phone calls and inquiries were logged via the publicized temporary hotline number.

3.5 PO3 – PUBLIC OUTREACH IMPLEMENTATION

The Public Outreach Implementation Control Measure provides that outreach be conducted with the residential community and general public to inform these audiences of the impacts of urban stormwater runoff and introduce steps they can take to reduce pollutants in stormwater runoff. Such outreach communicates to the City's residents and visitors the importance of stormwater quality protection and pollution prevention as it relates to the protection of the local water bodies.

An estimate of the total number of impressions made with the general public is provided in the table below.

Type of Outreach	Estimated Number of Impressions ¹
Distribution of Educational Materials	78,895
Conduct Mixed Media Campaigns	631,381
Participate in Community-Wide Events	27,450
Provide Community Relations	333
Provide Outreach to School-Age Children	3,231
Provide Business Outreach	147
Total	741,437

Notes:

1. This table summarizes the totals from each performance standard and represents an estimated number of impressions. A final calculation for the total number of impressions is based on actual hand-outs distributed, circulation totals, listenership numbers, items mailed, estimated number of attendees contacted.

3.5.1 Update/Conduct Public Opinion Survey

To better understand the level of awareness in the community, the City, in collaboration with the County, conducted a baseline public opinion survey in March and April 2003. The survey results established a baseline for assessing public perceptions and behaviors related to stormwater quality management. The survey also assisted the Permittees in assessing the overall effectiveness of the Public Outreach Program.

The survey results provided information for the development of the overarching campaign approach, which was formalized in a document entitled “Public Outreach Strategic Implementation Plan, July 2003”. This document was transmitted to the Regional Water Board in October 2003 as Appendix C-1 of the SWMP. The Plan is comprehensive and includes development, implementation, and assessment tasks so that public education objectives may be achieved over the life of the permit.

A follow-up public opinion survey was conducted in April and May 2005 to assess the changes in attitudes, perceptions and behaviors. The results of this survey were included as Appendix C-1 of the 2004-2005 Annual Report (“Public Opinion Survey Report Follow-Up 2005”). This study was implemented through a telephone survey of 401 heads of household in the Stockton Urbanized Area. The information obtained from the survey was used to guide the implementation of the City and County’s public awareness campaign for 2005-2006.

The City and County 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.

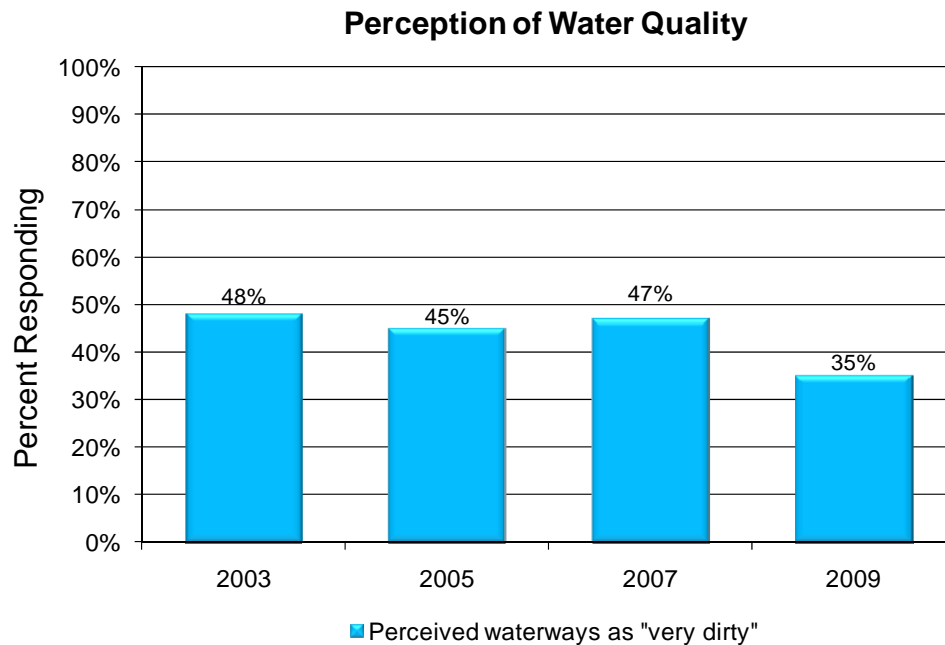
The survey provided information about the following issues:

- Perceptions of the seriousness and impacts of pollution;
- Understanding of major contributors to water pollution;
- Use patterns and disposal practices of pollution related products;
- Awareness of storm drains and the storm drain system;
- Willingness to participate in pollution prevention practices;
- Awareness of City and County stormwater programs; and
- Exposure to stormwater information.

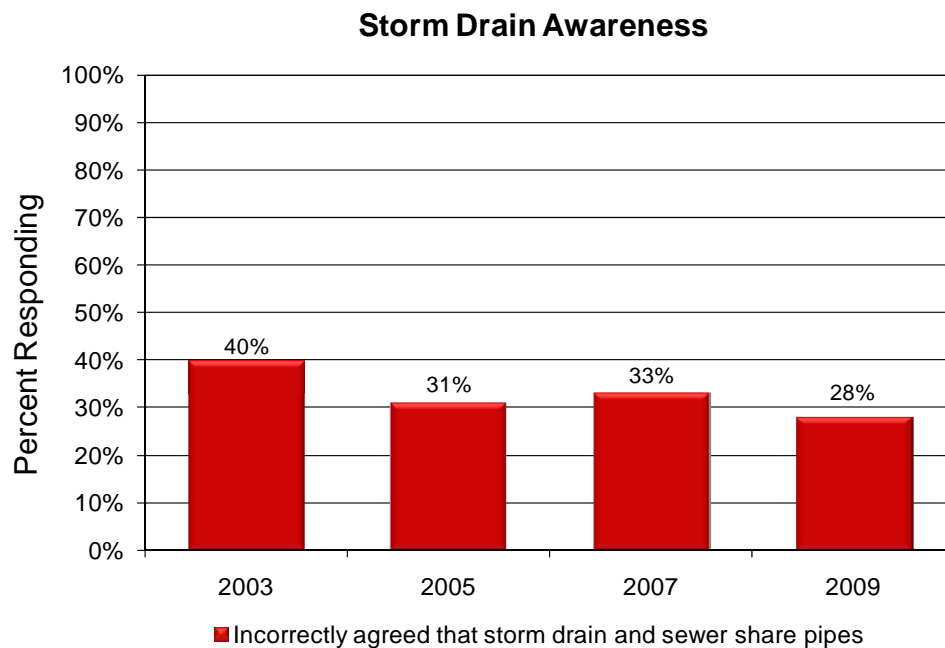
In addition, new questions were added to the survey to gain insight into residential application and purchasing preferences and practices related to pest control products. A full summary of this survey was provided in the 2009-2010 Annual Report. Select findings are presented below. The next survey will be conducted during the next permit term.

Select findings included the following:

- There was a decrease in the respondents who perceived the waterways as “very dirty”; and



- The respondents understood that the storm drain system was separate from the sewer system.



3.5.2 Identify and/or Create, Revise, and Distribute Educational Materials

A multi-media campaign has been developed to provide stormwater education and outreach. The campaign consists of print and radio advertising in both English and Spanish.

The City identified and/or created, revised, and distributed educational materials as needed. The educational materials are distributed through a number of mechanisms including:

- City Web site
- At civic locations
- At community events
- Mass mailings
- Utility Billing inserts
- Posted at community centers

In 2008-2009, the Stormwater Program worked with a marketing firm to create new stormwater brochures and a stakeholder's information packet. The brochure is a simple tri-fold targeted toward residents, while the packet contains four tiered information sheets for both residents and businesses. During the 2010-2011 reporting period, the City continued to utilize these brochures.

A summary of the educational materials distributed during the reporting period is provided below:

Name of Material	Target Audience/ Activity	Multi-Lingual?	Language	Source	# Distributed
Brochures					
County Household Hazardous Waste Consolidation Facility	General Public	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	English Spanish	San Joaquin County Solid Waste	330
Green Car Wash Program	Students Teachers Parents Principals General public	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	English	City	450
Clean Water, Clean Community	General public	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	English	City	120
Fact Sheets					
Our Water Our World IPM Fact Sheets	General Public.	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	15 English 8 Spanish	IPM Regional-BASMAA	351
Other					
Top 10 Most Wanted Bugs in the Garden	Residential Gardeners	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	English	Our Water, Our World	125
Clean Water Newsletter (Information about a Proposed Clean Water Fee for Stormwater Services)	Property owners General Public	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	English	City	77,519
Total Distributed					78,895



Stormwater Program Educational Materials

3.5.3 Ensure Educational Materials Address Proper Disposal of Pet Waste

As a component of the Pathogen Plan, the City seeks to minimize pet waste entering urban runoff by educating pet owners about proper disposal of pet waste.

3.5.4 Develop Outreach Materials Targeting Pet Owners

The City developed a brochure discussing the problem of pet waste pollution and possible actions pet owners can take to properly dispose of pet waste and help reduce pollution to local waterways. The brochure language addressing proper disposal of pet waste was included in the *Stockton Water News*, the City's utility billing insert, in an article entitled *Protecting Water Quality*. The article highlighted the importance of properly bagging and disposing of pet waste. The *Stockton Water News* utility billing inserts are distributed to all residents and businesses.

3.5.5 Provide Pet Waste Outreach/Literature to Pet Owners and Animal Adoption Agencies

The City provided outreach and literature on the proper disposal of pet waste via other mechanisms. Information regarding proper disposal of pet waste is included on the City's Web site. Informational brochures (i.e., *Outside Your Home* and *BMP for Kennels*) discuss proper disposal of pet waste. An article entitled *Protecting Water Quality* was included in the March 2011 edition of the City's utility billing insert. The article highlighted the importance of properly bagging and disposing of pet waste. The *Stockton Water News* utility billing inserts are distributed to all residents and businesses.

3.5.6 Implement Pet Waste Outreach Program

The City will implement the pet waste outreach program by providing outreach to/at businesses, events, and pet organizations. The City implemented the pet waste outreach program by providing outreach to/at the following businesses, events, or pet organizations (Water Quality Based Programs Performance Standard):

- Kennels – Outreach was provided to kennels during inspections conducted in 2009-2010. The next round of kennel inspections is scheduled to occur during the 2011-2012 Fiscal Year.
- Strut Your Mutt/Dog Day Afternoon – As of Fiscal Year 2009-2010, the City is no longer participating in this event. However, the City did provide public outreach regarding pet waste via billing inserts and its Web site, as discussed above.
- Barkleyville Dog Park – During the 2008-2009 Fiscal Year, signage was posted at the park.
- Other pet-related organizations/businesses – An article entitled *Protecting Water Quality* was included in the March 2011 edition of the City's utility billing insert. The article highlighted the importance of properly bagging and disposing of pet waste. The *Stockton Water News* utility billing inserts are distributed to all residents and businesses.

3.5.7 Develop Language for and Produce Pet Waste Signs

In 2010, Stormwater Program staff worked with the City's sign shop (Public Works Department) and Community Development to develop language for and produce new pet waste signs that remind the public to clean up and properly dispose of pet waste.



Example of Pet Waste Sign Developed and Installed in 2009-2010

3.5.8 Install Pet Waste Signs

In June 2010, as part of the Water Quality Based Programs, the City installed a total of 44 Pet Waste Signs within 10 existing City parks with stormwater inlets that discharge directly to local waterways. The locations of these signs are summarized in the table below.

Park Name	Sign Location	# of Signs
Victory Park	Argonne Drive & Yale Avenue Argonne Drive & Columbia Ave Argonne Drive & Pershing Ave Pershing Ave - Main Park Entrance Pershing Ave & Picardy - corner Picardy Dr - by Fire Station Picardy Dr - museum parking lot Parcardy Drive & Yale Ave Monte Diable Ave where splits to Picardy and Argonne	9
American Legion	Walnut St. entrance to park Stockton & Elm Sts SE corner of park - on Baker Street Baker Street and Baker Place Tuxedo Ave - near MUD pump station Tuxedo Ave and Yosemite Street	5
Louis Park	Boat Launch Boat Launch area - near doggie pop bag dispenser Shimizu Dr. - West side of park lot near picnic benches Shimizu Dr. - Parking lot entrance to park Shimizu Dr. - pathway entrance near horseshoe court Occidental Drive and Toyon Drive Occidental Drive pathway entrance Occidental Drive parking lot by handball/basketball court Monte Diablo Ave - parking lot in SE corner of park	10
Caldwell	Corner of Marisposa & Allston Way Along Allston Way - entrance to pathway leading Corner of Allston Way & Alpine Ave Pacific Avenue	4
Lafayette Square	Corner of Hunter Street & Worth Street Near Hunter St & fence by RR Tracks	2
Gleason	Corner of Church and California Sts. Corner of California & Sonora Sts Corner of Sonora & American Sts – walkway entrance	3
Columbus Square	Corner of Van Buren & Worth Street Corner of Lincoln and Worth Street	2
Liberty Square	Corner of Anderson and Stanislaus Sts Corner of Jefferson and Grant Sts	2
Union Square	Corner of Hazelton & Union Sts Corner of Scotts & Pilgrim Sts	2
Stribley	Corner of Della St & Hazelton Ave Along E. Hazelton Ave - pathway entrance Corner of E. Hazelton Ave & B St Visible from Marsh St - in park Corner of Della St & Marsh St - by community garden entrance	5
	Total	44

3.5.9 Implement Phased Installation and Maintenance of Pet Waste Bag Dispensing Stations

As a component of the Pathogen Plan, the City seeks to minimize pet waste entering urban runoff through installing and maintaining pet waste dispensing stations, which include pet waste bags, in City parks. During the reporting period, no new City parks were developed. The City has used the Web site as the primary means of distributing public education materials (in lieu of the mixed media campaign and brochures). Information regarding proper disposal of pet waste is included on the City's Web site. Informational brochures (i.e., Outside Your Home and BMP for Kennels) discuss proper disposal of pet waste. An article entitled *Protecting Water Quality* was included in the March 2011 edition of the City's utility billing insert. The article highlighted the importance of properly bagging and disposing of pet waste. The *Stockton Water News* utility billing inserts are distributed to all residents and businesses.

3.5.10 Track Installation of Pet Waste Bag Dispensing Stations

During the 2008-2009 reporting period, as part of the Water Quality Based Programs, the City tracked installation of pet waste bag dispensing stations. The City of Stockton entered into a Memorandum of Understanding with the Keep the Delta Clean Program to install pet waste bag dispensing stations. Through this partnership, the City installed ten (10) pet waste bag dispensing stations at various locations in parks and areas near waterways. Pet waste bag dispensing stations were installed in September 2008, as detailed in the 2008-2009 Annual Report.

3.5.11 Update Audiovisual Tools and Web Site

On an as-needed basis, the City updates the Web site audiovisual tools so that they remain current. During 2010-2011, the City updated its Web site³, including the stormwater public outreach information.^{4,5}

³ <http://www.stocktongov.com/government/departments/municipalUtilities/utilStorm.html>

⁴ <http://www.stocktongov.com/government/departments/municipalUtilities/utilStormOut.html>

⁵ <http://www.stocktongov.com/government/departments/manager/chan97AV.html>

3.5.12 Conduct Mixed Media Campaigns

The City conducted a mixed media campaign that consists of radio and government access cable channel public service announcements (PSAs), movie theater slides, print ads, and direct mailers. The mixed media campaign is the primary mechanism that is implemented in order to achieve impressions on the public.

A summary of the mixed media campaigns that were conducted for the general public is provided below. Please see **Appendix C-1** for some of materials used for the mixed media campaign.

Type of Outreach	Description	Number of Impressions Made
Cable TV	City of Stockton's Ch. 97 – Green Car Wash, Winter Weather/Street Flooding, and New Clean Water Fee ads	165,000
Cable TV	Crossing TV – Hmong language – Green Car Wash ad	50,000
Theater Ads	Stockton's two (2) movie theaters, slide ad – Winter Weather/Street Flooding ad	47,530
Radio	Local radio stations – KJOY & KWIN – Winter Weather/Street Flooding ad	250,000
Print Ad	Latino Time – Spanish ad – Winter Weather/Street Flooding ad	40,000
Direct Mailers	Newsletter -New Clean Water Fee/Stormwater Program general information	77,000
Direct Mailers	Letter & Brochures sent to fundraising groups, funeral homes, commercial businesses, and homeowners	1,851
Total Number of Impressions		631,381

3.5.13 Participate in Community-Wide Events

The City participates in community-wide events throughout the year that provide outreach to the general public and co-sponsors neighborhood events. These efforts also include partnering with other organizations as appropriate, waste oil recycling, and household hazardous waste events. The City participated in several community-wide events throughout the year, including:

- State of the City
- Earth Day
- Cinco de Mayo
- Senior Awareness Day
- Family Literacy Day in the Park
- Black Family Day

A summary of the community-wide events is provided below:

Name of Event	Date(s)	City Role in Event	Target Audience or Activity	Total Number of Attendees	Number of Impressions Made
Black Family Day	9/5/2010	Informational Booth	Adults	2,000	2,000
Family Day in the Park	9/18/2010	Informational Booth	Adults & Children	20,000	20,000
Green.edu	10/29/2010			300	300
Earth Day	4/10/2011	Informational Booth	Adults & Children	10,000	1,000
San Joaquin Delta College Earth Day	4/21/2011	Informational Booth	College Students	1,500	150
Steelhead Festival	5/1/2011	Provided literature	Children		200
Cinco de Mayo	5/5/2011	Informational Booth	Adults & Children	20,000	2,000
Stockton Ports	5/13/2011	Informational Booth	Adults & Children	2,000	200
Stockton Ports	5/19/2011	Informational Booth	Adults & Children	2,000	200
State of the City	5/19/2011	Informational Booth	Adults/ Business owners	500	500
Stockton Ports	5/23/2011	Informational Booth	Adults & Children	2,000	400
Senior Awareness Day	5/26/2011	Informational Booth	Seniors	5,000	500
Total Number of Impressions					27,450

During the 2009-2010 reporting period, the City also partnered with other Departments and agencies as a part of the stormwater outreach effort. The City partnered with the Stockton Area Water Suppliers (SAWS) to provide educational outreach to school-aged children (see **Section 3.6.1**).

3.5.14 Provide Community Relations

In addition to the community relations that are established through the various outreach efforts that are undertaken, such as multi-media campaigns, mass mailings, web site postings, volunteer solicitation, editorial and media relations, and participation in community-wide events, the City also builds these relationships by holding briefing sessions for community leaders, educators and public employees as well as coordinating with local organizations. During 2010-2011, the City provided community relations by holding briefing sessions for community leaders, educators and public employees and/or coordinating with local organizations. A summary of the community relations events held during the 2010-2011 reporting period is provided below.

Date	Target Audience	Topic of Discussion	Number of Attendees
Summer 2010	Kiwanis	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	40
Summer 2010	Lincoln Village West Homeowners Association 2	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	10
Summer 2010	Lincoln Village West Homeowners Association 6	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	10
Summer 2010	North Stockton Rotary Club	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	50
Summer 2010	Open Public Meeting	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	15
Summer 2010	Open Public Meeting	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	15
Summer 2010	San Joaquin Renters Association	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	50
Summer 2010	Stockton Lions Club	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	75
Summer 2010	Sunrise Rotary	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	40
3/5/2011	League of Women Voters	Informational Presentation – Stormwater Utility Operation	28
Total Number of Impressions			333

The City also conducts outreach to and/or coordinates with local community and environmental organizations. Due to lack of funding during the 2010-2011 reporting period, the City was not able to implement such coordination activities. However, extensive public outreach to convey important stormwater messages was conducted via the City's Web site and mixed media campaign (see **Appendix C-1**).

3.5.15 Implement Pesticide Outreach Efforts

The City implemented pesticide outreach efforts for city staff, residents, retail stores, and pest control operators (PCOs) (Water Quality Based Program Performance Standard). Education and outreach efforts focus on the promotion of less toxic pest control methods and use of IPM. Efforts during the reporting period included the following:

- The City contracted all landscape maintenance and weed control services. All current maintenance specifications require the contractor to comply with City Manager Administrative Directive P&R-03, Pesticides, Herbicides and Fertilizers. Maintenance contracts that started on January 1, 2010, and all future contracts/contract specifications, will require that the contractor use IPM techniques and practices and least toxic methods of pest control to achieve the expected/specified results (see Section 4).
- IPM information and fact sheets are provided to residents through the City's partnership with the "Our Water Our World Program".
- The City continues to promote IPM messaging through various media and expanded those efforts during the reporting period with the purchase of 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 "Our Water Our World" Program. During the reporting period, IMP Kiosk located in City Hall was stocked with IMP brochures. Approximately 350 informational Our Water Our World IPM brochures were provided and taken by the public.



IPM Kiosk Located at City Hall

3.5.16 Conduct Periodic Pest Control Product Surveys

The City conducted a survey in conjunction with other regional programs regarding local or regional sales and use of residential and commercial pest control products (Water Quality Based Program Performance Standard).

The Permittees are required to conduct a survey of the regional sales of residential and commercial pesticides which are available for the public on a bi-annual basis (i.e. once every two years). This survey will allow the Permittees to identify potential pesticide use and impacts before they occur. The survey was developed during 2008-2009, and the first survey was completed during the 2009-2010 reporting year by December 2009.⁶

The Permittees designed a three-part survey approach to address this requirement. The three components of the pesticide survey are as follows:

- Residential pesticide sales, assessed through shelf surveys of local retailers (completed November 2009);
- Residential pesticide use, assessed by pesticide-specific questions in a telephone Public Opinion Survey (completed December 2009); and
- Commercial pesticide use, assessed through collaboration with the County Agriculture Commissioner's office and Department of Pesticide Regulation (DPR). These records were obtained for 2008.

The approach and results of each of the three survey components were summarized in the 2009 Pesticide Survey Assessment and included in Section 9 as Appendix I-1 of the 2009-2010 Annual Report. The major conclusions from the pesticide survey are shown below.

In lieu of conducting a second survey in 2011, the City will continue to provide public outreach regarding key stormwater messages via the Web site during 2011-2012. The next survey is proposed to be completed during the next permit term.

⁶ The survey design and protocols were submitted with the 2009 Annual Work Plan, and were included as an appendix in the 2008-2009 Annual Report.

Summary of Main Conclusions from the 2009 Pesticide Survey

Survey Component	Main Conclusions
Shelf Survey	<ul style="list-style-type: none">• Consumers are faced with a wide variety of options for pest and weed control and may not understand the differences between them.• Pyrethroids are the most prevalent type of pesticide available for home use.• Organophosphate pesticides are no longer widely available.• Less-toxic pesticides represent a significant portion of available products.
Residential Use Telephone Survey	<ul style="list-style-type: none">• The majority of residents uses pesticides regularly, and stores multiple pest control products in their home.• Residents' awareness of proper disposal methods for pesticides has increased, as a significantly higher percentage reported using household hazardous waste collection events in 2009 compared to previous years.• Residents tend to store pest control products for greater than a year, and often don't remember when products were purchased.
Commercial Use Assessment	<ul style="list-style-type: none">• Pyrethroids are among the most widely used commercial pesticides.• OP pesticides are applied commercially in San Joaquin County.

3.6 PO4 – PUBLIC SCHOOL EDUCATION

Presentations made to school-age children may be an effective outreach method because the children are asked to pass the pollution prevention information on to their families. This Control Measure provides public school districts, after school programs, day camps, and the Children's Museum within the City with outreach materials to educate school-age children about stormwater pollution.

The City recently evaluated the ability to interface and coordinate with school education programs on a regional or local level. The school outreach efforts over the 2002-2007 Permit term were successful; however, due to increased curriculum and testing requirements, stormwater program staff has found it to be progressively more difficult to gain access to schools in order to provide outreach to students. The City is continuing with the assembly program to reach a large number of students.

The City has reviewed the existing program and assessed the feasibility of alternative programs. As a result, the City concluded that the most consistent mechanism for reaching out to school-aged children within the City is through an interactive stormwater exhibit at the Children's Museum and the continued participation with the assembly programs with Stockton Area Water Suppliers (SAWS) to reach a large number of students.

3.6.1 Send Letters to Fifth Grade Teachers and Principals

During 2010-2011, the City did not send letters to 5th grade teachers and principals inviting them to take part in the City's stormwater education program; however, the City continued its partnership with the SAWS to make individual classroom stormwater presentations to students, as detailed in Section 3.6.2.

3.6.2 Reach Out to School Age Children Outside of School

As of 2009, the opportunity no longer exists for the City to reach out to school age children outside of school by providing presentations through the Community Services Department's After School Program. The City will continue to identify opportunities to reach out to school age children outside of school and to support the interactive display at the Children's museum.

During the 2010-2011 reporting period, the City staffed an informational table or made presentations at events and during school assemblies at the request of community event organizers and/or teachers, resulting in a total of 3,231 impressions. Where noted below, the "Zun Zun Water Awareness Assembly," which includes a stormwater pollution prevention message, was presented.

- Zun Zun Water Awareness Assembly – Brookside Elementary School (1/7/2011)
- Zun Zun Water Awareness Assembly – Podesta Ranch Elementary School (1/7/2011)
- August Knodt Elementary School – Math & Science Fair, Informational Table (2/2/2011)
- August Knodt Elementary School – Farm Day, Informational Table (4/1/2011)
- Great Valley Elementary School – Ag Day, Informational Table (5/6/2011)
- Zun Zun Water Awareness Assembly – Pittman Elementary School (5/7/2011)
- Zun Zun Water Awareness Assembly – St. Luke's Elementary School (5/17/2011)
- Zun Zun Water Awareness Assembly – Wilhelmina Henry Elementary School (5/17/2011)
- Zun Zun Water Awareness Assembly – John Muir Elementary School (5/18/2011)

The Zun Zun Water Awareness Assembly is a musical assembly program which celebrates water and introduces students to the topics of clean water and watershed protection; it also highlights the impacts of stormwater pollution. The presentations were provided to area schools via the City of Stockton's partnership with the Stockton Area Water Suppliers.

3.6.3 Present at Day Camps

As of 2009, the opportunity no longer exists for the City to present at Day Camps sponsored by the Community Services Department. The City will continue to identify opportunities to reach out to school age children outside of school and to support the interactive display at the Children's museum.

3.6.4 Develop Interactive Exhibit for Display at Children's Museum

During the 2009-2010 reporting period, the City completed design and development of an interactive stormwater exhibit that is displayed at the Children's Museum.

3.6.5 Implement Educational Signage and Displays Relevant to Stormwater Pollution

During the 2009-2010 reporting period, the City completed construction of an interactive stormwater exhibit containing education signage and displays relevant to stormwater pollution that is displayed at the Children's Museum. The display was completed at the end of June 2010, with an unveiling to the public in July 2010. The exhibit remained on display during 2010-2011.





Educational Signage and Display at Children's Museum

3.7 PO5 – BUSINESS OUTREACH

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.

3.7.1 Conduct Business Workshops

The City conducted business workshops and/or held business specific events as required during the Permit term. The Energy and Clean Air Expo was held in December 2008, and a Got SWPPP? workshop was held in April 2009. In addition, the City held a Pre- and Post-Construction 101 workshop in conjunction with the San Joaquin Stormwater Quality Partnership.

3.7.2 Distribute Educational Material to Selected Businesses

The City distributes educational materials regarding stormwater pollution and BMPs, stormwater regulations, and penalties for noncompliance to a number of different types of businesses. Outreach is focused on the priority businesses identified in Section 5. The City will continue its outreach to businesses as needed and when it resumes inspections in 2011-2012.

Informational presentations were made and materials were provided regarding the Stormwater Program's operations and activities to a number of business organizations during summer and early fall 2010. These efforts were in advance of and preparation for the proposed New Clean Water Fee Proposition 218 ballot measure. The focus of the meetings was to build consensus and support for the measure, which would bring new funding resources to the Stormwater Program for expanded operations and administrative capacities. Presentations were made to the Greater Stockton Chamber of Commerce Board of Directors, the Chambers Manufacturers Industrial Roundtable group, the Building Industrial Association, the Chamber of Commerce Government Relations Council, the San Joaquin Business Council and the Grupe and Spanos Corporations. A summary of these presentations is provided in the table below.

Date	Target Audience	Topic of Discussion	Number of Attendees
Summer 2010	Builders Industry Association	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	20
Summer 2010	Chamber of Commerce – Government Relations Council	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	25
Summer 2010	Chamber of Commerce - Manufacturers Industrial Round Table	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	30
Summer 2010	Chamber of Commerce Board of Directors	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	30
Summer 2010	Grupe & Spanos – business leaders meeting	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	12
Summer 2010	San Joaquin Business Council	Informational Presentation – New Clean Water Fee; Stormwater Ballot Measure	30
Total Number of Impressions			147

3.7.3 Ensure Business Workshops Address Mercury

Although the City did not specifically address the proper handling and disposal of mercury-containing products during business workshops held during the Permit term, the City's stormwater Web site provides a link to the San Joaquin County Solid Waste Division, which provides disposal information for "Devices Containing Mercury".⁷ The Stormwater Program provided information on mercury and mercury disposal to businesses during 2009-2010 as part of the Commercial and Industrial Business Program Inspections. The form for the industrial business inspections was modified to specifically inquire about and review the mercury management plan of each of the businesses inspected. In addition, the City provided outreach regarding mercury awareness in the December 2009 edition of the *Stockton Water News* utility billing insert. This mailer reached more than 46,000 utility customers.

3.7.4 Revise Business-Specific Fact Sheets to Address Mercury

The City did not revise business-specific fact sheets to include proper handling and disposal of mercury-containing products (Water Quality Based Programs Performance Standard). The City has committed to distributing the materials developed by the County of San Joaquin's Household Hazardous Waste Facility for proper disposal of mercury-containing products during the next round of industrial and commercial inspections (scheduled to begin July 1, 2011).

During the 2010-2011 reporting period, three San Joaquin County Household Hazardous Waste brochures with information regarding the proper disposal of mercury-containing products were distributed as needed (see **Appendix C-1**).

⁷ <http://www.sjgov.org/solidwaste/>

3.8 PO6 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Public Outreach Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Public Outreach Program, the assessment primarily focused on Outcome Levels 1-4.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the 2009 SWMP?
- Outcome Level 2 (L2) answers the question: Can the City demonstrate that the control measure/performance standard significantly increased the awareness of a target audience?
- Outcome Level 3 (L3) answers the question: Can the City demonstrate that the control measure/performance standard significantly modified the behavior of a target audience?
- Outcome Level 4 (L4) answers the question: Can the City demonstrate that the control measure/performance standard reduced the load from sources to the storm drain and/or receiving water?

The table below summarizes the effectiveness assessment that was conducted for the Public Outreach Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Public Outreach

Public Outreach	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
PO1 - Public Participation	C – Catch Basins Marked C – Stream Cleanup Events C – Used Oil and HHW Programs C – Coordination with Pesticide Plan C – Updated Web Site	C – Volunteers Participating	C – Volunteers Participating	C – Materials Removed/ Diverted
PO2 - Hotline	C – Maintain and Promote/Publicize Hotline	A	N/A	N/A
PO3 - Public Outreach Implementation	C – Material Development and Distribution C – Coordination with Pathogen Plan C – Mixed Media Campaign C – Community-Wide Events C – Partnerships and Community Relations C – Coordination with Pesticide Plan	A	A	N/A
PO4 - Public School Education	C – Invite Schools to Participate C – Outreach to School Children	A	N/A	N/A
PO5 - Business Outreach	C – Distribute Educational Material to Selected Businesses	A	N/A	N/A

C – An effectiveness assessment was conducted during Fiscal Year 2009-2010

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

N/A – This outcome level is not applicable for this control measure

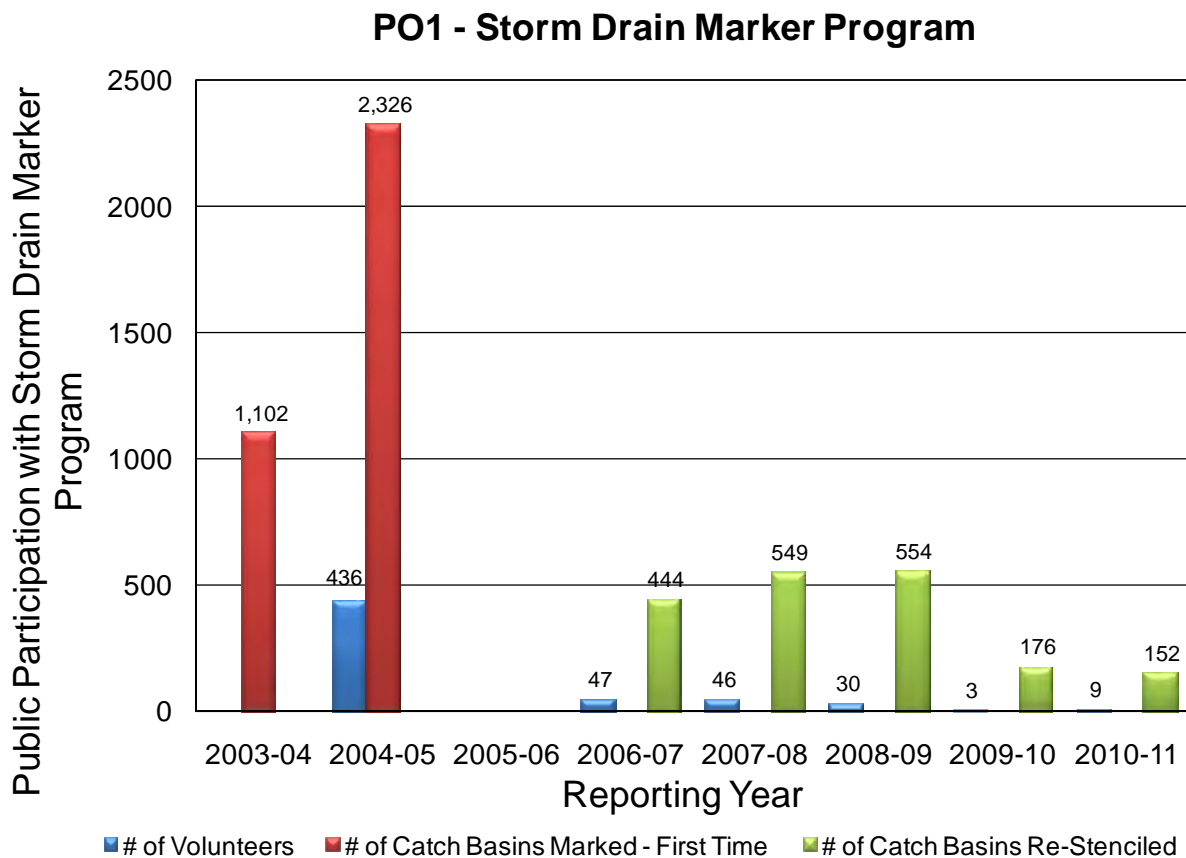
Following is an assessment regarding the effectiveness of the Public Outreach Program.

PO1 - Public Participation

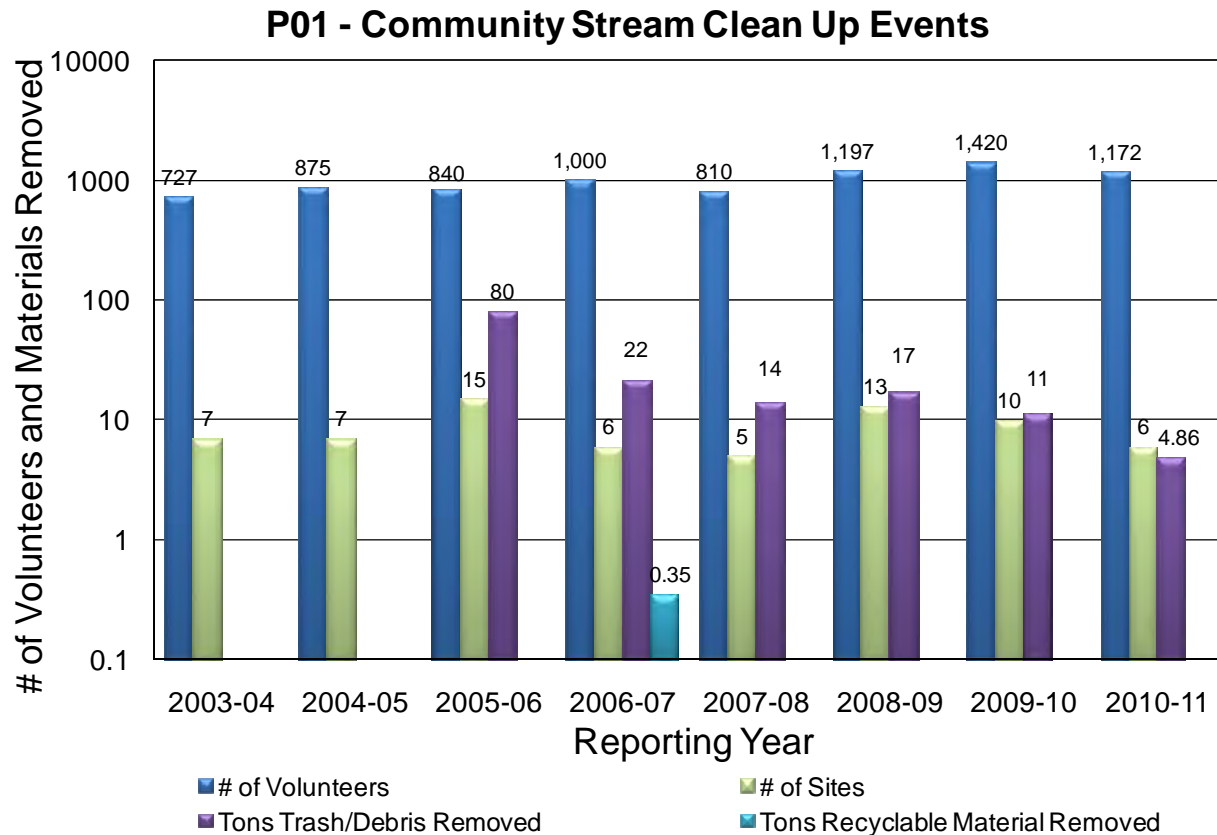
The City is outreaching to and involving the public in the implementation of the Public Outreach program. They are soliciting involvement in the program by advertising in the materials that are distributed, the Web site, newsletters, at community events, and distributing information at public counters. (L1)

The public is aware of the public education campaign and community events and are becoming more involved in the program. Materials are being removed from the local creeks and streams, thus reducing the amount of materials that would adversely impact the waterways. (L2, L3, L4)

- 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.



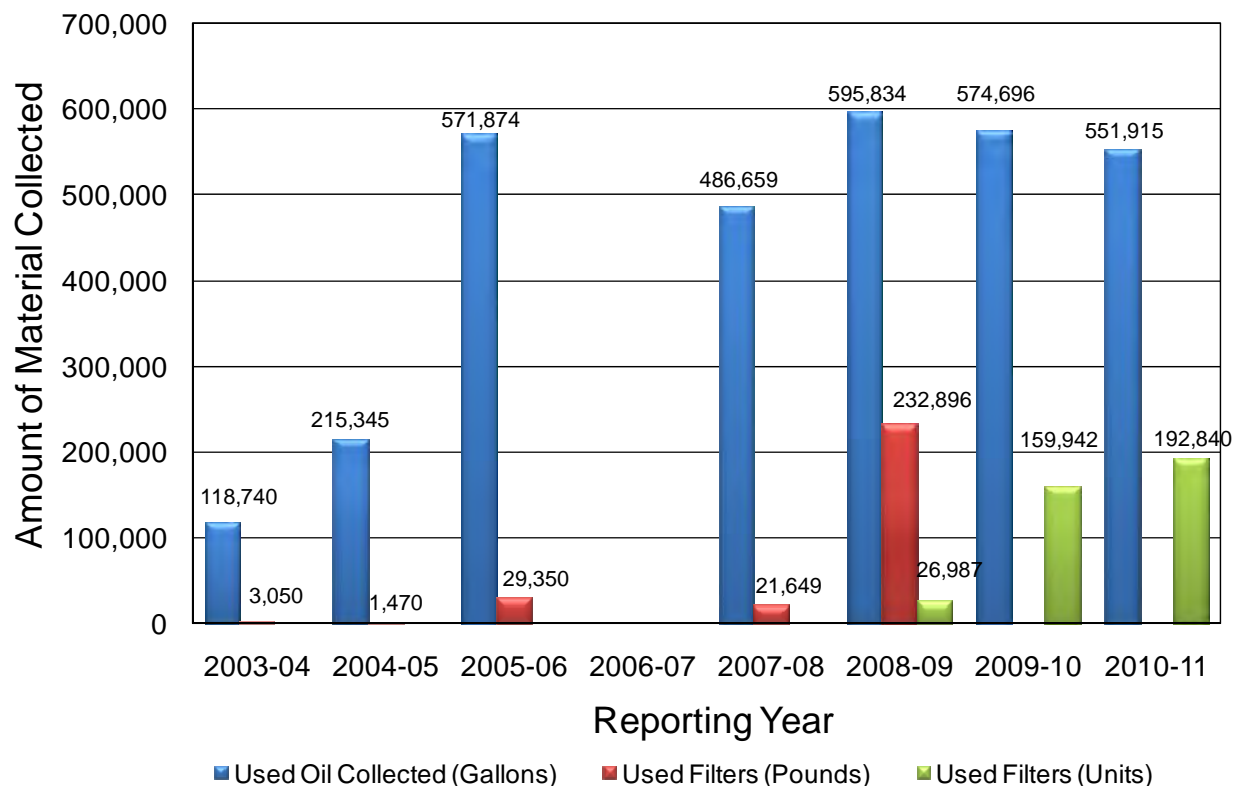
- Stream Clean-Up Events - Since 2003-2004, 8,041 volunteers have participated in local stream clean-up events, and an overall increasing trend in the number of volunteers has been apparent. The number of volunteers has been consistently high since 2008-2009. As a result, more than 148 tons of trash and debris have been removed. During the past year, a total of 4.86 tons of trash and debris were removed from six sites, and the waste removed included 18 tires and 6 furniture items.



The City has collected used oil and household hazardous waste for proper disposal, thus reducing the potential load of pollutants that could enter the storm drain system. **(L4)**

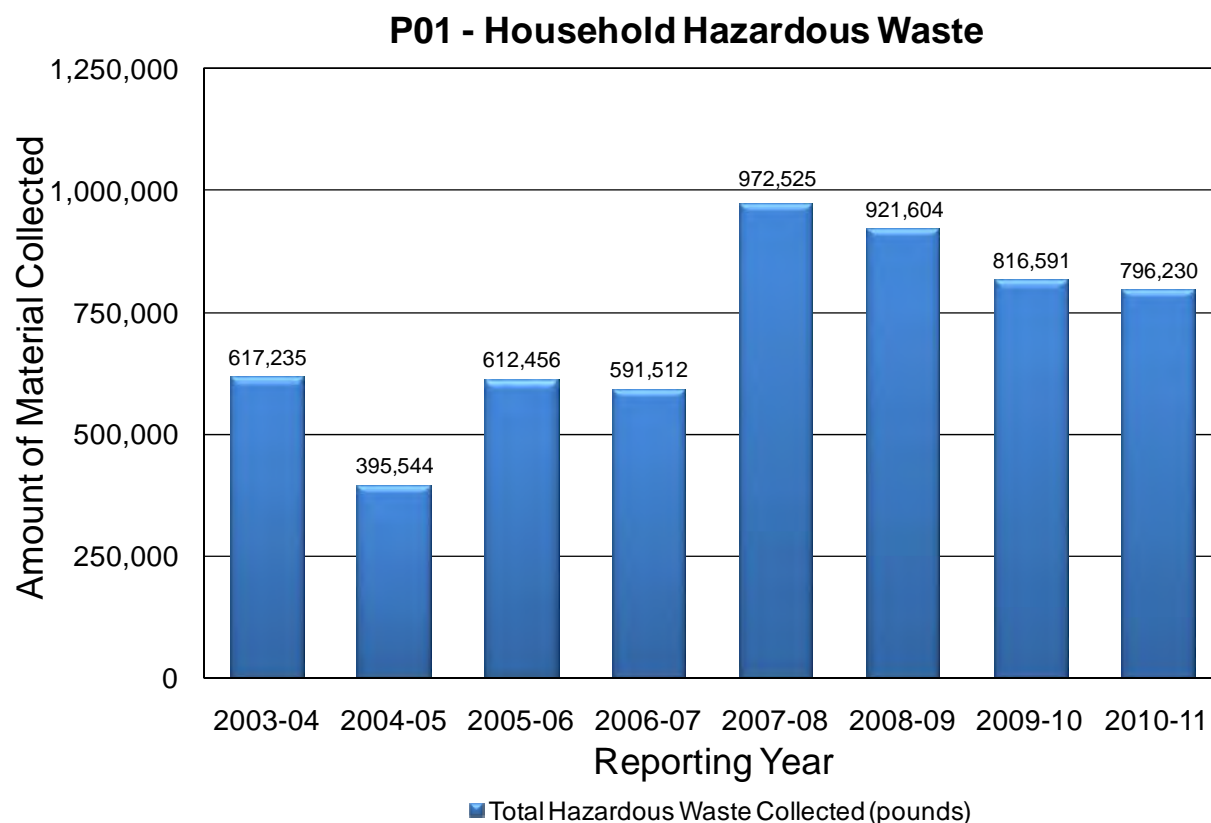
- Used Oil Collection Program – Since 2003, 3,115,063 gallons of used motor oil or motor oil products and 288,415 pounds (tracked between 2003-2009) and 379,369 units (tracked between 2008-present) of used oil filters have been collected at the permanent collection facility, the certified used oil collection 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.

P01 - Used Oil Collected



The City is raising awareness about household hazardous waste collection services. **(L1)**

- Household Hazardous Waste - The City collected household hazardous waste through the permanent collection facility. Since 2003, these efforts have resulted in more than 5 million (5,723,697) pounds of hazardous waste being collected and disposed of properly.



The City is coordinating with the household hazardous waste program with the Pesticide Plan to ensure that pesticides are safely and properly disposed of. The key messages are provided through printed materials, including the *Stockton Water News*, as well as the Web site. **(L1)**

The City has supported active public participation by periodically updating the City's Web site, which includes general stormwater information, links to pesticide disposal information, and stormwater information specific to summer activities and the rainy season. **(L1)**

PO2 – Hotline

The City is advertising the 24-hour hotline, the used oil program, and the household hazardous waste consolidation facility numbers and communicating the importance of proper disposal for used oil and household hazardous waste. The City is advertising the program through the Web site, the media (public service announcements), and the utility bill newsletter. **(L1)**

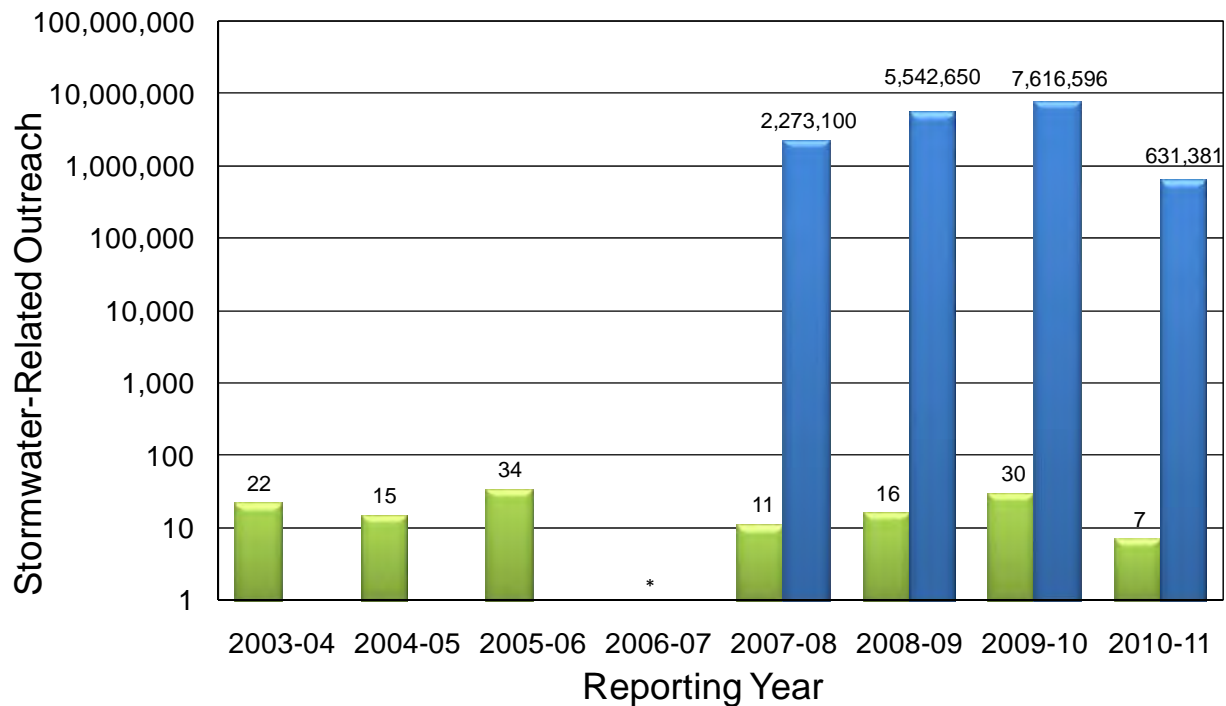
PO3 - Public Outreach Implementation

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 web site, 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 (22 in 03/04; 15 in 04/05; 34 in 05/06; 11 in 07/08; 16 in 08/09, 30 in 09/10, and 7 in 10/11). Between 2007 and 2011, it is estimated that these mixed media campaigns have resulted in more than 16 million (16,063,727) impressions.

P03 - Stormwater Outreach

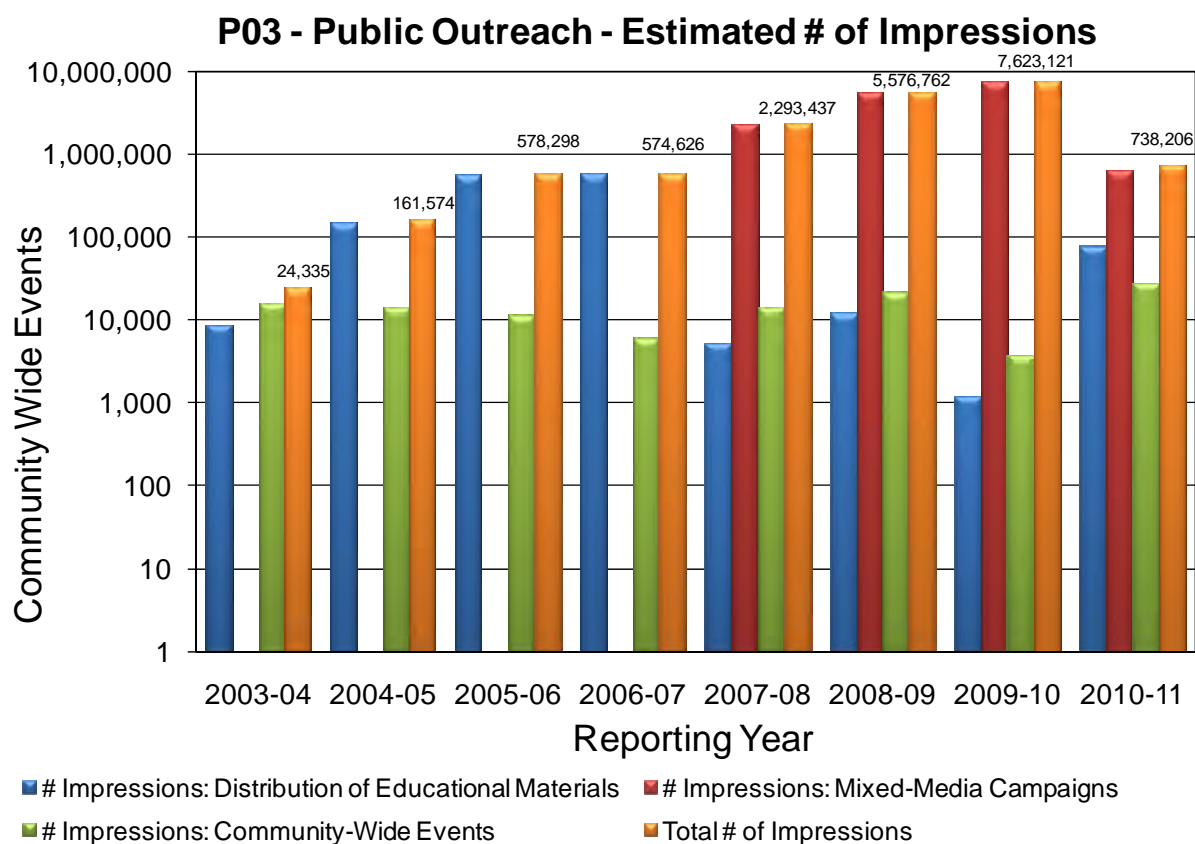


* Data not available.

■ # Stormwater-Related Messaging
■ # Impressions: Mixed-Media Campaigns

- **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.



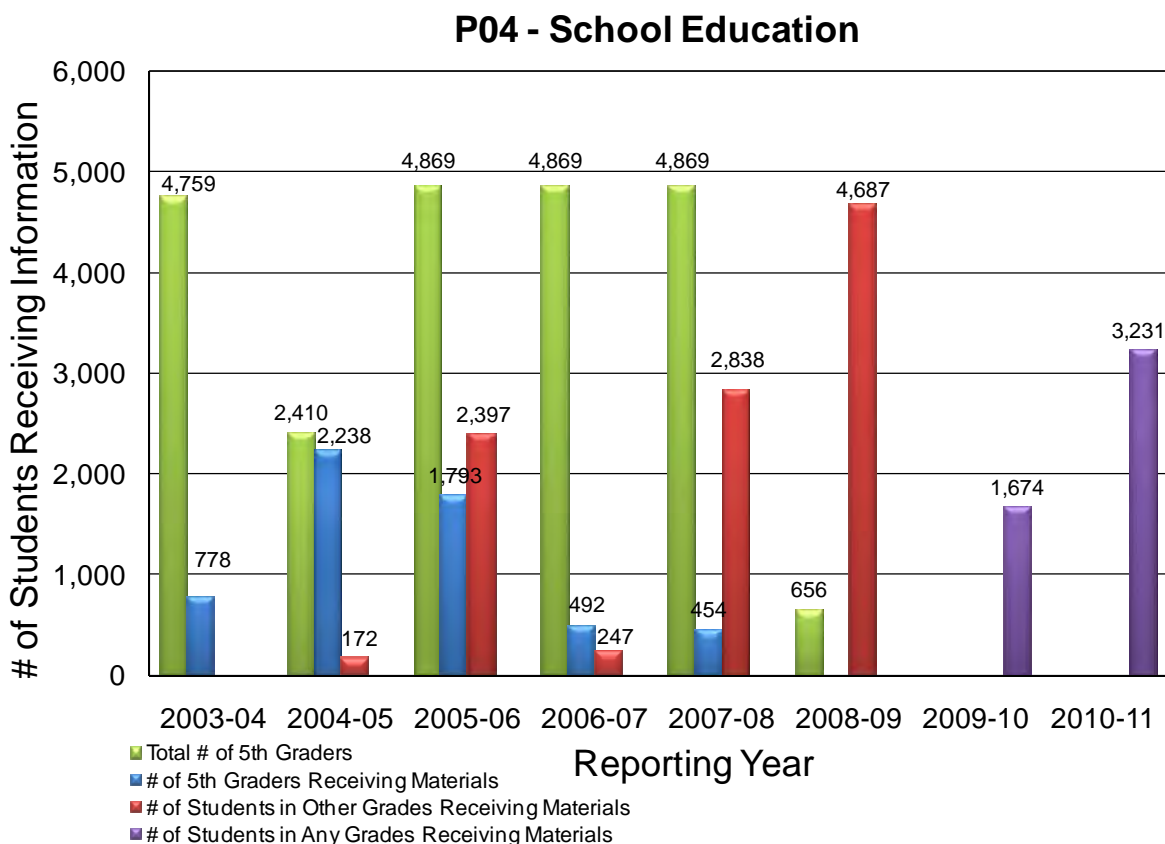
The City is implementing a pet waste outreach program in coordination with the Pathogen Plan to ensure that pet waste is properly disposed of. Since 2008-2009, the key messages have been provided through printed materials, the *Stockton Water News* utility billing insert, signage at the Barkleyville 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. (L1)

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. (L1)

PO4 - Public School Education

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 recently shifted to presentations made to school age children in any grade. (L1)

- The City continues to partner with the Stockton Area Water Suppliers (SAWS) to make individual classroom stormwater presentations to school age children, reaching 3,231 students this reporting period.
- During 2010-2011, the City continued to support the interactive stormwater pollution exhibit that is displayed at the Children's Museum.



PO5 - Business Outreach

The City is outreaching to the business community and providing key stormwater messages. **(L1)**

- **Materials** – Since 2003, the City has distributed educational materials to businesses regarding stormwater pollution and BMPs. As a result, approximately 5,552 pieces of educational materials have been distributed to industrial and commercial businesses. Materials are provided via the City's Web site, at community events, via utility billing inserts, and during industrial and commercial business inspections (see Section 5).
- During 2010-2011, presentations were made to business organizations, resulting in approximately 147 impressions.

3.9 PUBLIC OUTREACH PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Public Outreach Program. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

The program modifications that will be made to the Public Outreach Program during the next fiscal year (2011-2012) include the following:

- **Implement a public education strategy for the overall program through several performance standards (e.g., mixed media, community outreach).** – The City will use the Web site as the primary means of distributing public education materials, in lieu of the mixed media campaign and printed brochures.

Supporting Rationale:

- During this Permit term, more than 16 million impressions, including 738,206 impressions in 2010-2011, have been made through distribution of educational materials, mixed media campaigns, and community-wide events.
 - The City is currently meeting the intent of the public education and outreach program. Utilizing the Web site will allow the City to continue to provide public outreach while reducing costs.
 - The City is continuing to implement P01, P02, and other program elements.
- **Update the Public Opinion Survey and conduct Public Opinion Survey twice during the Permit term.** – The City, in conjunction with the County, will conduct the next public education survey during the next Permit term.

Supporting Rationale:

- The first survey was conducted in 2009 with 400 heads of household in the SUA, and the results were summarized in the 2009-2010 Annual Report.
 - The second survey is currently scheduled to be conducted in 2011. During 2011-2012, the City will continue to provide public outreach regarding key stormwater messages via the Web site.
 - 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 each permit term to assess the changes within the SUA community.
- **Conduct Periodic Pest Control Product Surveys.** – The City, in conjunction with the County, will conduct the next public education survey during the next Permit term.
 - In lieu of conducting a second survey in 2011, the City will continue to provide public outreach regarding key stormwater messages via the Web site during 2011-2012.

Section 4

Municipal Operations (MO)

4.1 OVERVIEW

The City, as part of its normal operations, conducts a number of activities (e.g., catch basin cleaning, street repairs, street sweeping via a contract) that may generate or mobilize pollutants. The Municipal Operations Program Element comprises Control Measures that are designed to ensure that these operations and maintenance activities are performed using processes and procedures to minimize the pollutants generated and the potential for pollutants to enter the storm drain system.

4.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that the municipal operations-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Municipal Operations Program Control Measures consist of the following:

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 City Facilities
MO4	Landscape and Pest Management
MO5	Storm Drain System Maintenance
MO6	Street Cleaning and Maintenance
MO7	Parking Lots Maintenance
MO8	Training
MO9	Effectiveness Assessment

The next section of the Annual Report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Municipal Operations Program Performance Standards and implementation schedules.

4.3 MO1 – SANITARY SEWER OVERFLOW AND SPILL RESPONSE

The Sanitary Sewer Overflow Emergency Response Plan (SSOERP) minimizes potential impacts to the receiving water from sanitary sewer overflows and spills. Sanitary overflow and spill response comprises four steps: investigation of complaints, containment, notification to appropriate agencies, and clean-up / mitigation. Follow-up to an overflow or spill may include procedures for containing and cleaning spills and leaks that enter the storm drain system.

4.3.1 Implement Sanitary Sewer Overflow Emergency Response Plan

The SSOERP attempts to prevent SSOs from entering the storm drain system and includes reporting information so that the responsible agencies are notified when these spills occur. The Environmental Control Division has a cooperative relationship with the MUD – Stormwater Management Program staff and informs them whenever a spill occurs and a cleanup is necessary. They also work together to collect and record related data. In the event of a private SSO or hazardous spill, communication of both parties is essential in resolving these incidents.

The City maintains a complaint hotline and responds to sanitary sewer overflow complaints and/or notifications in a timely manner. A summary of the sewer overflows is provided below.

Total Number of SSOs	Total Number of SSOs that Entered the <u>Storm Drain System</u>	Total Number of SSOs that Entered a <u>Receiving Water</u>
212	70	11

See **Appendix D-1** for a summary of reported SSOs, including locations, frequencies, total volume estimates, and the amount captured and returned to the sewer system.

4.3.2 Review/Revise Sanitary Sewer Overflow Emergency Response Plan

On June 16, 2009, the City and the California Sportfishing Protection Alliance agreed to incorporate several procedures to the City's SSORP. In November 2009, the County's 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 (Appendix D-1 of the County's 2009-2010 Annual Report).

The specific procedures that were addressed within the revised SSORP include the following:

1. The County will ensure that the County of San Joaquin's Emergency Dispatch personnel are prepared to field any call from the City of Stockton related to any SSO occurring within the County's jurisdictional area of the Stockton Urbanized Area MS4 ("County's MS4 Jurisdiction") that has discharged to, or threatens to discharge to, the County MS4.
2. For any SSO from the City of Stockton'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 United States, 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 developed a Sanitary Sewer Overflow Emergency Response Plan (SSOERP) to incorporate and implement these new procedures. The SSOERP will be included in the County 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 changes occur. 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, reporting by experienced maintenance personnel, and dry weather field screening. During the construction phase, regular inspection ensures 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) (**Appendix D-2**).

4.4 MO2 – NEW DEVELOPMENT AND CONSTRUCTION REQUIREMENTS FOR MUNICIPAL CAPITAL IMPROVEMENT PROJECTS

The New Development and Construction Requirements for Municipal Capital Improvement Projects Control Measure provides protocols to be followed in the design and construction phases of capital projects undertaken by the City. In essence, the City will follow the Development Standards and Construction Program Element requirements for all capital improvement projects (CIP), and obtain coverage under the General Construction Permit for projects greater than or equal to one acre in size.

4.4.1 Review CIP Designs to Ensure Specifications and Notes are Included

The City requires that all CIPs be reviewed by Municipal Utilities Department Engineering staff to ensure that the Construction BMPs and Stormwater Quality Control and Criteria Plan (SWQCCP) standards are incorporated during the design stage.

During the reporting period, Municipal Utilities Department Engineering staff reviewed all CIPs to ensure that the Construction BMPs and SWQCCP standards (when applicable) were incorporated during the design stage.

4.4.2 Require Submission of NOI for CIP Projects Greater than or Equal to One Acre

The City requires that CIP projects 1 acre or greater obtain coverage under the Construction General Permit.

The following table summarizes information for the reporting period regarding Notices of Intent (NOIs):

Total Number of Active Public Construction Sites	Total Number of Active Public Construction Sites ≥ 1 acre	Total Number of Active Sites that Submitted an NOI
11	7	7

4.4.3 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. During 2010-2011, only one (1) CIP was a priority project.

A summary of the CIPs reviewed during the reporting period is provided below.

Total Number of CIP that are Priority Projects	Total Number of CIP Priority Projects in Compliance with the SWQCCP
1	1

Summary of Approved Control Measures for CIP Projects

Type of Control Measure	Total Number Approved During the Reporting Period
General Site Design Control Measures (G1 – G4)	0
Site-Specific Source Control Measures (S1 – S8)	0
Treatment Control Measures (T1 – T13)	1
Total Projects¹	1

NOTE:

1. Total CIP priority projects reviewed and approved for SWQCCP requirements.

4.4.4 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 Capital Improvement Projects.

4.5 MO3 – POLLUTION PREVENTION AT CITY FACILITIES

The Pollution Prevention at City Facilities Control Measure addresses pollutants entering the storm drain system from City-owned facilities (e.g., corporation yard). To further the framework provided by this Control Measure, Facility Pollution Prevention Plans (FPPPs) will be developed and maintained for the City's facilities. The 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.

4.5.1 Assess Facilities to Determine if They Require Coverage under the General Industrial Permit

The City's Corporation Yard was previously covered under the General Industrial Permit. In June 2007, the Corporation Yard submitted a Notice of Termination (NOT) to the Regional Board. The basis for termination was two-fold:

- **Not Required to be Permitted.** Per an email from Leo Cosentini dated May 12, 2003, the facility is not required by federal regulations to be regulated by an industrial activities stormwater NPDES permit.
- **Regulated by Another Permit.** Discharge of storm water associated with industrial activity is specifically regulated by another general or individual NPDES permit. Order No. R5-2002-0181.

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 covered by the Permit requirements.

4.5.2 Modify SWPPP for Corporation Yard and Other Facilities into an FPPP

The City has not yet modified the SWPPP for the Corporation Yard and other facilities into an FPPP. This document is in progress, and many elements (e.g., maps, BMPs) have been updated. This performance standard was due to be completed by June 30, 2011, but it will be completed by June 30, 2012.

4.5.3 Implement SWPPP (FPPP) for Corporation Yard and other Facilities

Although the City has not yet modified the SWPPP for the Corporation Yard and other facilities into an FPPP, the City developed and has been implementing BMPs for a wide variety of activities at the Corporation Yard, including materials storage, equipment washing, and vehicle maintenance. The BMPs address spill control and illicit discharges. For instance, the equipment wash area runoff is collected in a self-contained pit. The material accumulated in the pit is treated as hazardous waste and is removed by Evergreen Environmental bi-annually. 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). The procedures include the following:

- All paved surfaces will be kept clear of debris
- Corp Yard to be swept two times per month with 10-foot clearance around catch basins
- Cover materials stockpiles
- Annually, change filters on September 1; inspect and clean filters on November 1, January 1, and March 1

Corporation Yard staff continues to maintain a map for trash and recycling bins/containers at the site and provide staff with a list of recyclable items. In addition, during the 2010-2011 reporting period, the Corporation Yard obtained an updated map of storm drain catch basins and a map of hazardous materials/waste storage and the spill kits that are available onsite. Staff added more spill kits and provided training on Environmental Management – SWPPP, SPCC, and Hazardous Waste. This training was presented by Steve Reichow of Network Environmental Services Inc. Corporation Yard staff have also been working with WGR Environmental, Health & Safety Consultants in producing a video for BMPs for stormwater pollution prevention.

During the 2010-2011 reporting period, Corporation Yard staff purchased an additional 24 Flo-gard plus catch basin inserts to more securely hold filters in place during maintenance activities, and to replace the less effective “fabric socks”.

The Facilities Maintenance Manager has shared with Project Managers and the Senior Facilities Maintenance Supervisor several BMPs for pressure washing City facilities. The Senior Facilities Maintenance Supervisor is aware of the requirements to not allow pressure washing wash water to discharge to the storm drain system.

4.5.4 Update FPPP on an Annual Basis

The City has not yet modified the SWPPP for the Corporation Yard and other facilities into an FPPP. This document is in progress, and many elements (e.g., maps, BMPs) have been updated. This performance standard was due to be completed by June 30, 2011, but it will be completed by June 30, 2012. Until the FPPP is created, there is no need to update it. After the FPPP is created, it will be reviewed and updated on an annual basis.

4.5.5 Review CIP Projects for Compliance with General Stormwater Requirements

The City reviews 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. During 2010-2011, no projects meeting this requirement were designed or planned.

4.5.6 Develop BMP Fact Sheets for Non-Emergency Fire Fighting Flows

The City developed a fact sheet identifying the BMPs that must be incorporated for non-emergency fire fighting flows (i.e., those from controlled or practice blazes during training exercises). Fire department activities are not generally considered significant sources of stormwater pollution, but some activities can result in the discharge of water containing pollutants that pose a threat to both human health and the quality of receiving waters if it enters the storm drain system. The two main types of fire department activities that pose potential problems are:

- Emergency Fire Fighting Flows and
- Non-Emergency Fire Department Activities

Although the Permit recognizes that emergency fire fighting flows (i.e., flows necessary for the protection of life or property) can enter the storm drain system, fire department personnel should follow general BMPs in order to minimize the impact of fire fighting flows to the environment. During the 2008-2009 reporting period, the City developed procedures and BMPs addressing emergency and non-emergency fire fighting flows, entitled, “Emergency and Non-Emergency Fire Department Procedures” (Appendix D-4 of the 2009 SWMP).

4.5.7 Distribute BMP Fact Sheets for Non-Emergency Fire Fighting Flows

The City of Stockton Fire Department routinely updates Standard Operating Procedures (SOPs) for training and proper handling of non-emergency fire fighting 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 the 2010-2011 reporting period, no changes were made to the Fire Department's training program.

4.5.8 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* (Appendix B-1 of the 2009-2010 Annual Report). An emergency event is considered to be a severe, natural or manmade disaster within the City, including any of the following:

- Earthquakes
- Floods
- Major power outages
- Major fires
- Radiological accidents/attacks
- Chemical accidents/attacks
- Biological accidents/attacks
- Terrorist attacks

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.

4.6 MO4 – LANDSCAPE AND PEST MANAGEMENT

The Landscape and Pest Management Control Measure ensures that the discharge of pollutants from the City's use and storage of fertilizers and pesticides is reduced to the MEP. Among other things, the BMPs promote the use of integrated pest management (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 City will serve as a positive example to citizens and prevent adverse impacts on the local water bodies.

4.6.1 Implement Pesticide and Fertilizer Application Protocol

The Water Quality Based Program aims to reduce pesticides entering urban runoff by implementing BMPs and IPM to minimize pesticide use. In support of its Pesticide Plan, the City developed and began to implement protocols for routine and non-routine use of pesticides and fertilizers. In general, the City follows these procedures:

- Chemicals are stored in a central facility, meeting OSHA, HAZMAT, and County Agricultural Commissioner's requirements by providing secure storage and spill control.
- Landscaping is performed to maintain a healthy landscape, and a regular fertilizer program ensures healthy turf.
- Pesticides are used as a last resort, conforming to a sound integrated pest management program.
- To maximize the benefit of applications, all chemicals are applied at the minimum dose while avoiding runoff and wind drift.
- Native plants and trees are used whenever possible to reduce water needs while promoting resistance to disease and pests.

In August 2008, the parks maintenance functions were transferred to Public Works. Maintenance of the golf courses remained under the Parks and Recreation Department, subsequently renamed Community Services. As of July 1, 2009, all park landscape maintenance tasks are contracted. Contract specifications call for parks to be fertilized two (2) times a year with an all purpose fertilizer that has broadleaf and crabgrass control, unless conditions indicate that another fertilizer should be used.

During the reporting period, the City implemented the pesticide and fertilizer application protocol (Parks and Recreation Department Landscape Management Procedures, Landscape Maintenance BMP MO-1) at park sites, landscaped medians, and golf courses. The City also implemented a pesticide application protocol for the detention basins maintained by the City's Storm Drainage Maintenance Assessment Districts. The Assessment Districts' basin maintenance is outsourced and completed under a contract with Odyssey Landscape, Inc. The City's contract with Odyssey Landscape specifies that the contractor shall use less toxic pesticide alternatives in accordance with IPM techniques and practices. In addition, any pesticide determined to cause cancer, birth defects, mutations, or other severe chronic health effects is banned from use. The contractor is required to supply a written pest control recommendation by a licensed pest control adviser for each material to be used at each site—for approval by the City of Stockton—and to keep a log of all chemicals and their quantities applied.

In addition, during 2010-2011, the City reevaluated how it requests and collects information **regarding fertilizer and pesticide application** from outside contractors on the maintenance done for City-owned parks and landscape medians and golf courses. Public Works requires contractors to submit pesticide, herbicide and fertilizer reports in an electronic format that is compatible with City software.

The following table summarizes information regarding the implementation of the **fertilizer protocols**:

	Total Number of Acres Treated with Fertilizers	Total Pounds of Nitrogen Applied	Total Pounds of Phosphorous Applied
Last Year 2009-2010	8 (Parks) ¹	5168 (Golf Courses) ¹	408 (Golf Courses) ¹
This Year 2010-2011	225 (Golf Courses) 51.3 (Parks)	9,273 (Golf Courses) 1,600 (Parks)	312 (Golf Courses) 600 (Parks)

Notes:

1. The acreage for Golf Courses treated with fertilizers, as well as information regarding fertilizer application at Parks, was not available from the contractors for 2009-2010.

A summary of the **pesticide** (e.g., herbicides, algaecides) applications is provided in the tables below:

	Total Number of Acres Treated with Pesticides
Last Year 2009-2010	N/A ¹
This Year 2010-202011	77 (Golf Courses) 646 (Parks)

4.6.2 Implement IPM Program

The City has 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.

During 2010-2011, the City contracted all landscape maintenance and weed control services. All current maintenance specifications require the contractor to comply with City Manager Administrative Directive P&R-03, Pesticides, Herbicides and Fertilizers. 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 Program¹ to determine the most effective and least toxic methods of pest control.

During 2010-2011, the City reevaluated how it requests and collects information regarding implementation of the IPM Program from outside contractors on the maintenance done for City-owned parks and landscape medians and golf courses. Specifications for all new contracts starting January 1, 2010, and later require the contractors to submit a written report by July 15 of the Integrated Pest Management practices, principles, and concepts and least toxic methods of pest control used during the previous year. The following table summarizes information regarding the implementation of the IPM program.

	Total Number of Acres Under the IPM Program
Last Year 2009-2010	N/A ¹
This Year 2010-2011	400 (Golf Courses) 112 (Parks)

Note: This information was not available from the contractors for 2009-2010.

The specific alternatives to pesticides that were employed by the pest control crews as a part of the implementation of the IPM program are listed below:

Weeds

- ☒ Hand weeding/hoeing
- ☒ Mulch for suppression
- ☐ Fabric for suppression
- ☐ Adjust mowing height
- ☐ Improve Drainage
- ☐ Flaming
- ☐ Landscape Design

Diseases

- ☐ Irrigation
- ☐ Plant Selection
- ☐ Pruning
- ☐ Fertilization
- ☐ Landscape Design
- ☐ Other_____

Insects

- ☐ Biological Controls
- ☐ Plant Selection
- ☐ Pruning
- ☐ Physical Removal
- ☐ Landscape Design

¹ www.ipm.ucdavis.edu

4.6.3 Develop Formal Document Describing IPM-Related Policies and Procedures

During 2009-2010, the City worked to formalize IPM protocols within an administrative directive. The *City Manager Administrative Directive P&R-03* (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.

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 the use Integrated Pest Management practices, principals, and concepts and least toxic methods of pest control to achieve the expected/specified results. Contractor is 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."

In 2010-2011, these protocols were utilized by City staff, as well as by contractors hired by the City.

4.6.4 Maintain and Expand Internal Inventory on Pesticide Use

The Water Quality Based Program aims to reduce pesticides entering urban runoff by implementing BMPs and IPM to minimize pesticide use. To evaluate its municipal pesticide use over time, the City will maintain and expand its internal inventory on pesticide use and continue to track pesticide use by the Department of Public Works.

A summary of total pesticide use (by active ingredient, when available) at City parks, golf courses, and detention basins is provided below.

Brand Name of Product(s) & EPA Number	Name of Active Ingredient	Total Amount of <u>Material</u> Applied in <u>2009-2010</u> (pounds)	Total Amount of <u>Material</u> Applied in <u>2010-2011</u> (pounds)
	2,4-D,2-ethylhexyl	21.42	15.8
	Azoxystrobin	11	10.4
	Chlorophenoxy	1.5	1.5
	Chlorothalonil	61.5	22.5
	Chlorpyrifos	0	7.875
	Copper Ammonium	0	0.588
Turf Supreme 16-6-8 plus Trimec, 2217-643-7001	<ul style="list-style-type: none"> • 2,4-dichlorophenoxyacetic acid; • (+)-(R)-2-(2 methyl-4-chlorophenoxy) propionic acid; • Dicamba: 3,6-dichloro-o-anisic acid 	5,800	10,000
Reward	Diquat dibromide	145	46.43
Dimension.25 w/DG PRO	Dithiopyr	4,856	0
	Ethephon	64.4	0.113
Fusilade	Fluazifop-P-butyl	0.5	0
	Fludioxonil	2.5	0
	Flumioxazin	15	0
	Flutolanil	49.7	70.7
<ul style="list-style-type: none"> • Round-up Pro, 524-475 • Round-up, 524-308 • Quali-Pro, Glyphosate T&O, 63220-6 • Ranger Pro, 524-517 • Prosecutor Professional Max, 100-1169 • Prosecutor Pro, 524-536-10404 	Glyphosate	1,900	46.43
	Imidacloprid	1.895	5.1
	Indoxacarb	0.188	0
	Lambda-cyhalothrin	0.1	0

Brand Name of Product(s) & EPA Number	Name of Active Ingredient	Total Amount of <u>Material</u> Applied in <u>2009-2010</u> (pounds)	Total Amount of <u>Material</u> Applied in <u>2010-2011</u> (pounds)
	Mefenoxam	1.875	7.94
	MSMA	3.75	21.1
Pre M AquaCap, 241-416-10404	Pendamethalin	157	0
	Pentachloronitrobenzene	102	0
	Prodiamine	15.75	24.375
	Propiconazole	1.625	11.65
	Propionic Acid	3.125	0
	Quinclorac	5.625	0
Speedzone, 2217-835	2,4-D, Carfentrasone-ethyl Mecoprop-p acid	0	18.81
Turflon Ester, 62719-258	Triclopyr, butoxyethyl ester	1.688	9
	Trifloxystrobin	1.5	0.75
	Trinexapac-ethyl	0.845	0.34
Turflan, 17545	<i>Not available</i>	0.38	0
	Total	13,225	10,321

4.6.5 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.

4.7 MO5 – Storm Drain System Maintenance

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.

4.7.1 Implement Storm Drain System Mapping

The City's Municipal Utilities Department implements an aggressive maintenance program for the storm drain system, including main lines, catch basins, and catch basin laterals. Records are maintained for numbers of catch basin grates and laterals unplugged, main lines unplugged, catch basins cleaned, catch basin laterals cleaned, main lines cleaned, and lines televised.

The City's GIS data were created in 1993 and have been maintained at MUD since then by entering new storm drain lines from improvement plans. The data are stored in the Geodatabase GIS format in a SQL Server database. 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. When the field crews find errors they notify City staff so the data can be corrected. The database is periodically updated with the latest information regarding new additions to the system.

4.7.2 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.

As of June 30, 2011, the City has a total of 16,217 catch basin laterals, 16,217 catch basins, and 622 miles of lines. Of the 16,217 catch basins, 13,024 are low priority catch basins that discharge to a storm pump station and 3,193 are catch basins that discharge to direct outfalls. Catch basins are cleaned if they are at 40% capacity. Catch basins that drain to receiving waters (without the use of a pump) are inspected annually and cleaned as necessary. All pump stations are cleaned out every other year, regardless of their priority; priority for cleaning is determined by the amount of debris at each station.

The table following is a summary of the City's prioritization:

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

4.7.3 Maintain and Annually Update Catch Basin Database

The City maintains and annually updates its catch basin database, which identifies catch basins and drainage areas. Catch basin cleaning is also tracked using work orders created by the database. The database information can be exported to GIS as needed.

4.7.4 Implement Catch Basin Maintenance Program

The City regularly cleans 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. During the reporting year, the City cleaned a total of 570 catch basins. This total includes the high priority catch basins, which are inspected once prior to the wet season (between August and October), as well as the low-priority catch basins, which were inspected and cleaned as necessary.

The following table summarizes the inspection and cleaning of high priority catch basins:

Total Number of High Priority Catch Basins Inspected Annually	Total Number of High Priority Catch Basins Cleaned
2,418	65

The following table summarizes the inspection and cleaning of low priority catch basins:

Total Number of Low Priority Catch Basins Inspected	Total Number of Low Priority Catch Basins Cleaned ¹
0	505

Note:

1. Total Number of Low Priority Catch Basins Cleaned = All Catch Basins Cleaned - Total Number of High Priority Catch Basins Cleaned

The following table summarizes information regarding overall storm drain system maintenance activities:

	Last Year 2009-2010	This Year 2010-2011
Total Length of Channel/Pipe Cleaned (linear feet) ¹	53,768	13,521
Total Amount of Material/Debris Removed From Catch Basins (tons)	15	33.6

Notes:

1. Total Length of Channel/Pipe Cleaned = All M41436 & M41428

4.7.5 Implement Pump Station Maintenance Program

The City 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 city has implemented the pump station maintenance program. The City inspects the pump stations annually and cleans them as necessary (a minimum of once every two years).

The following table summarizes the inspection of pump stations during fiscal year 2010-2011:

Total Number of Pump Stations	Total Number of Pump Stations Inspected
77	77

The following table provides a summary regarding overall pump station maintenance activities:

	Total Number of Pump Stations Cleaned	Total Amount of Material/Debris Removed (tons)¹
Last Year 2009-2010	12	181.03
This Year 2010-2011	5	8.66

Note:

1. Amount of debris removed is based on wet tonnage.

4.7.6 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 Programs. Throughout the winter and spring of 2009, City staff completed the development and release of a comprehensive bid for the routine inspection and maintenance of the City's five storm detention basins operated under maintenance assessment districts. A bid was released on April 24, 2009 with two sealed bids received and opened. A three-year contract was awarded on June 9, 2009 to the local firm, Odyssey Landscape Company, Incorporated.

The contract scope of work includes 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 contractor performed an initial extensive clean out of each of the original seven basins during the summer of 2009, and thereafter performed quarterly inspections and routine maintenance as needed, for a total of 13 site visits during the contract period.

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 maintenance of an eighth basin, the ProLogis Park at Duck Creek extended detention basin, began per the contract during Fiscal Year 2010-2011. Odyssey Landscape performed the first inspection and maintenance of the basin in August 2010. The operation and maintenance was then turned over to the Assessment District.

4.7.7 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. During the reporting period, a total of 18 site inspections and maintenance were performed on these basins. A total of 135.25 cubic yards of trash and debris was removed from these basins.

The Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1 now maintains three additional basins (Riverbend, Morada, and ProLogis Park at Duck Creek) that were developed to provide water quality control functions as well as flood control. During the reporting period, a total of 11 site inspections and maintenance were performed on these basins. A total of 71.5 cubic yards of trash and debris was removed.

A summary of detention basin inspections is provided below.

Total Number of Detention Basins	Total Number of Inspections Conducted After Significant Storms	Total Number of Regular Inspections Conducted
Flood Control Detention Basins: Arch Road Industrial, Stockton Airport Business Center, Western Pacific, Charter Way, and Stockton Airport Gateway (5)	0	18
Water Quality and Flood Control Detention Basins: Riverbend, Morada	0	11

The amount of trash, debris, and sediment removed from the forebays and detention basins is summarized below. Note that the total amount is not segregated between forebays and detention basins.

	Total Amount of Trash, Debris, and Accumulated Sediment Removed from the Forebays and Basins (tons) ¹
Last Year 2009-2010	Flood Control Detention Basins: 2,012 cubic yards Water Quality and Flood Control Detention Basins: 83 cubic yards + 50 pounds
This Year 2010-2011	Flood Control Detention Basins: 135.25 cubic yards Water Quality and Flood Control Detention Basins: 71.5 cubic yards

Note:

1. Tonnage was not available for 2009-2010 or 2010-2011.

4.7.8 Implement Notification Procedures for ID/IC and Missing Catch Basin Markers or Illegible Stencils

Catch basins are marked 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.

In 2003-2004, the City developed and implemented a protocol so that responsible staff can be notified of and respond to the following:

- Illegible inlet stenciling or missing markers (to be re-stenciled in 180 days)
- Evidence of illicit connections or discharges as discovered by municipal field crews (respond within 2 business days)

All of the catch basins installed since 2003-2004 have been required to be permanently imprinted in the sidewalk with the message "No Dumping – Flows to River" or "No Dumping – Flows to Delta".

The City has a total of 16,217 catch basins, all of which are stenciled or imprinted with the storm drain message. During 2010-2011, 2,254 catch basins were inspected by Collections crew, 855 were re-stenciled, and 152 catch basins were re-stenciled by volunteers.

4.7.9 Include Special Event Use Provisions in Special Use Permits

Periodically, special events occur at City 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. Because the intent of this performance standard is appropriately addressed through this process, the City will not update the MUD Directive (Appendix B-5 of the 2009 SWMP) to include Special Use Provisions for proper management of trash and litter.

During the reporting period, a total of five large events were required to address trash and debris removal, including the following:

- Stockton Asparagus Festival (Total: 27.77 tons; amount recycled: 4.8 tons)
- Cinco de Mayo (Total: 2.1 tons)
- Earth Day (Total: 1.1 tons; amount recycled: 0.4 tons)
- California Coastal Clean-Up Day (Total: 4.86 tons removed among all sites)
- Family Day in the Park (Total: 0.5 tons; amount recycled: 0.2 tons)

4.7.10 Treatment Feasibility Study

The City and County were required by the second term Permit to evaluate the feasibility of diverting dry weather discharges from the storm drainage system to the City's Regional Wastewater Control Facility (RWCF) or, alternatively, to provide treatment of dry weather discharges using BMP treatment controls. Using a prioritization process, each outfall in the storm drain system was analyzed to determine the feasibility for dry weather discharge diversion opportunities. The prioritization effort is summarized in the table below.

Watershed	Outfall Name	Outfall ID	Outfall Type	Treatment Option	Prioritization Score
Recommended for 10% design assessment					
5-Mile Creek	Swenson & 5-Mile Creek P.S.	5M-27	Pump	Diversion	51
Calaveras River	Brookside & I-5 P.S.	CR-40	Pump	Diversion	53
	Sutter & Calaveras River P.S.	CR-45	Pump	Diversion	49
	Holman & Calaveras River P.S.	CR-48	Pump	Diversion	46
Mosher Slough	Mariner & Mosher Slough P.S.	MS-13	Pump	Diversion	53
	Kelly & Mosher Slough P.S.	MS-14	Pump	Diversion	49
San Joaquin River	Eighth Street & San Joaquin River P.S.	SJ-61	Pump	Diversion	47
Walker Slough	Turnpike & Walker Slough P.S.	WK-64	Pump	Diversion	50

The Treatment Feasibility Study Report describing these efforts was submitted to the Regional Water Board in April 2006. Based on the results of the Treatment Feasibility Study, the City prepared four preliminary design reports during the 2008-2009 reporting period for the prioritized outfalls in the order of prioritization.

The name of the CIP Project that the City is currently designing to divert the feasible portion of summer flows into sanitary sewer is called "Connection of Storm Pump Stations to Sanitary System, Project No. M04016".

There were initially four stormwater pump stations selected based on the April 2006 Treatment Feasibility Study and the March 2006 "Feasibility of Discharging Stormwater Summer Flows to the Sewer System" report prepared by CXS Consulting, Inc. The four selected Pump Stations were as follows:

- Alexander & 14-Mile Slough Pump Station
- Swenson & 5-Mile Creek Pump Station
- Mariner & Mosher Slough Pump Station
- Kelly & Mosher Slough Pump Station

The City's design consultant, Peterson-Brustad, Inc., submitted a Draft Pre-Design Report in June 2009, as well as a Pre-Design Report, Revision 2, in August 2009. The August 2009 Pre-Design Report was included as Appendix D-3 of the 2008-2009 Annual Report and contains proposed retrofit details as well as the proposed operations.

Following review of the June 2009 Draft Pre-Design Report, it was decided that both the Alexander & 14-Mile Slough Pump Station and Kelly & Mosher Slough Pump Station should be removed from the scope of this project. The Alexander & 14-Mile Slough Pump Station receives only overflows from the Quail Lake sub-division. The runoff flowing through this lake is treated through natural, physical, and biological processes. Therefore, it was not necessary to divert the subject flows into the sanitary system. In the case of Kelly & Mosher Slough Pump Station, it was determined that there was not enough

capacity in the existing 12" sanitary pipe to safely divert the summer flow from this pump station. Replacing the existing pipe with a larger one was not considered to be cost effective.

Therefore, the City decided to add the Stockton Airport Business Center Pump Station from the existing list of feasible pump stations in place of the two eliminated above. This pump station is included in the August 2009 Pre-Design Report.

Watershed	Outfall Name	Outfall ID	Outfall Type	Treatment Option	Prioritization Score
Little John Creek	Stockton Airport Business Center P.S.	LJ-80	Pump	Diversion	43

In April 2010, Peterson.Brustad, Inc., the City's design firm completed the design of this project. It consists of three outfalls: Swenson & 5-Mile Creek Pump Station, Mariner & Mosher Slough Pump Station, and Stockton Airport Business Center Pump Station. The project was advertised and received three bids on May 13, 2010. On June 29, 2010, the City authorized the construction of this project. The construction of the two pump stations, Mariner / Mosher Slough and Stockton Airport Business Park was completed on April 30, 2011, and the third one, Swenson Park / 5-Mile Creek Pump Station is expected to be complete in August 2011.

The preliminary design reports will not be completed. Per recommendation made in the CXS Consulting, Inc. report dated March 2006 (Feasibility of Discharging Stormwater Summer Flows to the Sewer System), the four remaining outfalls in the recommended feasible list—Sutter & Calaveras River Pump Station, Holman & Calaveras River Pump Station, 8th St. & San Joaquin River Pump Station, and Turnpike & Walker Slough Pump Station—were evaluated and determined to be technically infeasible. This group of pump stations was classified as Category B, or cost-prohibitive, because they would require installation of discharge pipes spanning a long distance between the pump station and the outfall, as well as new summer pumps and associated electrical components.

4.8 MO6 – STREET CLEANING AND MAINTENANCE

The Street Cleaning and Maintenance Control Measure ensures that City streets are maintained and cleaned to reduce pollutants to the MEP. In conducting the Control Measure, the City 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 City maintains a long-term contractual relationship with two major waste haulers to conduct this work effort.

4.8.1 Implement Street Sweeping Program

The City implements a street sweeping program. 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 of Stockton, Republic (formerly Allied Waste) and Waste Management, Inc., and is sub-contracted out to Universal Sweeping.

The following table summarizes the street sweeping activities conducted during the reporting period:

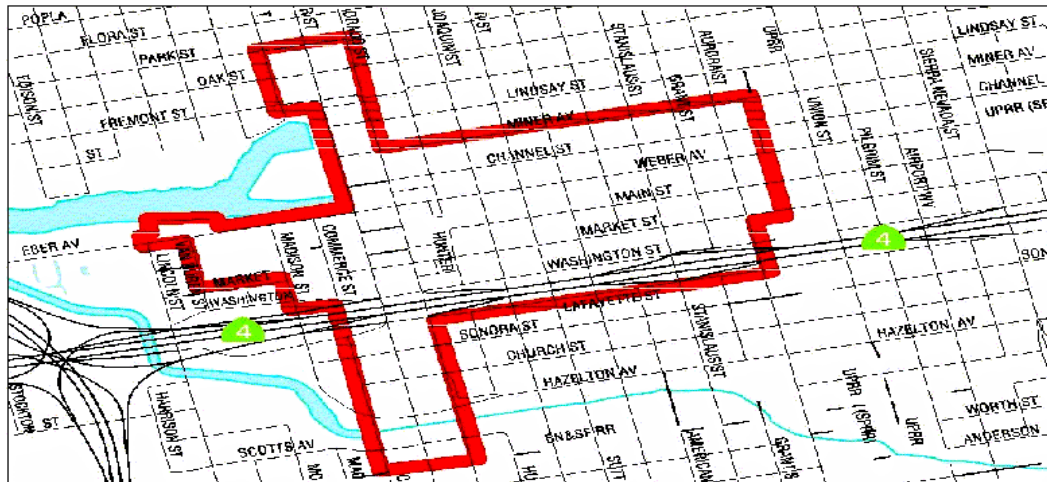
	Total Miles Swept	Total Amount of Debris Removed by Street Sweeping (tons)	Total Amount of Green Waste Collected (tons)
Last Year 2009-2010	47,794	5,445	75,775
This Year 2010-2011	47,654	6,039	50,727

4.8.2 Review/Revise Prioritization of Streets for Street Sweeping Program

At the time the first term permit was drafted, the City swept with its own staff and equipment. Due to lack of funding, sweeping was minimal; streets often were only swept once a month. The Regional Water Board incorporated the concept of prioritization so that the City could prioritize sweeping locations and frequency to adequately address specific areas of the City.

The City currently has 15-year franchise agreements Allied Waste and Waste Management, Inc. which responsible for street sweeping (see Exhibit H, Street Sweeping and Leaf Collection, included as Appendix D-4 of the 2008-2009 Annual Report). 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 downtown street sweeping area is depicted below.



DOWNTOWN STREET SWEEPING AREA

January 15, 2004



Street Sweeping is Conducted Every Other Week in Residential Areas

4.8.3 Implement Green Waste Collection Program

As part of the Water Quality Based Programs, the City maintains a program to pick up 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. In addition to weekly green waste collection, residents are provided with additional green waste services (e.g., Christmas tree collection, leaf service during “Leaf Season”) at no additional charge. Additional green waste carts are available, upon demonstrated need, at no additional charge.

During the reporting period, the City continued to implement the green waste collection program through its 15-year franchise agreements with waste haulers, Waste Management and Allied Waste.

4.8.4 Update Maintenance Staff Guide – Road Maintenance and Small Construction BMPs

During 2009-2010, the City updated its *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs* to refer primarily to California Stormwater Quality Association (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.

4.8.5 Implement Maintenance Staff Guide – Road Maintenance and Small Construction BMPs

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 *Maintenance Staff Guide* was originally developed in 2004-2005, and the City continues to implement the BMPs. Public Works – Operations and Maintenance has an established pavement maintenance program that addresses the removal and proper disposal of pavement material, paint residue, and other construction waste. A street sweeper is permanently assigned to each road crew to facilitate daily clean-up of debris, at a minimum, with more frequent clean-up activities conducted as needed.

During 2009-2010, the *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs* was updated, and the updated version has been distributed to City staff. The *Maintenance Staff Guide – Road Maintenance and Small Construction BMPs* were implemented by staff in 2010-2011.

4.9 MO7 – Parking Lots Maintenance

The Parking Lots Maintenance Control Measure ensures the City's 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 City maintains a long-term contractual relationship with two major waste haulers, Waste Management and Republic (formerly Allied Waste), to conduct this work effort.

4.9.1 Implement BMPs for Parking Lot Cleaning

The City maintains several parking lots. A Parking Lot Cleaning BMPs Fact Sheet (included as Appendix D-7 to the 2009 SWMP) was developed and is currently implemented by the City.

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. During 2009-2010, MUD Stormwater 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.

In 2010-2011, the following garage and oil/sand separator cleanings took place:

- SEB Garage cleaned 8/17/10 thru 8/24/10
 - Oil/sand separator cleaned 8/26/10
- Channel St Garage cleaned 7/21/10
- Market St Garage cleaned 7/26/10-7/29/10
 - Oil/sand separator cleaned 8/11/10

4.9.2 Inspect City-Owned Parking Lots Annually

The City's Central Parking District is responsible for operations and maintenance of city-owned parking lots and parking structures. A summary of the city-owned parking lots and parking structures is provided below.

- 5 parking structures in the downtown area
- 15 flat parking lots in the downtown area
- 16 park sites throughout the City
- North Police Department facility

4.10 MO8 – TRAINING

Training is important for the implementation of the Municipal Operations Program Element. An effective training program 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.

Areas of Focus for the Municipal Operations Program Element Training

Target Audience	Format	Subject Material	Comments
<ul style="list-style-type: none">• Maintenance crews• Road crews• Street sweepers• Parking Facilities crews• Waste Pickup• Parks & Rec crews• Pesticide/fertilizer applicators• Contract/lease staff involved in above activities	<ul style="list-style-type: none">• Classroom• Field demos• Tailgate sessions	<ul style="list-style-type: none">• Overview of stormwater management• BMPs for municipal operations	<ul style="list-style-type: none">• Pesticide applicators must also attend annual pesticide application classes

4.10.1 Conduct Training

Although the City did not develop and provide three to four training workshops to address the training elements outlined in the SWMP, City staff attended trainings during the 2010-2011 reporting period, as detailed below.

A summary of the training sessions held is provided below.

Date of Training	Title of Training Module	Number of Attendees	Staff Positions Trained	Trainee City Departments or Divisions
5/23/2011	SSO Emergency Response Plan	5	Collection System Operators	Collections Department
1/24/2011	Hazardous Waste Training (Refresher)	1	Public Works Safety/Training Officer	O&M Environmental Staff
3/15/2011	SPCC Plans for APSA Sites	3	Supervising Mechanic Fleet Manager Project Manager	O&M Environmental Staff
3/22/2011	Basic Auto Industry Hazardous Waste	6	Fleet Light Mechanic Fleet Heavy Mechanic Fleet Manager Supervising Mechanic Project Manager	O&M Environmental Staff
3/30/2011	Underground Storage Tank System	11	Fleet Heavy Mechanic Fleet Light Mechanic Fleet Body and Painter Supervising Mechanic Fleet Manager Project Manager	O&M Environmental Staff

Date of Training	Title of Training Module	Number of Attendees	Staff Positions Trained	Trainee City Departments or Divisions
4/26/2011	SPCC for APSA Sites	2	Public Works Safety/Training Officer Program Manager III	O&M Environmental Staff
5/11/2011	SWPP, SPCC, & Hazardous Waste	63	Administrative Aid II Auto Body and Painter Craft Maintenance Worker Electrician Engineering Technician II Fleet Fire Mechanic Fleet Heavy Mechanic Fleet Light Mechanic HVAC Mechanic Landscape Maintenance District Coordinator Maintenance Repair Technician II Maintenance Worker Office Assistant Parks Inspector Plummer Program Manager III Project Manager Public Works Safety/Training Officer Public Works Supervisor Sr. Facilities Supervisor Sr. Maintenance Repair Technician Sr. Traffic Signal Electrician Supervising Mechanic Traffic Signal Electrician Tree Supervisor Tree Worker Welder Fabricator	Environmental Management Corporation Yard
6/7/2011	Basic Hazardous Waste Compliance	3	Office Assistant Public Works Safety/Training Officer Project Manager	O&M Environmental Staff

4.11 MO9 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Municipal Operations Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Municipal Operations Program, the assessment primarily focused on Outcome Levels 1-4.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the 2009 SWMP?
- Outcome Level 2 (L2) answers the question: Can the City demonstrate that the control measure/performance standard significantly increased the awareness of a target audience?
- Outcome Level 3 (L3) answers the question: Can the City demonstrate that the control measure/performance standard significantly modified the behavior of a target audience?
- Outcome Level 4 (L4) answers the question: Can the City demonstrate that the control measure/performance standard reduced the load from sources to the storm drain and/or receiving water?

The table below summarizes the effectiveness assessment that was conducted for the Municipal Operations Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Municipal Operations

Municipal Operations	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
MO1 - Sanitary Sewer Overflow and Spill Response	C – Implementation of SSOERP C – Review/Revise SSOERP	N/A	N/A	N/A
MO2 - Construction Requirements for Municipal Capital Improvement Projects	C – Reviewed CIP Designs C – Require Submission of NOI C - Ensured CIP Priority Projects are Developed in Conformance with the SWQCCP C - Improved Interdepartmental Communication	N/A	C – NOIs submitted	N/A
MO3 - Pollution Prevention at City Facilities	C – Assessed Facilities C - Implemented SWPPP for Corporation Yard C – Reviewed CIP Projects C – Developed/Distributed BMP Fact Sheets for Non-Emergency Fire Fighting Flows C – Developed Procedures to Address Emergency Events	N/A	N/A	N/A
MO4 - Landscape and Pest Management	C – Landscape and Pest Management Protocols C – Developed Formal IPM Policies Document	N/A	N/A	A

Municipal Operations	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
MO5 - Storm Drain System Maintenance	C – Storm Drain Maintenance Program C – Pump Station Maintenance Program C – Detention Basin Maintenance Program C – Catch Basin Marker Maintenance C – Treatment Feasibility Study C – Implement Special Event Use Provisions for Trash and Debris Removal	N/A	A	C – Materials Removed
MO6 - Street Cleaning and Maintenance	C – Street Sweeping Program C – Green Waste Program C – Updated Maintenance Staff Guide C – Implemented Maintenance Staff Guide	N/A	N/A	C – Materials Removed
MO7 - Parking Lots Maintenance	C – Parking Lot Maintenance	N/A	N/A	N/A
MO8 - Training	C – Staff Attended Training	A	A	N/A

C – An effectiveness assessment was conducted during fiscal year 2010-2011

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

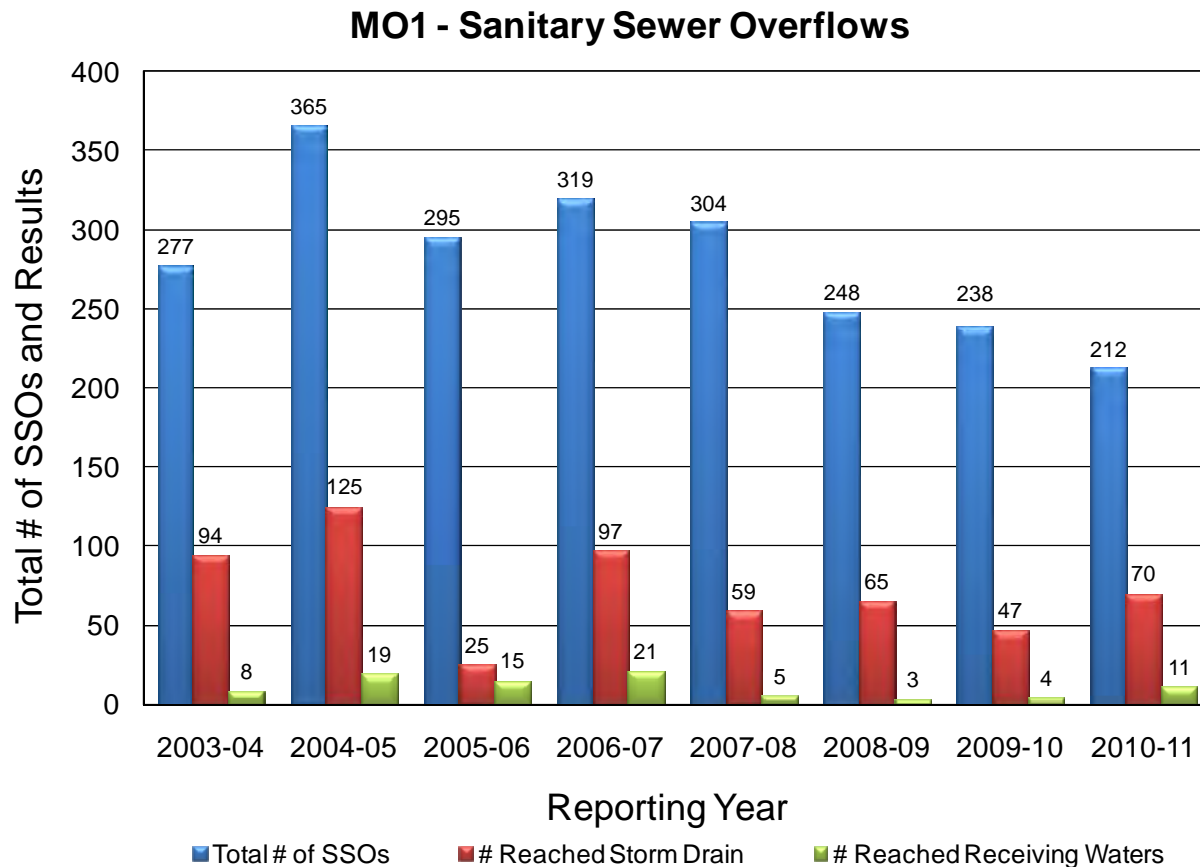
N/A – This outcome level is not applicable for this control measure

Following is an assessment regarding the effectiveness of the Municipal Operations Program.

MO1 - Sanitary Sewer Overflow and Spill Response

The City developed and continues to implement the sanitary sewer overflow response plan, respond to sanitary sewer overflows and, when possible, prevent the spills from entering the storm drain system and/or the receiving waters. The City will also review and revise the SSORP 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 number of SSOs per year.

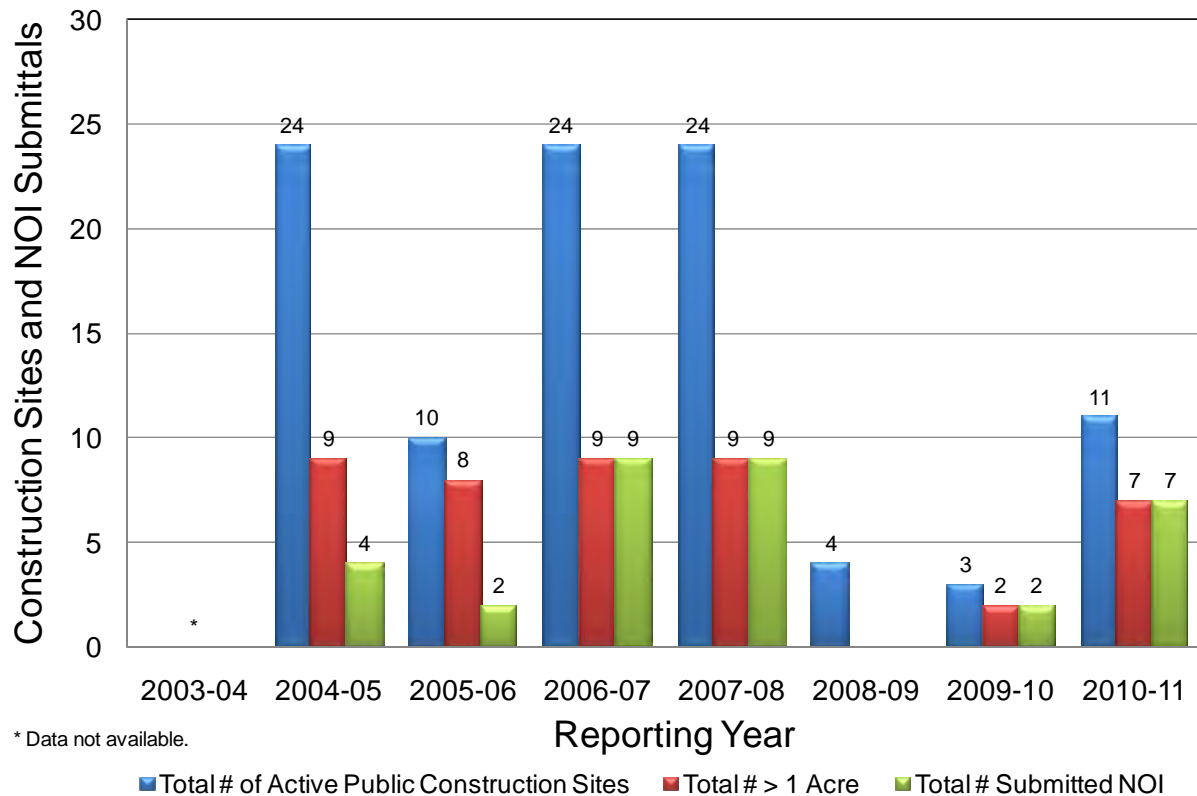


MO2 – Construction Requirements for Municipal Capital Improvement Projects

City staff have reviewed the capital improvement projects (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)

MO2 - Active Construction Sites and Submittals of NOIs



MO3 – Pollution Prevention at City Facilities

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 stormwater pollution prevention plan (SWPPP). **(L1)**

The City developed and distributed procedures and BMPs addressing emergency and non-emergency fire fighting flows. The City also developed and distributed procedures to address emergency events. **(L1)**

MO4 – Landscape and Pest Management

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.

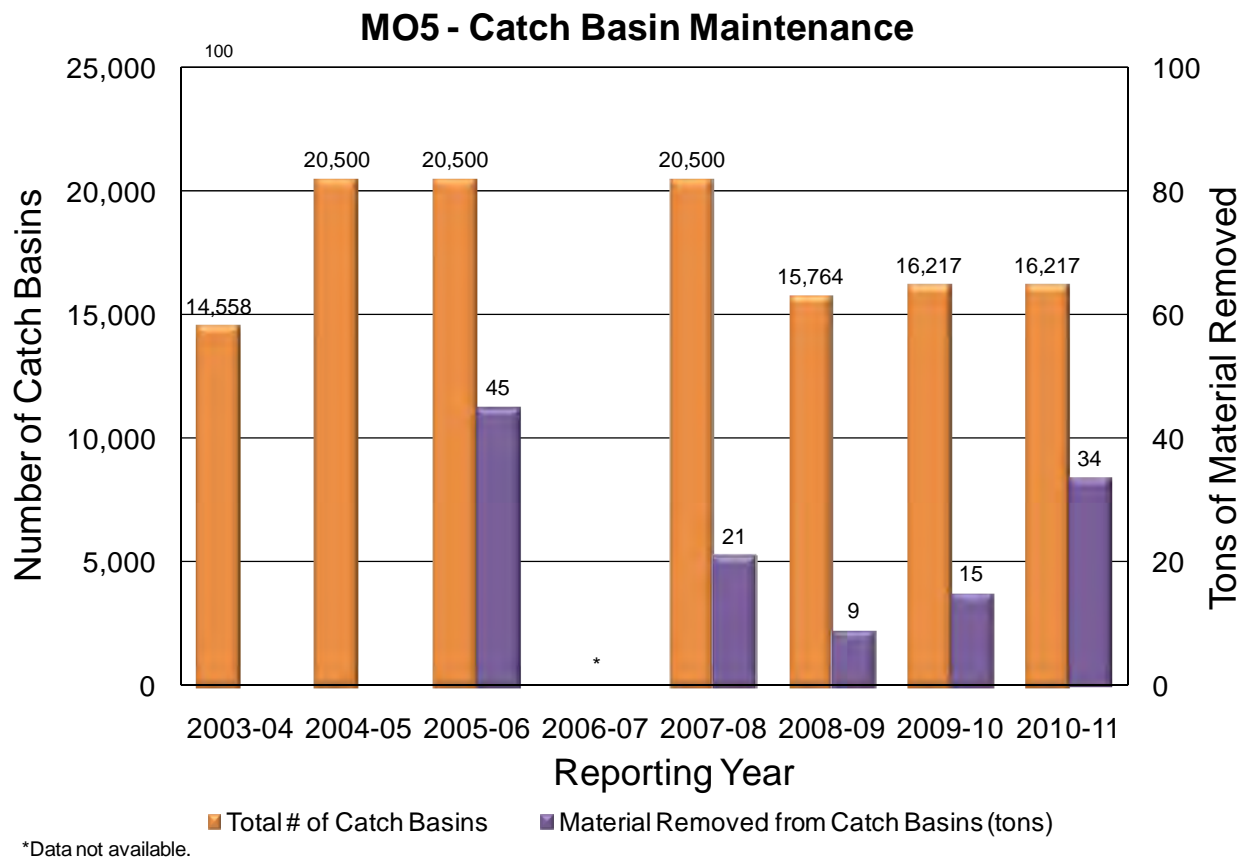
MO5 – Storm Drain System Maintenance

City staff remains responsive to the stormwater program and continues to implement the programs to maintain the storm drain system, including the following: **(L1)**

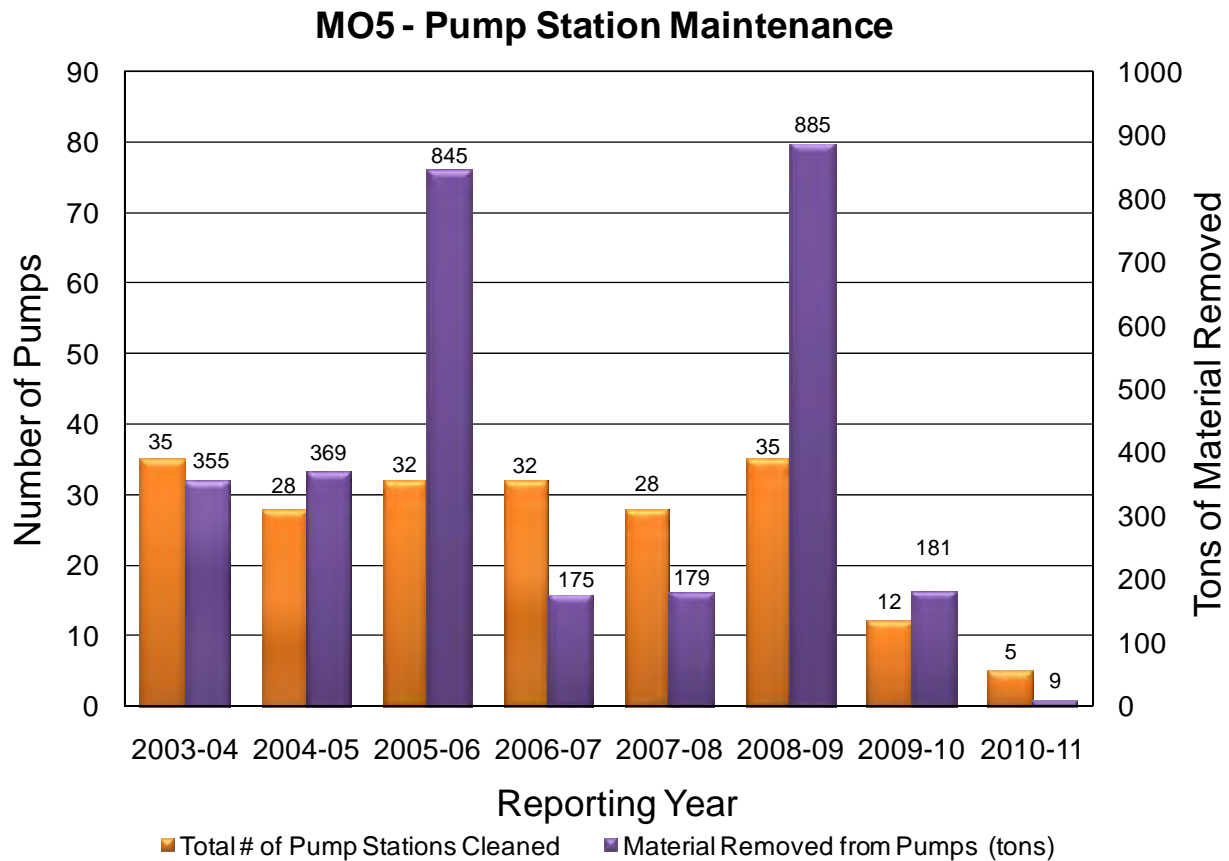
- Storm Drain System Mapping
- Catch Basin Maintenance
- Pump Station Maintenance
- Detention Basin Maintenance
- Catch Basin Marker/Stencil Maintenance

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. During the current reporting year, the City inspected 2,418 high priority catch basins and cleaned a total of 65 high priority catch basins. Since 2005, approximately 124 tons of materials have been removed from catch basins. Data are not available for 2006-2007. (L4)



- Pump Station Maintenance – The City has inspected pump stations annually and removed approximately 2,997 tons of mud and debris since 2003. (L4)



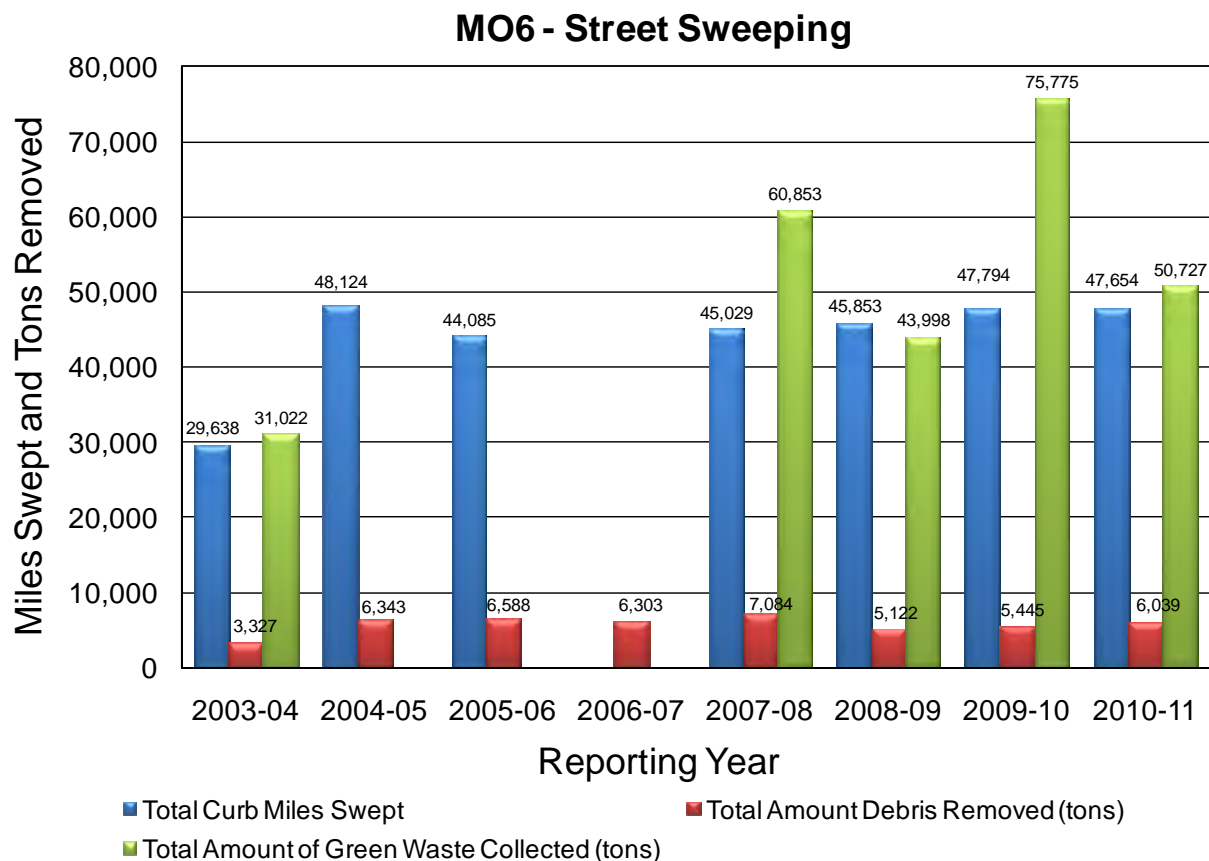
The City is requiring large events (as well as large venues) to address trash and debris removal, including containerization and street sweeping as appropriate. During 2010-2011, a total of five (5) large events were required to address trash and debris removal, resulting in collection and proper disposal of more than 35 tons of trash and debris. (L1, L4)

The City completed a Treatment Feasibility Study and a Pre-Design Report (August 2009) for those pump stations deemed feasible. Project design for three outfalls was completed in April 2010, and construction was authorized in June 2010. The construction of the two pump stations, Mariner/Mosher Slough and Stockton Airport Business Park, was completed on April 30, 2011, and the third one, Swenson Park / 5-Mile Creek Pump Station is expected to be complete in August 2011. (L1)

MO6 – STREET CLEANING AND MAINTENANCE

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.

MO7 – PARKING LOTS MAINTENANCE

All City-owned parking lots in the permit area have been identified (37 total in 2010-2011). (L1)

MO8 – TRAINING

Key City staff (89 total) participated in a total of eight (8) trainings to enhance their understanding of appropriate BMPs and stormwater-related issues. (L1)

4.12 MUNICIPAL OPERATIONS PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Municipal Operations Program. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

The program modifications that will be made to the Municipal Operations Program during the next fiscal year include the following:

- **Modify SWPPP for Corporation Yard and Other Facilities into an FPPP.** This document is in progress, and many elements (e.g., maps, BMPs) have already been updated. The FPPP was due to be completed by June 30, 2011, but it will be completed by June 30, 2012.
- **Update FPPP on an Annual Basis.** As noted above, the FPPP will be completed by June 30, 2012. After the FPPP is created, it will be reviewed and updated on an annual basis.

Section 5

Industrial and Commercial (IC)

5.1 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. Due to the similarities in the industrial and commercial programs, the two programs have been combined into one Program Element. In addition to program similarities, the industrial and commercial land uses within the City are, in general, located in close proximity to each other, often in the same watersheds or sub-watersheds.

5.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that the industrial and commercial business-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Industrial and Commercial Businesses Program Control Measures consist of the following:

Control Measures for the Industrial and Commercial Program Element

IC	Control Measure
IC1	Facility Inventory
IC2	Prioritization and Inspection
IC3	Industrial/Commercial Outreach
IC4	Enforcement
IC5	Training
IC6	Effectiveness Assessment

5.3 IC1 – FACILITY INVENTORY

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 to impact water quality. Information for the database is primarily obtained from new business licenses and sanitary sewer hook-up permits. The inventory provides the basis for prioritization of facilities within the City and serves as a repository for all outreach, inspection, and notices for each facility.

5.3.1 Perform Internal Audit of Database

The City reviews the commercial and industrial database prior to the start of each inspection round.

5.3.2 Maintain and Annually Update the Industrial and Commercial Facility Inventory

The City maintains an inventory of industrial and commercial facilities, including those covered under the state Industrial General Permit that are within its jurisdiction. The City utilizes information provided by the Regional Water Board, Business License, and County Health to obtain current facility numbers prior to scheduled inspections. These data were compiled during the 2009-2010 inspection round, which was completed by June 30, 2010, and will be updated during the next round of inspections during 2011-2012. The inventory was included as Appendix E-1 of the 2009-2010 Annual Report.

A summary of the information tracked by the inventory/database is provided below.

Category	Current Inventory ¹	Total Number of Facilities To Be Inspected
Industrial Facilities	121	121
Commercial Facilities (Significant Sources)	1,235	0

NOTES:

1. These are the most recent data based on inventory numbers determined after the completion of the last round of inspections during 2009-2010.

A summary of the Commercial Facilities (Significant Sources) by category is provided below.

Category	Current Inventory
Auto Body Shops	47
Auto Dealers	61
Auto Repair Shops	217
Dry Cleaners/Laundromats	33
Equipment Rentals	14
Kennels	7
Nurseries	10
Restaurants	766
Retail Gasoline Outlets	64
Other ¹	16
Total	1,235

Note:

In 2009-2010, a total of 16 Auto Washing & Detailing facilities were inspected.

5.3.3 Map Industrial and Commercial Facilities

Although the City does not map the industrial and commercial facilities on an annual basis, it does utilize information provided by the Regional Water Board, Business License, and County Health to obtain current facility numbers, addresses, and other identifying information prior to scheduled inspections. These data are included in the inventory, included as Appendix E-1 of the 2009-2010 Annual Report.

5.3.4 Develop a Mobile Business Pilot Program

During the 2009-2010 reporting period, the City and County developed a mobile business pilot program for one mobile business category deemed to be a potentially significant source and included all mobile business within this category in the inventory.

The category chosen for the pilot program was carpet cleaners. The *Mobile Business Pilot Program: Carpet Cleaners Implementation Strategy* (Appendix E-2 of the 2009-2010 Annual Report) identifies how the various components of the carpet cleaner pilot program (pilot program) will be implemented. The strategy addresses inventory, inspections, outreach/education, and enforcement. The carpet cleaner inventory (Attachment A of Appendix E-2 of the 2009-2010 Annual Report) includes carpet cleaners located within the San Joaquin County area—those most likely to operate within the jurisdictions of the City and Phase I area of the County. The pilot program serves as a template for the potential development of implementation strategies for other mobile business categories.

5.3.5 Implement a Mobile Business Pilot Program

The City implemented a mobile business pilot program for one mobile business category deemed to be a potentially significant source of pollutants. Although the mobile business pilot program was due to begin by January 1, 2010, the program was developed later in the 2009-2010 fiscal year. Thus, the City began implementing the pilot program for carpet cleaners in 2010-2011.

The County verified the information in the inventory on the City's behalf by calling each business to verify that each is in business and provides carpet cleaning services in the Stockton Urbanized Area (SUA). To ensure that the information for the mobile cleaner inventory is accurate and up-to-date, the County contacted each business during the week of January 5, 2011, to verify their business category, service area, and contact information (i.e., missing addresses, phone numbers). Those not operating within San Joaquin County were removed from the inventory.

5.4 IC2 – PRIORITIZATION AND INSPECTION

The Prioritization and Inspection Control Measure establishes procedures for prioritizing industrial and commercial facilities within the City for inspection 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 the City ordinances, and unauthorized non-stormwater discharges do not occur. Inspection of facilities covered under the state Industrial General Permit also ensure that the operator has a current Waste Discharge Identification (WDID) number, the SWPPP is available on site, and the operator is effectively implementing BMPs in compliance with City ordinances.

5.4.1 Prioritize Facilities

The City prioritizes all industrial facilities and the significant sources for commercial facilities (e.g. auto body shops, nurseries, kennels, etc.) as high priority and inspects each facility twice during the five-year Permit cycle. If the City encounters a new industrial or commercial facility that may pose a threat to water quality, the City will evaluate the business using the evaluation criteria and ranking system that has been developed.

A summary of the prioritizations is provided below. The information is current as of June 30, 2010.

Category	Total Number of Facilities Prioritized As High	Total Number of Facilities Prioritized As Low
Industrial Facilities	121	0
Commercial Facilities	1,235	0

5.4.2 Evaluate the Prioritization Criteria and Incorporate Exceedances of Water Quality Benchmarks as Criteria for Prioritizing Industrial Facilities

The City evaluated the prioritization criteria (see technical memorandum, *Industrial Facility Prioritization Criteria*, Appendix E-3 of the 2009-2010 Annual Report) and incorporated exceedances of the water quality benchmark data as criteria for prioritizing the industrial facilities.

During the 2009-2010 reporting period, the City of Stockton used benchmark data provided by the Regional Water Board for 2007-2008 and 2008-2009 to prioritize the industrial inspections. Facilities that received multiple compliance inspections due to violations or BMP issues—or that had benchmark exceedances during both years, based on reports received from the Regional Water Board—were prioritized so inspections for these facilities were completed first. A total of 35 industrial facilities met this criteria and were inspected before the remaining 86 industrial facilities.

The same process will be followed for the next round of inspections, scheduled to begin July 1, 2011.

5.4.3 Inspections

The City ordinance allows authorized officers to enter any property or building to perform inspections. On refusal to allow inspection by the owner, tenant, occupant, agent or other responsible party, the City may seek an Administrative search warrant.

In order to ensure that the inspectors conduct thorough and consistent inspections, industrial and commercial checklists have been developed. City industrial inspectors receive proper training to adequately assess facilities and offer assistance in suggesting remedies. City ordinances and City Attorney's Office also provide the proper legal backing for inspections and any necessary enforcement.

Review/Revise the Industrial Inspection Checklists as Needed

The industrial inspection checklist was reviewed and revised prior to the 2009-2010 inspections. The revised checklist was provided as Appendix E-4 to the 2009-2010 Annual Report.

Review/Revise the Commercial Business-Specific Inspection Checklists as Needed

Prior to the 2009-2010 commercial facility inspections, the City reviewed the kennel-specific checklist and determined that critical areas within kennel facilities that have a significant potential to discharge a pollutant for which there is a water quality based plan (i.e., pathogens) are inspected. In addition, general updates were made to the commercial inspection checklists. The commercial checklists used during 2009-2010 were provided as Appendix E-5 to the 2009-2010 Annual Report.

Prior to the next round of inspections that are scheduled to be completed during 2011-2012, the City will review/revise the commercial business-specific checklists as needed to ensure that critical areas within facilities that have a significant potential to discharge a pollutant for which there is a water quality based plan are inspected. In particular, vehicle maintenance and repair and restaurant and food service facility checklists will be reviewed/revised to include mercury information and conformance to Universal Waste Rule standards, and the nursery checklist will be reviewed/revised to include an IPM-related item (Water Quality Based Programs Performance Standard).

Revise Industrial and Commercial Inspection Evaluation Checklists to Include Mercury Handling and Disposal Procedures

During the 2009-2010 reporting period, the City revised the industrial inspection checklist to include two questions pertaining to mercury (Water Quality Based Programs Performance Standard) (Appendix E-4 to the 2009-2010 Annual Report). During the industrial inspections, the following questions were asked:

- Does the business have a mercury management, reduction, and elimination plan?
- Are mercury-containing devices present which show evidence of leakage, spillage, or damage that could cause leaks?

Prior to the next round of inspections that are scheduled to be completed during 2011-2012, the City will revise the commercial inspection evaluation checklists to include discussion of mercury-containing products, along with proper handling and disposal procedures.

Inspect High Priority Industrial and Commercial Facilities Twice during Permit Term

During the 2009-2010 reporting period, all commercial and industrial facilities that were still in business and inspected during the last round of inspections were re-inspected during this round. The City will continue to inspect high priority industrial and commercial facilities twice during the Permit term. If the inspection reveals that there is no risk of exposure of the commercial/industrial activities to stormwater at a facility, the facility may be dropped from the high priority list. At least one year will elapse before the second inspection. The next round of inspections is scheduled to begin July 1, 2011.

During 2010-2011, the City conducted unscheduled inspections of a total of nine (9) industrial facilities either at the request of the RWQCB (due to being in violation of their state-issued permits) (three (3) facilities) or in response to complaints (six (6) facilities). Enforcement actions were issued as necessary. A summary of the industrial inspections conducted during the reporting period is provided in the table below.

High Priority Industrial Facility Inspection Summary (2010-2011)

Inspection Cycle	Total Number of Industrial Facilities Requiring Inspection ¹	Total Number of Industrial Facilities Inspected		Inspection Results		
		By <u>City</u>	By <u>RWQCB</u>	Number of Facilities with SWPPPs On Site	Number of Facilities Adequately Implementing BMPs	Number of Facilities in General Compliance with Stormwater Control Requirements
First Cycle 2009-2010	121	121	4	98	94	94
2010-2011	N/A	9	N/A	6	1	2
Second Cycle 2011-2012	N/A	N/A	N/A	N/A	N/A	N/A

The commercial facilities considered to be temporary or intermittent sources are not significant sources of pollutants in stormwater. The City inspects these facilities on an as-needed basis. An inspection is performed only if (1) there is a complaint filed; (2) a phone call is received regarding the discharge of potential pollutants into storm drain from these facilities; or (3) City field staff identifies a suspicious discharge.

During 2009-2010, the City updated the waste categories it uses to categorize illicit discharges. During 2010-2011, the City utilized the updated waste categories, as described in Section 2, to specifically track illicit discharges from these commercial sources.

Under the new system, each illicit discharge is tracked by facility type, activity causing the illicit discharge, and updated waste categories. The facility types to be tracked will incorporate subcategories of commercial facilities, including those considered to be temporary or intermittent sources, as listed below:

- Automotive washing and detailing
- Carpet cleaners
- Commercial pesticide applicators
- Concrete pouring contractors
- Concrete cutting contractors
- General building contractors
- Landscape installation / maintenance contractors
- Painting contractors
- Portable toilet rental and maintenance
- Pressure washers
- Street sweepers
- Swimming pool contractors
- Swimming pool maintenance
- Other

Evaluate the Feasibility of Developing a Compliance Rating System

During the 2009-2010 reporting period, the City evaluated the feasibility of developing a compliance rating system to track the effectiveness of the program and to assist inspectors in defining compliance. The City has determined that it will not develop a compliance rating system because it considers the current program to be effective, and such a system is not anticipated to significantly enhance the effectiveness of the program. The City will continue to implement the current industrial and commercial program, which includes progressive enforcement and the tracking of any enforcement actions taken against specific businesses.

Conduct Follow-up Inspections as Necessary

When facilities are deemed out of compliance, the City conducts follow-up inspections as necessary in order to bring the facility into compliance.

A summary of the follow-up inspections conducted during the reporting period is provided in the table below.

Category	Total Number of Facilities Requiring Follow-Up Inspections	Total Number of Facilities In Compliance Post-Follow-Up Inspection
Industrial Facilities	9	9
Commercial Facilities	N/A	N/A

Identify how Inspections May Be Conducted for the Mobile Business Category

During 2009-2010, the City and County identified how inspections may be conducted for the mobile business category identified in IC1, carpet cleaners (Appendix E-2 of the 2009-2010 Annual Report). Inspections of carpet cleaner businesses are challenging because they are often smaller operations lacking a fixed facility location. In addition, the services are provided in many different locations. Thus, a mandatory, regional self-certification program will be implemented to cost-effectively and comprehensively address this requirement and send a consistent message to carpet cleaners regarding the regulations and best management practices (BMPs). The City will follow up with particular businesses if they are not responsive to the City's request for completing a self-certification form.

The County, acting on the City's behalf, verified the carpet cleaner inventory during the week of January 5, 2011, and identified sixty-nine (69) mobile carpet cleaners that were operating within the Stockton Urbanized Area. On April 25, 2011 mailings were sent to 100% of the inventoried carpet cleaners. The mailings included the following components: a Carpet Cleaners Water Quality Self Certification Letter, a Stormwater Pollution Prevention for Carpet Cleaners Pamphlet (Carpet Cleaners BMP Fact Sheet), a Carpet Cleaners Water Quality Self-Certification, and a self-addressed envelope.

The County followed up with those businesses contacted with initial mailing that did not return Self-Certification Forms and business license applications. On April 25, 2011, mailings were sent to the inventoried carpet cleaners and required that they complete and return the Self-Certification within 90 days (expiring on July 18, 2011). Inventoried mobile businesses were contacted during the week of June 21, 2010 (60 days) to verify their receipt of the mailing and to correct contact formation where appropriate.

Due to the longer than expected development of the mobile business program, there was an overlap in the program's implementation schedule and the first required annual update. The County determined that an annual update (due by June 30, 2011), six months after the initial verification and two months after the return of the Self-Certification Form, would be redundant and unnecessary. The County will conduct the next scheduled annual update during the 2011-2012 reporting period.

Although no annual update occurred during the 2010-2011 reporting period, the first-year implementation of the mobile business program was successful because the County, on behalf of the City, verified the inventory, conducted follow-up phone calls to mobile businesses for verification, mailed out Self-Certification Forms, and re-contacting the mobile cleaners within its inventory in an effort to obtain 100% compliance.

5.5 IC3 – Industrial/Commercial Outreach

The Industrial/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 the City 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.

5.5.1 Review/Revise BMP Fact Sheets for High Priority Facilities

In order to assist the industrial and commercial facilities in selecting and implementing the appropriate types of BMPs, the City developed BMP Fact Sheets for the high priority industrial and commercial businesses. The BMP Fact Sheets are made available on the City's website.¹ Business-specific BMP Fact Sheets for the following businesses were attached as Appendix E-6 to the 2009-2010 Annual Report and will be reviewed and revised as needed prior to the next round of inspections:

- Auto Body Shops
- Auto Dealers
- Auto Repair Shops
- Dry Cleaning
- Equipment Rental
- Kennels
- Nurseries
- Restaurants
- Retail Gas Outlets

Additional media materials were distributed to the public, including businesses, as described within **Section 3 (Appendix C-1, Stormwater Outreach Materials)**.

During the next round of inspections (2011-2012), the City will work with its inspectors to ensure that facilities that have a significant potential to discharge a pollutant for which there is a water quality based plan (i.e., pesticides, pathogens, mercury) receive guidance. For example, since there is a Pathogen Plan, kennels will receive a kennel-specific BMP Fact Sheet that identifies BMPs that would reduce the pollutants of concern from being discharged (Water Quality Based Programs Performance Standard).

¹ <http://www.stocktongov.com/MUD>

5.5.2 Distribute BMP Fact Sheets During Inspections

The City distributes BMP Fact Sheets to the facility owners/operators as a part of the inspection procedures. Industrial and commercial facility inspections were conducted during the 2009-2010 reporting period, and BMP Fact Sheets and general stormwater information were provided.

The number of fact sheets distributed at high priority industrial and commercial facilities is summarized in the table below. Fact sheets will be distributed during the next round of inspections, scheduled to begin July 1, 2011.

Category	Total Number BMP Fact Sheets Distributed	
	2009-2010	2010-2011
Industrial		
Industrial Facilities	121	N/A
Commercial		
Auto Body Shops	47	N/A
Auto Dealers	61	N/A
Auto Repair Shops	217	N/A
Dry Cleaners/Laundromats	33	N/A
Equipment Rentals	14	N/A
Kennels	7	N/A
Nurseries	10	N/A
Restaurants	766	N/A
Retail Gasoline Outlets	64	N/A
Other	16 ⁽¹⁾	1

Note:

1. In 2009-2010, a total of 16 Auto Washing & Detailing facilities were inspected.

5.5.3 Target Outreach Efforts as Needed

Although the City opted not to develop a compliance rating system (see IC2), during the 2009-2010 and 2010-2011 reporting periods, the City provided outreach to high priority facilities, as described in Sections 5.5.1 and 5.5.2.

5.5.4 Identify BMPs and Develop an Outreach/Education Strategy for the Mobile Business Category Identified in IC1

During 2009-2010, the City and County identified BMPs for the mobile business category identified in IC1, carpet cleaners, and developed an outreach/education strategy. In order to assist carpet cleaners in selecting and implementing the appropriate types of BMPs, a *Carpet Cleaner BMP Fact Sheet* was developed (Attachment C to Appendix E-2 of the 2009-2010 Annual Report).

Outreach to carpet cleaners will take several forms, including distribution of BMP Fact Sheets, outreach via carpet cleaner associations and suppliers, and outreach to homeowners. The goal of this multi-faceted approach is to increase carpet cleaners' awareness of water quality issues and promote compliance with regulations.

In addition, the City and County will contact the inventoried carpet cleaners by mail and request that they fill out the Self-Certification Form. This approach will ensure that the Permittees provide outreach to the inventoried carpet cleaners, since educational materials will also be provided as part of the mailing. The mailing will include the following items:

- Cover letter that provides background information on stormwater quality, the purpose of the mailing, and what is required to be completed;
- Business license applications for the City—when necessary for particular businesses—with an explanation of:
 - Business license requirements, per the City's Municipal Code; and
 - Business license application process;
- Self-Certification Form; and
- Carpet Cleaning BMP Fact Sheet.

5.5.5 Implement Outreach Efforts to Mobile Businesses

Acting on the City's behalf, the County included outreach materials in the Self-Certification Form mailings on April 25, 2011. Outreach materials included: a cover letter, a Self-Certification Form, and a Carpet Cleaning BMP Fact Sheet. Business license applications were not included.

During the 2010-2011 reporting period, the County, on the City's behalf, identified potential partners in the carpet cleaning industry (e.g., suppliers, carpet cleaner associations, and industry journals). The City and County will be pursuing and exploring relations with these potential partners as a joint effort in providing outreach to mobile carpet cleaners during the 2011-2012 reporting period.

Mobile carpet cleaning outreach was provided to homeowners via the Permittees' Web sites. The City and County recognize that residents who choose to do their own carpet cleaning should follow the same BMPs as mobile business operators. Outreach to homeowners regarding these BMPs primarily occurs through the County's Web site (www.sjcleanwater.org). The focus of these BMPs is to educate homeowners and to provide the motivation to protect water quality from illicit discharges that may occur during carpet cleaning activities.

5.6 IC4 – ENFORCEMENT

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 Industrial General Permit 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 and should be implemented in coordination with the City's efforts to maintain adequate legal authority for the Stormwater Program in general.

5.6.1 Implement the Progressive Enforcement and Referral Policy

The City has 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 actions are taken in accordance with the *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* (MUD Directive) (Appendix B-8 of the 2009-2010 Annual Report). Inspections are performed to assess compliance with City stormwater ordinances. Noncompliance may include non-submittal by an industrial facility of an NOI, failure to implement BMPs, or other violation of City ordinances.

The number and types of enforcement actions taken *against all businesses* are summarized below.

Type of Enforcement Action	Number
Verbal Warning	9
Administrative Enforcement	
Notice of Violation	1
Notice to Clean	3
Correction Order	0
Cease and Desist Order	3
Violation Warning Notice	0
Stop Work Order	0
Criminal Enforcement	
Misdemeanor	0
Infraction	0

Total number of enforcement actions taken during this reporting period: 16

Number of repeat offenders identified: 0

5.6.2 Track Enforcement Actions Using the Industrial/Commercial Database

During the reporting period, the City tracked all enforcement actions taken within the industrial and commercial inspection results. Currently, the City does not have a specific database for tracking enforcement actions taken against industrial and commercial facilities.

5.6.3 Implement Procedures for Responding to Regional Water Board-Based Complaints

The City implements 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.

The City has (and will continue to) worked closely with the Regional Water Board when a facility is identified as requiring a compliance inspection.

5.6.4 Implement Industrial Referral Policy

The City will review and modify, as necessary, the procedures for informing the Regional Water Board of violations at industries covered by the Industrial General Permit. Referral in writing to the Regional Water Board is appropriate concurrently (within 30 days) with issuance of Notices of Violation or the discovery of the non-filer. The City must refer industrial business violations to the Regional Water Board under three circumstances:

- If a facility fails to respond to progressive enforcement actions;
- If an industrial facility receives a notice for a significant violation under the City's stormwater ordinance; or
- If it is determined that a site should obtain coverage under the General Industrial Permit (non-filers).

The referral to the Regional Water Board should include:

- Name of facility
- Operator of facility
- Owner of facility
- Industrial activity or activities subject to the state Industrial General Permit conducted at the facility
- Records of communication between the City and facility owner and operator.

Non-filers are referred to the Regional Water Board via its website as they are discovered.

The table below summarizes the number and causes of referrals made to the Regional Water Board:

Cause of Referral	Total Number (See the summary below)
Progressive Enforcement	0
Significant Violations	0
Potential Non-Filers	0

5.6.5 Develop an Enforcement Strategy Specifically Addressing the Mobile Business Category Identified in IC1

During 2009-2010, the City developed an enforcement strategy that specifically addresses the mobile business category identified in IC1, carpet cleaners.

The Permittees have progressive enforcement and referral policies in place to address violations by commercial or industrial businesses, including Carpet Cleaners. Enforcement actions match the severity of violation and include distinct, progressive steps. Enforcement steps are addressed within the Permittees' ordinances, as well as within the MUD Directive (Appendix B-8 of the 2009-2010 Annual Report).

The progressively severe corrective actions include verbal warnings, followed by written warnings and legal action, if necessary. Illicit discharges are addressed in a formal manner through the appropriate administrative remedies, depending upon the compliance history of the business. Corrective actions are taken in every instance where a responsible party is identified. Progressive enforcement will be utilized when the Permittees are conducting follow-up actions for businesses that do not respond to the initial

mailing by returning the Self-Certification Form within the timeframe stated on the form (i.e., 90 days). Enforcement will include the following steps:

- **Second notification** – A second mailing (as described within the Carpet Cleaner Self-Certification Form section) will be sent, with a cover letter stating that if the Self-Certification Form and appropriate business license application(s) are not completed within 30 days, a Notice of Violation will be sent to the business owner.
- **Notice of Violation** – If the Permittees do not receive the Self-Certification Form and appropriate business license application(s) within 30 days, a Notice of Violation will be sent to the business owner.

Major violations of stormwater regulations or violations that have a potential for a significant impact to the environment will result in a more stringent enforcement response. Repeat offenders (i.e., businesses with multiple violations within a 12-month period) will also be subject to progressive enforcement actions. Incidents that require clean-up will be re-inspected within a short timeframe appropriate for mobile businesses (i.e., within hours).

During 2010-2011 reporting period, the City and County enforced against non-responsive mobile carpet cleaning businesses, illicit discharges, and other stormwater violations. Mobile businesses were mailed Self-Certification Forms on April 25, 2011. Unresponsive businesses were re-contacted by Stormwater Program staff on June 21, 2011 by phone. In an effort to obtain 100% compliance, a second mailing was sent the week of June 21, 2011 that included a Self-Certification Form (due to be completed and returned within 30 days). At this point in implementation of the mobile business program, the County will conduct enforcement actions against non-responsive mobile carpet cleaning businesses as needed during 2011-2012. These may include stormwater violations and a Notice of Violation. Violations are scheduled to be mailed to mobile carpet cleaning businesses that are unresponsive 30 days past the initial 90-day allowance.

The number and types of enforcement steps taken *that were related to Self-Certification Forms* are summarized below.

	Enforcement Steps Related to Self-Certification Forms	
	Second Notification (Mailing)	Notice of Violation
Total Number	18	0

Total number of enforcement actions taken during this reporting period: 18

Number of repeat offenders identified: 0

The number and types of enforcement actions taken *against carpet cleaners* are summarized below.

	Administrative Remedies				Legal Action
	Verbal Warnings	Notice of Noncompliance	Administrative Compliance Orders	Cease and Desist Orders	Type (Misdemeanor, Infraction, Etc.)
Total Number	0	0	0	0	0

Total number of enforcement actions taken during this reporting period: 0

Number of repeat offenders identified: 0

5.7 IC5 – TRAINING

The Training Control Measure is important for the implementation of the Industrial and Commercial Program Element. An effective training program 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.

Areas of Focus for the Industrial/Commercial Program Training

Target Audience	Format	Subject Material	Comments
<ul style="list-style-type: none">Industrial/Commercial inspectors (City staff, not contracted inspectors)Code Enforcement Officers	<ul style="list-style-type: none">ClassroomField Demos	<ul style="list-style-type: none">Overview of stormwater management programStormwater ordinance and enforcement policyBMPs for facilitiesDatabase tracking	<ul style="list-style-type: none">Training seminars or workshops related to the program may be made available by other organizations

5.7.1 Conduct Training

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.

During 2010-2011, City staff attended an EPA Basic Inspector Academy training sponsored by the Air Resources Board to increase their knowledge regarding conducting industrial inspections.

A summary of the training sessions held is provided below.

Date of Training	Title of Training Module	Number of Attendees	Staff Positions Trained	Trainee City Departments or Divisions
05/02/2011 – 05/05/2011	EPA Basic Inspector Academy	2	Stormwater Inspection Staff	MUD – Stormwater

5.8 IC6 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Industrial and Commercial Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Industrial and Commercial Program, the assessment primarily focused on Outcome Levels 1-3.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the 2009 SWMP?
- Outcome Level 2 (L2) answers the question: Can the City demonstrate that the control measure/performance standard significantly increased the awareness of a target audience?
- Outcome Level 3 (L3) answers the question: Can the City demonstrate that the control measure/performance standard significantly modified the behavior of a target audience?

The table below summarizes the effectiveness assessment that was conducted for the Industrial and Commercial Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Industrial/Commercial Program

Industrial/Commercial	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
IC1 - Facility Inventory	C – Internal Audit of Database C - Maintain/ Update Industrial/ Commercial Facility Inventory C – Developed a Mobile Business Pilot Program and Inventory C – Verified Mobile Business Inventory	N/A	N/A	N/A
IC2 - Prioritization and Inspection	C – Prioritized Facilities C – Evaluated Prioritization Criteria C – Reviewed Business Checklists C – Conducted Inspections C – Evaluated Compliance Rating System C – Identified Inspection Strategy for Mobile Business Pilot Program C – Sent Mailings for Mobile Business Pilot Program	C – BMP Implementation	C – BMP Implementation	N/A
IC3 - Industrial/ Commercial Outreach	C – Reviewed/Revised Outreach Material C – Distributed Outreach Material C – Identified BMPs and Outreach Strategy for Mobile Business Pilot Program C – Sent Mailings for Mobile Business Pilot Program	A	A	N/A
IC4 - Enforcement	C – Implemented Progressive Enforcement C – Tracked Enforcement Actions C – Implemented Industrial Referral Policy C – Developed Enforcement Strategy for Mobile Business Pilot Program C – Sent Second Mailings for Mobile Business Pilot Program	N/A	N/A	N/A
IC5 - Training	C – Staff Attended Training	A	N/A	N/A

C – An effectiveness assessment was conducted during fiscal year 2009-2010

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

N/A – This outcome level is not applicable for this control measure

Following is an assessment regarding the effectiveness of the Industrial and Commercial Program.

IC1 - Facility Inventory

- 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 are 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)**

IC2 - Prioritization and Inspection

- The City inspected 9 industrial facilities during the 2010-2011 reporting period. Although inspections were not scheduled, these inspections occurred in response to requests from the Regional Board or complaints. **(L1)**
- During the 2010-2011 reporting period, approximately 22% of industrial facilities inspected were in general compliance with stormwater control requirements during the first inspection. All facilities (100%) requiring follow-up inspections were in compliance after those inspections were completed. **(L2, L3)**
- During 2010-2011, the County, on behalf of the City, 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. **(L1)**

IC3 - Outreach

- 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 will work 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)**
- During 2010-2011, the County, on behalf of the City, included a Carpet Cleaning BMP Fact Sheet in the Self-Certification Form mailings. In addition, mobile carpet cleaning outreach was provided to homeowners via the County's Web site. **(L1)**

IC4 - Enforcement

- 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)**
 - During the 2010-2011 reporting period, the City took 16 enforcement actions against industrial and commercial businesses, including 9 verbal warnings, 1 notice of violation, 3 notices to clean, and 3 cease and desist orders.
- The City has modified the industrial/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)**
- During 2010-2011, the County, on behalf of the City, 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)**

5.9 INDUSTRIAL AND COMMERCIAL PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Industrial and Commercial Program Element. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

The program modifications that will be made to the Industrial and Commercial Program during the next fiscal year (2011-2012) include the following:

- **Review/Revise the Commercial Business-Specific Inspection Checklists as Needed:** Prior to the next round of inspections that are scheduled to be completed during 2011-2012, the City will review/revise the commercial business-specific checklists as needed to ensure that critical areas within facilities that have a significant potential to discharge a pollutant for which there is a water quality based plan are inspected. In particular, vehicle maintenance and repair and restaurant and food service facility checklists will be reviewed/revise to include mercury information and conformance to Universal Waste Rule standards, and the nursery checklist will be reviewed/revise to include an IPM-related item (Water Quality Based Programs Performance Standard). *(Change due date from June 30, 2011 to December 31, 2011)*
- **Revise Industrial and Commercial Inspection Evaluation Checklists to Include Mercury Handling and Disposal Procedures:** Prior to the next round of inspections that are scheduled to be completed during 2011-2012, the City will revise the commercial inspection evaluation checklists to include discussion of mercury-containing products, along with proper handling and disposal procedures. *(Change due date from June 30, 2011 to December 31, 2011)*

Section 6

Construction (CO)

6.1 OVERVIEW

During construction projects, a number of activities may generate or mobilize pollutants. The purpose of the Construction Program Element is to coordinate City programs and resources to effectively reduce pollutants in runoff from construction sites during all construction phases.

6.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that the construction-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Construction Program Control Measures consist of the following:

CO	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
CO8	Effectiveness Assessment

6.3 CO1 – MUNICIPAL CODE FOR CONSTRUCTION SITES

The goal of this Control Measure is to ensure that the City has 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 resulting codification in the City's Municipal Code) and erosion and sediment control standards. This Control Measure addresses specific legal authority issues related to construction activities and should be implemented in coordination with Section 1 of the SWMP.

6.3.1 Review/Modify Grading and Erosion Control Ordinance and Standard Specifications

The City adopted a Grading and Erosion Control Ordinance (Municipal Code Section 15.48) effective July 1, 1997.¹ Pursuant to this ordinance, construction activities (with some exclusions, such as mining and agriculture) disturbing more than 50 cubic yards of material and clearing and grubbing more than 0.5 acres are required to obtain a Grading and Erosion Control Permit.

During the 2008-2009 reporting period, the City reviewed and modified the Grading and Erosion Control Ordinance and the Standard Specifications, including items such as changing the Grading and Erosion Control Ordinance language stating "...Disturbances of 5 Acres or More" to "Disturbances of 1 Acre or More". The revised Grading and Erosion Control Ordinance and the Standard Specifications was provided as Appendix F-1 of the 2008-2009 Annual Report.

¹ This ordinance, Stockton Municipal Code - Grading and Erosion Control (Title 15: Buildings and Construction), can be found online at www.stockton.gov. The City of Stockton Standard Specifications (Appendix D-1 of the SWMP) also require erosion and sediment control measures.

6.4 CO2 – PLAN REVIEW AND APPROVAL PROCESS

Effective planning of construction site activities leads to minimizing erosion and preventing pollutants from entering the storm drain system. The City requires projects that disturb greater than one acre of land to address pollutants and activities during the construction phase of the project. Prior to issuing a grading permit, the City reviews construction drawings to ensure that erosion and sediment control BMPs and source and treatment control BMPs are identified.

6.4.1 Review Grading and Building Permit Applications for SWPPP Requirements

The City's Grading and Erosion Control Ordinance (see Control Measure CO1) requires the submittal with grading plans of proof that a NOI has been filed and that a SWPPP has been developed. The City provides a link on its website to the State's Model SWPPP for Construction Activities for project developers.² The Model SWPPP is a five-page guidance document comprising a checklist of information required to be included in the site-specific SWPPP, as applicable.

To ensure that site plans, improvement plans, and building plans are reviewed for stormwater requirements, all plans that are submitted to the City are routed to the MUD representative at the Permit Center for review. A plan review process flow chart was provided as Appendix F-1 to the 2009 SWMP. As part of this review, the MUD representative in the Permit Center reviews project plans, as well as grading and building permit applications, to determine if a SWPPP is required and to verify the following:

- An NOI has been submitted to the State Water Resources Control Board;
- The name of and contact information for the person responsible for SWPPP implementation are provided; and
- The location of and details for all construction activity BMPs are listed.

No permit is issued until the stormwater requirements are satisfied.

During the reporting period the City reviewed the following permit applications to ensure that they complied with the above requirements:

Time Period	Grading Permit Issued	No. of Applicants Requiring SWPPPs and NOIs
Last Year 2009-2010	10	5
This Year 2010-2011	11	27

A detailed list of all sites tracked during the reporting period is provided as **Appendix F-1**.

² http://www.stocktongov.com/MUD/General/stormwater/stormwater_construction.cfm

6.4.2 Develop a Plan & Permit Application Review Procedure Handout

Although the City has not specifically developed a Plan & Permit Application Review Procedure 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, a flow chart of the plan review process is provided as Figure 2-3 of the 2009 SWQCCP and encompasses both construction and post-construction requirements. This flow chart is available to the public on the City's Web site and can be found within the 2009 SWQCCP.³

6.4.3 Distribute the Plan & Permit Application Review Procedure Handout

A flow chart of the plan review process was provided as Figure 2-3 of the 2009 SWQCCP and encompasses both construction and post-construction requirements. This flow chart is available to the public on the City's Web site and can be found within the 2009 SWQCCP.

6.4.4 Evaluate the County's Construction Small Site SWMP

During the 2009-2010 reporting period, the City evaluated the County's Construction Small Site Stormwater Management Plan and determined that a similar handbook is not warranted for the City, since smaller sites (<1 acre) are adequately addressed by the City's current process. Such sites are not routinely inspected by MUD Stormwater; however, all sites that have a building permit are inspected by Building Inspectors, and they conduct a Stormwater Inspection. If a site has inadequate BMPs, the site is referred to MUD Stormwater for continued follow-up.

³ www.stocktongov.com/mud/General/stormwater/SWQCCP.cfm

6.5 CO3 – CONSTRUCTION PROJECTS INVENTORY

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.

6.5.1 Maintain and Update the Construction Project Database

The MUD – Stormwater Management Program maintains a database system that is capable of tracking inspections that occur at each construction site. The current database fields include:

- Site owner and contact information
- Name, address, and description (type) of project
- WDID numbers
- Inspector and inspection date
- Comments on site conditions
- Notices of Violation and other letters sent

The City maintained and updated the Construction Project Database during the 2010-2011 reporting period.

During the reporting period, the following construction sites were tracked within the City's database:

Construction Site Category	Total Number of Active Construction Sites Requiring SWPPPs	Total Number of Completed Construction Sites
Private Projects	21	4
Public Projects	6	3

6.6 CO4 – CONSTRUCTION OUTREACH

The Construction BMP Implementation Control Measure is required to ensure that appropriate BMPs are implemented at construction sites to prevent pollutants from being discharged to the storm drain system to the MEP. Construction site BMP implementation is accomplished through a combined approach of requiring BMPs at construction sites; educating contractors about the needs and requirements to implement BMPs for different construction-related activities; reviewing grading and erosion control plans and building plans to ensure that stormwater controls have been adequately considered; and ensuring through inspection and enforcement that contractors have a construction site SWPPP and are implementing identified BMPs. This Control Measure focuses on the City's requirements for BMPs at construction sites and the associated outreach efforts to the building community.

6.6.1 Distribute Appropriate BMP Fact Sheets During Inspections

As noted in Control Measure CO2, all construction project applicants identified as having to comply with the Grading and Erosion Control Ordinance are provided 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.

During 2009-2010, a flyer announcing and explaining the requirements of the new General Construction Permit requirements was developed and mailed out to property owners with active construction projects. During the 2010-2011 reporting period, appropriate outreach materials (e.g., concrete washout/trash, general BMPs) were provided during inspections. In addition, property owners were referred to the CASQA BMP handbooks.

6.6.2 Conduct Contractor Tailgate Meetings

The City conducts education and training for construction activities through informational brochures, the City's website, and through one-on-one discussions during site inspections by MUD – Stormwater Construction staff. Experience has shown that the best environment to educate contractors is in the field, where issues, BMP implementation, and regulatory requirements can be discussed on-site.

Tailgate meetings are held on an ongoing basis by the MUD Stormwater Inspector as the routine, monthly inspections are conducted. These meetings are held on-site with the site superintendent and any of the sub-consultants that are present that day. During these meetings, the MUD Stormwater Inspector reviews the Construction General Permit and City requirements for construction sites, including BMPs.

A summary of the contractor tailgate meetings held during the reporting period is provided below.

Date	Location	Number of Active Construction Sites Represented	Number of Attendees
1/2/2010	800 Church Street	2	2
6/24/2011	8 Mile & N.Micke Grove Rd	5	5

6.6.3 Conduct Training for Developers, Builders and Contractors

During the reporting period, the City invited developers, builders and contractors to internal construction training. A summary of the trainings held during the reporting period is provided under CO7, Training.

6.7 CO5 – CONSTRUCTION SITE INSPECTIONS & BMP IMPLEMENTATION

The Construction Site Inspection Control Measure is critical to the ultimate success of the Construction Program Element. An effective construction site inspection program requires having adequate legal authority to enforce City requirements, tracking active construction sites to identify repeat violators, and conducting inspections to ensure the sources are identified and that 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. Building and engineering inspectors should also be aware of stormwater quality issues and notify the MUD – Stormwater Management Program if any violations are noticed.

6.7.1 Review/Revise Stormwater Construction Site Inspection Form

The MUD – Stormwater Management Program's current inspection checklist includes key fields recommended by the Regional Water Board, as well as an area for general comments. During the first field visit, the inspector verifies that SWPPPs are on-site and being implemented. BMP implementation is assessed at each site. If any problems are identified, the current practice is to identify the sources and conduct a comparison of on-site conditions with SWPPPs or grading plans.

The City last reviewed the Stormwater Construction Site Inspection Form and updated it in September 2007. During the 2009-2010 reporting period, the City's Stormwater Construction Site Inspection Form was reviewed and updated by the stormwater construction inspector. The updated Stormwater Construction Site Inspection Form was included as Appendix F-2 to the 2009-2010 Annual Report.

6.7.2 Evaluate Options for a Construction Site Compliance Rating System

During the 2009-2010 reporting period, the City discussed options for a rating system for construction site compliance. A rating system will not be developed; however, the intent of this performance standard is being met by the City's existing inspection process. The City determined that the consistency desired for the construction inspection program is currently achieved through use of the updated Stormwater Construction Site Inspection Form, regular inspections, documentation with photographs, and progressive enforcement.

6.7.3 Inspect Construction Sites \geq 1 Acre

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 notice of termination for coverage under the General Construction Permit is issued by the Regional Water Board.

Additional inspections are conducted as time allows or as follow-up when problems were detected in previous inspections. The inspection program ensures that the following minimum requirements are effectively implemented at construction sites:

- Sediments generated on the project site are retained using adequate source control BMPs;
- Construction-related materials, wastes, spills, or residues are retained at the project site to avoid discharges to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;
- Non-stormwater runoff from equipment and vehicle washing and any other activity is contained at the project site; and
- Erosion from slopes and channels are controlled by implementing an effective combination of BMPs.

A summary of the active construction sites and inspections conducted is provided below.

Reporting Period	Number of Active Construction Sites Greater than or Equal to One (1) Acre	Number of Regular Inspections¹ Conducted <i>at Each Active Construction Site</i>	Number of Follow-Up Inspections² Conducted <i>at Each Active Construction Site</i> due to Violations
Last Year 2009-2010	55	672	16
This Year 2010-2011	27	274	27

NOTES:

1. Regular inspections: Number of construction sites adequately implementing and maintaining BMPs
2. Follow-up inspections: Number of construction sites adequately implementing and maintaining BMPs

A detailed list of all construction sites tracked and inspected during the reporting period is provided as **Appendix F-1**.

6.8 CO6 – ENFORCEMENT

The Enforcement Control Measure outlines the progressive levels of enforcement applied to construction sites that are out of compliance with local ordinances and establishes the protocol for referring apparent violations of construction sites subject to the General Construction Permit to the Regional Water Board. The progressive enforcement and referral policy, as well as the accompanying legal authority to execute it, is an important tool for providing a fair and equitable approach to bringing contractors and developers into compliance with the City's municipal code requirements. Enforcement actions range from issuance of verbal warnings to stop work orders. Legal action may also be taken. For repeat offenders or contractors that have not filed appropriate applications, the referral policy includes notification to the Regional Board.

6.8.1 Implement Progressive Enforcement and Referral Policy

City inspectors currently have the legal authority, under the Stormwater Management and Discharge Control Ordinance (Chapter 13.16)⁴, to issue administrative complaints (Notice of Violation, or NOV) and, if necessary, to pursue civil actions, criminal actions, and criminal penalties, including arrests and issuance of citations. The Regional Board is routinely mailed copies of NOVs.

The City has developed a *Municipal Utilities Department Directive Prohibiting Non-Stormwater Discharges to the Storm Drainage System* (MUD Directive) for Construction Activities, Commercial/Industrial Businesses, Residential Activities, and Special Events (see Appendix B-5 of the 2009 SWMP). The MUD Directive⁵ identifies the steps that should be taken when citing violators of ordinances, allows for Citywide consistency in the enforcement of the local ordinances, and provides a mechanism for cost recovery. The progressively severe corrective actions involve verbal warnings followed by written warnings and legal action, if necessary. Illicit discharges by industrial or commercial facilities or construction sites are addressed in a formal manner through issuance of notices of violations, citations, or notices and orders (Cease and Desist) depending upon the compliance history of the facility. Corrective actions are taken in every instance where a responsible party is identified.

The types of enforcement actions that may be taken include the following:

- Administrative Remedies
 - Verbal Warning
 - Notice of Violation
 - Cease and Desist Order
 - Stop Work Order
- Legal Action
 - Administrative Citation
 - Fine

⁴ The relevant ordinances are available on the City of Stockton's website, <http://www.stocktongov.com>, or at <http://qcode.us/codes/stockton/>.

⁵ The City had planned to develop an Enforcement Consistency Guide (ECG); however, the MUD Directive and the Investigative Guidance Manual being developed (see ID3) together will adequately address consistency in the enforcement of the local ordinances and will provide standard guidelines and protocols for identifying, documenting, responding to, and enforcing violations.

- Other

The City generally refers construction site violations to the Regional Board under two circumstances:

- If three *significant violations* have occurred; and
- If it is determined that a site should obtain coverage under the General Construction Permit (*potential non-filers*)

If a construction site has received its third notice for a significant violation of the City's Stormwater Management and Discharge Control Ordinance⁶ within a 12-month period, the City notifies the Regional Board. The construction site referral is made in writing within 30 days of the inspection that led to the third notice. It should be noted that some referrals may vary from this schedule due to the nature of the violation and the type of response involved (i.e., an egregious violation would result in immediate notification of the Regional Board).

6.8.2 Track Enforcement Actions Using Construction Database

During the 2010-2011 reporting period, the City tracked the results of construction inspections; however, a database change resulted in errors in tracking and reporting the associated enforcement actions. The City will correct the database tracking mechanism during 2011-2012 to ensure that all enforcement actions are thoroughly tracked and documented.

The City generally refers construction site violations to the Regional Board under two circumstances:

- If three *significant violations* have occurred; and
- If it is determined that a site should obtain coverage under the General Construction Permit (*potential non-filers*)

If a construction site has received its third notice for a significant violation of the City's Stormwater Management and Discharge Control Ordinance within a 12-month period, the City notifies the Regional Board. The construction site referral is made in writing within 30 days of the inspection that led to the third notice. It should be noted that some referrals may vary from this schedule due to the nature of the violation and the type of response involved.

6.8.3 Review/Modify Procedures for Informing Regional Water Board of Violations

The City will review and modify, as necessary, the procedures for informing the Regional Board of violations at construction sites subject to the General Construction Permit. Referral to the Regional Board is appropriate concurrently (within 30 days) with issuance of a third citation, or immediately if the violation is egregious. As of the 2009-2010 reporting period, the City has reviewed the procedures for informing the Regional Board of violations at construction sites subject to the General Construction Permit. No modifications were deemed necessary.

⁶ Re-codification of the Stockton Municipal Code is underway as of April 2009. The relevant ordinances are available on the City of Stockton's website, <http://www.stocktongov.com>.

6.9 CO7 – TRAINING

Training is important for the implementation of the Construction Program Element. An effective training program 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.

Areas of Focus for Construction Program Element Training

Target Audience	Format	Subject Material	Comments
<ul style="list-style-type: none">• Stormwater construction inspectors• Building inspectors• Grading permit inspectors• Developers• Builders• Contractors	<ul style="list-style-type: none">• Classroom• Field demos• Tailgate sessions	<ul style="list-style-type: none">• Overview of stormwater management• Stormwater impacts of land development• Stormwater ordinance and enforcement policy• Construction stormwater inspection training• BMPs for construction activities• Tracking database	<ul style="list-style-type: none">• Training seminars or workshops related to Construction may be made available by other organizations
<ul style="list-style-type: none">• Grading plan and SWPPP reviewers	<ul style="list-style-type: none">• Classroom• Field demos	<ul style="list-style-type: none">• Overview of stormwater management• BMPs for construction activities• SWPPP requirements• Tracking database	<ul style="list-style-type: none">• Training seminars or workshops related to Construction may be made available by other organizations

6.9.1 Conduct Training

Although the City did not develop and provide training workshops to address Construction (i.e., Inspecting Construction Site BMPs; Grading Plan Review), during 2010-2011, 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, WGR Southwest, Inc. hosted a Qualified SWPPP Developer & Qualified SWPPP Practitioner (3-Day) Training Program that was based on the changes to the State's Construction General Permit (effective on July 1, 2010). A permit-required step to becoming a certified QSD and/or QSP is to attend the State of California and CASQA approved training course. The course was held October 12-14, 2010 and April 18-21, 2011 at the San Joaquin County Agriculture Center. The City advertised this training opportunity to City staff. A total of nine (9) City staff attended this training. Developers, builders, and contractors were also invited to, and attended, this training.

6.10 CO8 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Construction Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Construction Program, the assessment primarily focused on Outcome Levels 1- 3.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the 2009 SWMP?
- Outcome Level 3 (L3) answers the question: Can the City demonstrate that the control measure/performance standard significantly modified the behavior of a target audience?

The table below summarizes the effectiveness assessment that was conducted for the Construction Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Construction

Construction	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
CO1 - Municipal Code for Construction Sites	C – Review and Revision of the Erosion and Sediment Control Ordinance	N/A	N/A	N/A
CO2 - Plan Review and Approval Process	C – Plan Review Process	N/A	N/A	N/A
CO3 - Construction Projects Inventory	C – Maintained and Updated the Database	N/A	N/A	N/A
CO4 - Construction Outreach	C – Distributed Materials C – Held Tailgate Meetings as Needed C – Invited Developers to Training	A	A	N/A
CO5 - Construction Site Inspections & BMP Implementation	C – Conducted Inspections	A	C – BMP Implementation	N/A
CO6 - Enforcement	C – Conducted Enforcement Actions	N/A	N/A	N/A
CO7 - Training	C – Staff Attended Training	A	A	N/A

C – An effectiveness assessment was conducted during fiscal year 2009-2010

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

N/A – This outcome level is not applicable for this control measure

Following is an assessment regarding the effectiveness of the Construction Program.

CO1 – Municipal Code for Construction Sites

- 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)**

CO2 – Plan Review and Approval Process

- Project plans are reviewed by a MUD representative at the Permit Center for satisfaction of stormwater requirements and providing educational materials to the developers via its Web site. **(L1)**
- Developers and construction contractors are becoming better educated and responsive to the City's stormwater requirements as indicated by the following: **(L1)**
 - They are applying for coverage under the General Construction Permit and submitting proof of an NOI to the City.

CO3 – Construction Projects Inventory

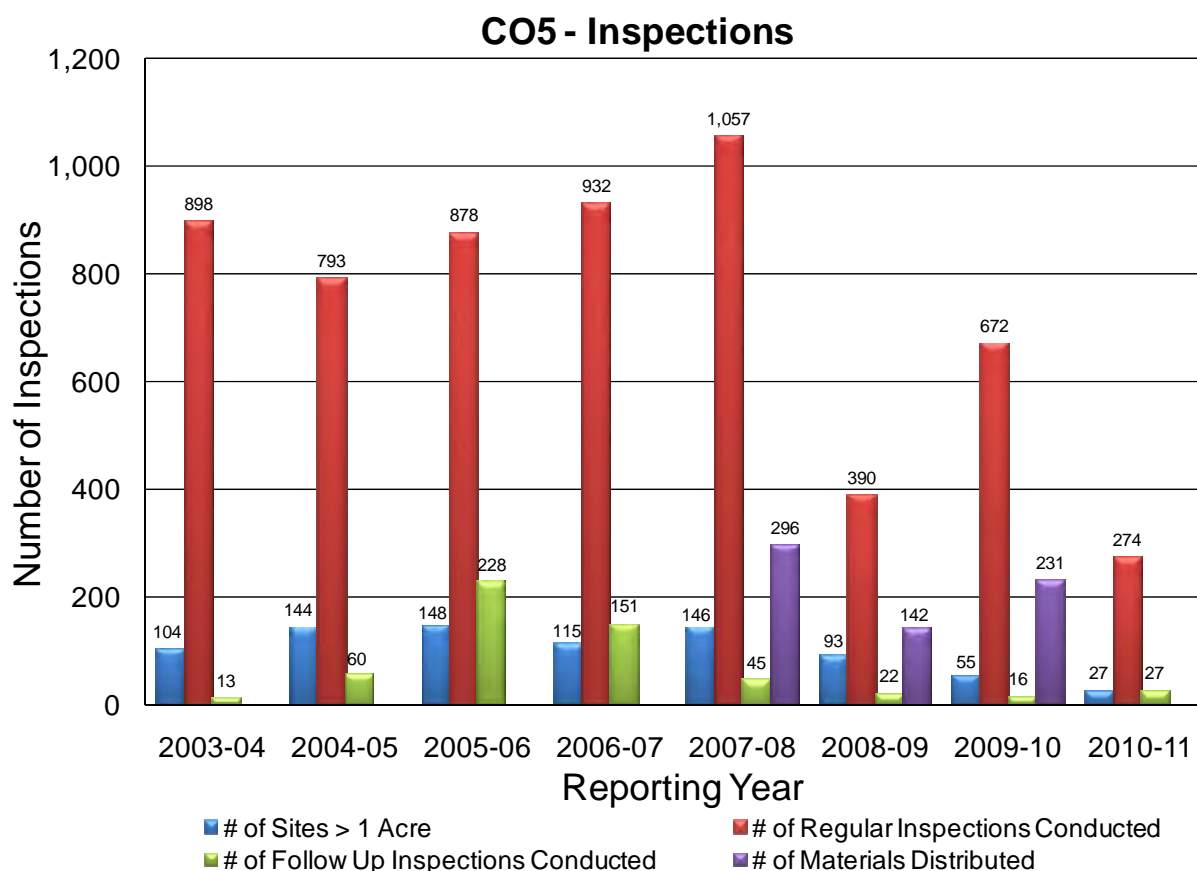
- The City has developed and is maintaining a construction project database. The database is updated on an ongoing basis. **(L1)**

CO4 – Construction Outreach

- The City has developed and is distributing construction-related outreach materials and holding tailgate meetings as needed. **(L1)**

CO5 – Construction Site Inspections and BMP Implementation

- 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, 90.5% of the regular inspections were conducted for construction sites that were in compliance with the City’s stormwater program requirements and ordinances and did not require enforcement actions or follow up inspections. **(L3)**



CO6 – Enforcement

- 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)**

CO7 – Training

- Although the City did not hold their own training session during 2010-2011, 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 work to incorporate the lessons from these outside training sessions into their day-to-day inspection and enforcement activities. **(L1)**

6.11 CONSTRUCTION PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Construction Program Element. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

The program modifications that will be made to the Construction Program during the next fiscal year (2011-2012) include the following:

- **Track Enforcement Actions Using Construction Database** – The City will correct the construction database tracking mechanism during 2011-2012 to ensure that all enforcement actions are thoroughly tracked and documented.

Section 7

Planning and Land Development (LD)

7.1 OVERVIEW

The addition of impervious areas for homes, industrial and commercial businesses, parking lots, streets and roads increases the amount of stormwater runoff, as well as the potential for pollution. The Planning and Land Development Program Element ensures that the impacts on stormwater quality from new development and redevelopment are limited through 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 treatment controls selected for a site.

7.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that the planning and land development-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Planning and Land Development Program Control Measures consists of the following:

LD	Control Measure
LD1	Incorporation of Water Quality Protection Principles into City Procedures and Policies
LD2	New Development Standards
LD3	Plan Review Sign-Off
LD4	Maintenance Agreement and Transfer
LD5	Training
LD6	Effectiveness Assessment

The next section of the annual report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Planning and Land Development Program performance standards and implementation schedules.

7.3 LD1 – INCORPORATION OF WATER QUALITY PROTECTION PRINCIPLES INTO CITY PROCEDURES AND POLICIES

Traditional methods of land development tend to increase stormwater discharge volumes and flow velocities. These alterations to the natural hydrologic regime may lead to increased erosion and flooding and decreased habitat integrity. 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 the City's General Plan 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 appropriate mitigation measures.

7.3.1 Review and Revise CEQA Review Documents

The CEQA review process is necessary for determining what impacts a proposed development project could have on the environment. The City's current CEQA review process includes procedures for considering potential stormwater quality impacts and providing for appropriate mitigation.

The City reviews and revises the CEQA review documents as needed for consistency with the Permit. The Municipal Utilities Department (MUD) reviews all CEQA documents, responding to checklist items under the Hydrology and Water Quality section.

7.3.2 Revise Municipal Code

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 Stormwater Quality Control Criteria Plan (SWQCCP) requirements for post-construction best management practices (BMPs).

During fiscal year 2008-2009, the City of Stockton updated/codified the Stormwater Management Control Ordinance. No additional changes to the Standards are necessary.

7.4 LD2 – NEW DEVELOPMENT STANDARDS

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 identified within the Permit require specific mitigation measures. In order to assist developers in meeting these requirements, the City developed a guidance manual for stormwater quality control measures for new development and redevelopment, the SWQCCP.

7.4.1 Require Priority Projects to Implement the 2009 SWQCCP

The City and County updated the 2003 SWQCCP to reflect new permit requirements with a special emphasis on the implementation of low impact development (LID) strategies in the Stockton Urbanized Area. Revision of the SWQCCP included a stakeholder participation element. Stakeholder input was solicited through three stakeholder meetings and three rounds of public comment. Modifications to the SWQCCP included the creation of a Volume Reduction Requirement to provide a measureable criterion for achievement of LID. The Volume Reduction Requirement is defined as the post-project runoff volume minus the pre-project runoff volume for the 0.51" rainfall event. The Volume Reduction Requirement must be met through the application of Volume Reduction Measures (e.g., rain barrels, interception trees) and LID Treatment Controls (e.g., bioretention, tree-well filters).

The Board of Supervisors adopted the 2009 SWQCCP in February 9, 2010. Priority Projects were required to comply with the 2009 SWQCCP from that date forward. The 2009 SWQCCP is available on the City's website.¹ A 2009 SWQCCP fact sheet (Appendix G-1 of the 2009-2010 Annual Report) and Volume Reduction Requirement (VRR) Calculator (Appendix G-2 of the 2009-2010 Annual Report) were developed in February 2010 to communicate changes to the SWQCCP and assist with new requirements. On March 11, 2010 San Joaquin County and the City of Stockton held a four hour workshop at the San Joaquin County Agricultural Center for key personnel and the development and construction community to highlight the requirements of the 2009 SWQCCP. This workshop was also used to introduce the VRR Calculator and illustrate how it is to be used to comply with the Volume Reduction Requirement.

7.4.2 Review Local Development Standards for Compatibility with the 2009 SWQCCP

The City recently reviewed their development regulations in the context of the 2009 SWQCCP requirements. A summary of findings is provided below:

- **Setbacks:** For the residential medium-density zoning district, the City of Stockton's Development Standards require the following: side setbacks of five feet, front setbacks of 15 feet and rear setback of 10 feet. Setbacks are considered minimal and provide the flexibility needed to minimize clearing and grading and conserve natural resources.
- **Landscaping:** The Landscaping Standards do not prohibit integration of stormwater management with landscape features.
- **Tree Canopy/Tree Preservation:** Tree preservation is indirectly encouraged through the Volume Reduction Requirement. The Volume Reduction Requirement can be reduced through the conservation of trees and other natural vegetation. The 2009 SWQCCP also includes tree interception as a Volume Reduction Measure. No known conflicts exist.

¹ <http://www.stocktongov.com/government/departments/municipalUtilities/utilStorm.html>.

- Street Width: The Public Works Standard Specifications include street schematics that depict curb and gutter. Standard Specifications indicate that the minimum street width for residential collector street with no parking is 26 feet. The 2009 SWQCCP strongly encourages the use of swales in place of curb and gutter.
- Parking Lot Design: The City's minimum parking space requirements are standard in comparison with most other communities. For example, for most business types, 1 space per 200 square feet of gross floor area is required for the first 50,000 square feet of floor area. Gross floor area exceeding 50,000 square feet is required to provide 1 space per 500 square feet. Landscape and parking requirements specify that continuous curbing must be provided, but alternatives may be approved. The Parking Standards address shared parking which may reduce impervious cover: where two or more adjacent nonresidential uses have distinct and differing peak parking usage periods, (e.g. a theater and a bank), a reduction in the required number of parking spaces may be approved.
- Rooftop Runoff: The SWQCCP strongly encourage rooftop runoff to be conveyed to vegetated swales and vegetative buffer strips. The SWQCCP also actively encourages the use of rain gardens, cisterns and rain barrels. No known conflicts exist.

This review reveals that the majority of Stockton's codes and ordinances are not in conflict with the 2009 SWQCCP. An update of the Standard Specifications is not anticipated at this time, but the City will continue to hold a dialogue with Public Works staff so that this issue may be revisited during the next revision.

7.5 LD3 – PLAN REVIEW SIGN-OFF

Stormwater quality controls should be considered throughout the development plan review and approval process. The City provides comprehensive review of development plans in order to ensure that stormwater controls minimize stormwater quality impacts.

7.5.1 Review the Post-Construction Plan Review Database

The City requires that each Priority Project submit a Project Stormwater Quality Control Plan (SWQCP) that documents how the project is complying with the requirements contained within the 2009 SWQCCP. An Excel spreadsheet is used to document control measures proposed on the site plan. The City has reviewed the SWQCP template and the Excel spreadsheet.

7.5.2 Revise the Post-Construction Plan Review Database

The City has revised the SWQCP template and Excel spreadsheet. Each Priority Project is required to submit a SWQCP as documentation of compliance with the 2009 SWQCCP. The SWQCP template is provided as an appendix to the 2009 SWQCCP on the City's website.²

7.5.3 Use Post-Construction Plan Review Database

The City utilized the SWQCP template and Excel spreadsheet for each Priority Project, as described above.

7.5.4 Participate on the DRC

The City's Development Review Committee (DRC), which is made up of representatives from various City departments, primarily reviews and approves larger projects and sub-divisions and ensures that the erosion control, Stormwater Pollution Prevention Plan (SWPPP) requirements, and post-construction controls are identified and included on the tentative map. A MUD representative is on the DRC to ensure that post-construction stormwater quality controls are addressed and included during the planning of new development projects. If there are any issues identified by the DRC, they are resolved with the developer prior to project approval.

A summary of MUD participation on the DRC is presented below:

How many times did the DRC meet? 24

How many meetings did the MUD staff participate in? 24

7.5.5 Review Project Plans and Grading Plans for Stormwater BMPs

The City reviewed project and grading plans to make sure that stormwater BMPs were incorporated. Since the 2009 SWQCCP was formally adopted by the City Council in July 6, 2009, the majority of the projects reviewed have fallen under the 2009 SWQCCP requirements.

² <http://www.stocktongov.com/government/departments/municipalUtilities/utilStorm.html>

A summary of the projects that were reviewed is provided below:

Reporting Period	Total Number of Project Plans Reviewed
Last Year 2009-2010	110
This Year 2010-2011	75

The majority of projects reviewed in Fiscal Year 2010-2011 were not Priority Projects and included tenant improvements in existing commercial buildings, infill projects, and single family homes. The table below summarizes the Priority Projects:

Priority Project Category ¹	Total Projects Reviewed
Commercial Developments (\geq 100,000 SF)	1
Automotive Repair Shops	0
Retail Gasoline Outlets	0
Restaurants	0
Parking Lots (\geq 5,000 SF or 25 spaces)	6
Streets and Roads ($>$ 1 acre paved surface)	2
Home Subdivisions (\geq 10 units)	0
Total	9

NOTE:

1. The Development Standards apply to all Priority Projects or phases of Priority Projects at the date of adoption unless the projects already had approval by the City or County Engineer, a permit for development or construction or an approved tentative map prior to the Development Standards date of adoption.

Total number of Priority Projects approved: 9

Total acreage covered by the approved Priority Projects: 112.55 (as of June 30, 2011)

In the following tables, a summary of the type and number of post-construction BMPs that were implemented as a part of the Priority Projects that were approved is provided. Definitions and guidance for each of the controls can be found in the City's 2009 SWQCCP.

Control Measure Type	Total Number Approved 2010-2011
Site Design Controls	
G-1: Conserve Natural Areas	9
G-2: Protect Slopes and Channels	9
G-3: Minimize Soil Compaction	9
G-4: Minimize Impervious Area	9
Total Site Design Controls	36
Source Controls	
S-1: Storm Drain Message and Signage	9
S-2: Outdoor Materials Storage Area Design	1
S-3: Outdoor Trash Storage and Waste Handling Area Design	7
S-4: Outdoor Loading/Unloading Dock Area Design	2
S-5: Outdoor Repair/Maintenance Bay Design	0
S-6: Outdoor Vehicle/Equipment/Accessory Wash Area Design	1
S-7: Fuel Area Design	0
Total Source Controls	20
Volume Reduction Measures	
V-1: Rain Garden	2
V-2: Rain Barrel/ Cistern	0
V-3: Vegetated Roof	0
V-4: Interception Trees	5
V-5: Grassy Channel	4
V-6: Vegetated Buffer Strip	2
Total Volume Reduction Measures	13
Treatment Control Measures	
L-1: Bioretention	1
L-2: Stormwater Planter	0
L-3: Tree-well Filter	0
L-4: Infiltration Basin	0
L-5: Infiltration Trench	0
L-6: Porous Pavement Filter	0
L-7: Vegetated (Dry) Swale	1
L-8: Grassy Swale	7
L-9: Grassy Filter Strip	0
C-1: Constructed Wetland	0
C-2: Extended Detention Basin	0
C-3: Wet Pond	0
C-4: Proprietary Treatment Controls (see table below for details)	2
Total Treatment Control Measures	11

Number of Priority Projects draining to regional treatment facility: 0

Additional detail on approval of proprietary control measures (Treatment Control Measures C-4) is provided in the table below:

Facility Name	Type of Treatment Unit
N. Stockton Grade Separation Project, Humphrey's College	Contech MFS, Stormgate and Stormfilter

The City has a comprehensive database established for all developments projects reviewed for stormwater quality as well as for other requirements.

7.5.6 Explore Options for a GIS or Other Electronic System for Tracking Projects with Post-Construction Treatment Control BMPs

During the 2007-2008 reporting period the City developed a GIS system for tracking projects with post-construction BMPs.

7.5.7 Implement a GIS or Other Electronic System for Tracking Projects with Post-Construction Treatment Control BMPs

Information related to tracking the project while under active construction is kept within the Stormwater Construction Inspection database and is included as **Appendix F-1** (List of All Construction Sites Inspected). Specifically, the Construction inspector tracks project information including contact information, project size and WDID number.

By June 30, 2010, the City completed GIS plotting of all permanent post-construction stormwater treatment devices that have been approved and constructed within the City of Stockton to date. Staff developed maps which pinpoint the location of all devices (see **Appendix G-1**). As new devices are constructed, they will be plotted, and the maps will be updated annually. During the 2010-2011 Fiscal Year, the maps were updated with eight (8) new constructed devices. The location maps will assist in monitoring and maintenance and will be placed on the MUD webpage for public information.

7.5.8 Conduct Inspections of Completed Priority Projects

Inspections take place over the different phases of project construction by staff from the following Departments: Building, Community, Development, Public Works and MUD. All construction sites are inspected at least once over a 30-day period. MUD has the primary responsibility for following up once the treatment control has a fully signed operation and maintenance agreement.

Completed projects with post-construction treatment control BMPs are inspected annually as part of the management of Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1 to ensure that all approved control measures have been implemented and are being maintained. City-maintained BMPs are addressed through a contractor (see below), and privately-maintained BMPs are addressed through maintenance agreements (see Section 7.6).

During the 2010-2011 reporting period, the City developed maintenance procedures for the inspection and maintenance of the underground proprietary stormwater treatment devices operated under the Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1 and by the City. Throughout the summer and fall of 2010, City staff completed the development and release of a comprehensive bid for the routine inspection and maintenance of the underground proprietary stormwater treatment devices operated under the Maintenance Assessment District and those owned and operated by the City. A bid was released on September 3, 2010, with five sealed bids received and opened. A two-year contract with

three possible one-year extensions was awarded on October 19, 2010 to Storm Water Inspection and Maintenance Services, Inc. (SWIMS). A total of 11 units are inspected and maintained under this contract. Nine of the units are operated under the Maintenance Assessment District and exist in residential developments. The remaining two units (at Legion Park and Stockton Event Center) are owned and operated by the City at-large.

The scope of work includes the semi-annual inspection of the treatment devices, removal of accumulated sediment, and for a few devices, replacement of filter cartridges as needed to ensure optimal operation of the units. The initial inspections were performed by the contractor in January 2011 to establish a baseline assessment of the condition of and accumulated sediment within each of the units. A second round of inspections and a first clean-out of each of the units occurred in March 2011. During the inspections, it was determined that all the units with cartridges (i.e., Malisa Manor, Dama Estates, Meadowlands, Legion Park and Stockton Events Center) required replacement of the cartridges. This was completed as part of the first clean-out. Similarly, those units that operate with the use of hydrocarbon mats had those mats replaced (i.e., Oakmore Meadows, Little Johns Creek North and South, and Silver Springs & Gold Springs). A total of 22 inspections of these units were performed during the 2010-2011 reporting period.

After the initial round of clean-outs, the units will be inspected each fall, in advance of the winter rains, between September 15 and October 31, and again each spring, between May 1 and June 30. Routine pump-outs and any necessary maintenance on the units are to occur in the spring.

7.6 LD4 – MAINTENANCE AGREEMENT AND TRANSFER

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 City requires 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. Alternatively, a maintenance district zone may be established by the City.

7.6.1 Require Stormwater Treatment Device Access and Maintenance Agreement

The City integrated the development/submittal of a stormwater maintenance agreement as a condition within the project approval process for Priority Projects. To enforce the requirements of post-construction BMPs, a Maintenance Agreement is required to be executed between the City and the ODS for any private facilities who remain the responsible party in operating and maintaining the post-construction treatment control measures. However, if the project is annexed to the City, the Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1, established on July 26, 2005, is responsible for operation and maintenance of all post-construction treatment control measures built within each subdivision zone. Funding to provide O&M services is provided through an annual tax roll levied upon the ODS of the property in the subject district.

The SWQCCP addresses the City's Development Standards (see LD2) as well as the need for the development and submittal of Maintenance Agreements when a developer is responsible for ongoing maintenance of on-site treatment BMPs.

During this reporting period, the City required the Stormwater Treatment Device Access and Maintenance Agreement as part of the project approval process.

A summary of the maintenance agreements executed during the reporting period is provided in the table below:

Agreements for City-Maintained BMPs	Agreements for Privately Maintained BMPs
0	8

Total number of maintenance agreements executed and recorded in FY 2010-2011: 8

7.6.2 Finalize and Populate Post-Construction BMP Tracking Spreadsheet

By June 2011, staff completed the GIS tracking of all post-construction treatment devices, both those that are privately owned and those maintained by the Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1. A citywide map containing all approved and fully constructed BMPs was developed. A current map of the City's Assessment Districts is provided in **Appendix G-2** (City Assessment Districts Map).

Staff also worked throughout the 2010-2011 Fiscal Year to update property owner information for all additional privately owned properties with signed and recorded access and maintenance agreements. With the current economic crisis and the high foreclosure rates, staff continued to experience difficulties in securing accurate property owner information of these parcels to send the new annual maintenance reminder letter. Staff continues to work diligently on updating property information.

7.6.3 Finalize Post-Construction BMP Maintenance Oversight Protocols

Maintenance efforts began on the post-construction treatment devices operated under the Stockton Consolidated Storm Drainage Maintenance Assessment District No. 2005-1. City staff developed and utilized a basin maintenance inspection form which was provided as Appendix G-2 of the 2008-2009 Annual Report.

The City's BMP maintenance oversight protocol includes sending a letter to each owner of privately maintained post-construction stormwater treatment devices reminding them of their maintenance responsibilities, as stipulated in their executed and recorded access and maintenance agreements with the city. The letter requests copies of documentation from the owner's operation and maintenance records that verifies 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. The City also sends follow-up letters to those owners who fail to respond to the first letter. This second letter indicates that failure to respond will result in an inspection completed by the City and that the owner will be invoiced for reimbursement of cost to the City as well as for any required maintenance.

7.6.4 Implement Post-Construction BMP Maintenance Oversight Protocols

The letters were mailed to 68 owners by certified mail on September 23, 2010. The owners were given until November 5, 2010 to respond. The City received a response from 50 (73.5%) of the owners, who sent in documentation of inspection and maintenance, notified the City that the property had been sold, or stated that their development plans had slowed and the device had not been installed. A second, more severe letter was generated and sent specifically to those owners who failed to respond to the first letter by November 5, 2010. A copy of the mailing list and letter are provided in **Appendix G-3** (Maintenance Oversight Letter).

During 2011-2012, the City will follow up with those owners who have not responded to the second notice. The City will complete an inspection, and the owner will be invoiced for reimbursement of cost to the City as well as for any required maintenance.

7.7 LD5 – TRAINING

Training is important to the successful implementation of the Planning and Land Development Program Element. An effective training program 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.

Areas of Focus for Training

Target Audience	Format	Subject Material
<ul style="list-style-type: none">• Plan Checkers• Engineers• Building and Construction Inspectors	<ul style="list-style-type: none">• Classroom	<ul style="list-style-type: none">• Overview of storm water management• Stormwater Ordinance• Enforcement policy• SWQCCP and overview of post-construction control measures• Project tracking database

7.7.1 Conduct Project Planning and Design Training

Although the City did not develop and provide training workshops to address Project Planning and Design, during 2010-2011, City staff attended Construction General Permit Qualified SWPPP Developer (QSD)/ Qualified SWPPP Practitioner (QSP) training as summarized below.

7.7.2 Conduct Project Inspection Training

Although the City did not develop and provide training workshops to address Project Inspection, during 2010-2011, City staff attended Construction General Permit Qualified SWPPP Developer (QSD)/ Qualified SWPPP Practitioner (QSP) training as summarized below.

Date of Training	Title of Training Module	Number of City Attendees	Staff Positions Trained	Trainee City Departments or Divisions
4/19/2011 through 4/21/2011	Construction General Permit Qualified SWPPP Developer (QSD)/ Qualified SWPPP Practitioner (QSP)	9	Civil/Senior Engineer Associate Engineer PW Inspectors Stormwater Program Manager	PW, Community Development and MUD Staff

7.8 LD6 – EFFECTIVENESS ASSESSMENT

In order to determine the effectiveness of the Planning and Land Development Program, a comprehensive assessment of the program data is conducted as a part of the annual report. The results of this assessment are used to identify modifications that need to be made to the program. Each year the effectiveness assessment is reviewed and revised as needed.

By conducting these assessments and modifying the program as needed, the City ensures that the iterative process is used as an effective management tool. Due to the types of data collected for the Planning and Land Development Program, the assessment primarily focused on Outcome Level 1 with some assessment conducted at Outcome Level 2.

- Outcome Level 1 (L1) answers the question: Did the City implement the components of the Permit and the SWMP?
- Outcome Level 2 (L2) answers the question: Can the City demonstrate that the control measure/performance standard significantly increases the awareness of a target audience?

The table below summarizes the effectiveness assessment that was conducted for the Planning and Land Development Program Element. Additional detail for each component of the assessment is provided on the following pages. It should be noted that Outcome Levels 5 and 6 will only be assessed as a part of the Water Quality Based Programs and the Monitoring Program on a longer term basis since those analyses rely on environmental data.

Program Effectiveness Assessment Summary for Planning and Land Development

Planning and Land Development	Level 1	Level 2	Level 3	Level 4
	Implement Program	Increase Awareness	Behavior Change	Load Reduction
LD1 - Incorporation of Water Quality Protection Principles into City Procedures and Policies	C – Reviewed CEQA Documents C - Revised Municipal Code	N/A	N/A	N/A
LD2 - New Development Standards	C - Required Implementation of 2009 SWQCCP C – Reviewed Local Development Standards	N/A	N/A	N/A
LD3 - Plan Review Sign-Off	C – Reviewed Plan Review Database C – Revised Plan Review Database C – Participated on DRC C - Reviewed Project Plans for BMPs C – Explored Options for a Tracking BMPs C – Implemented Tracking BMP System C – Conducted Inspections of Priority Projects	A	N/A	N/A
LD4 - Maintenance Agreement and Transfer	C - Required Maintenance Agreement C - Finalized Maintenance Tracking Spreadsheet C - Finalized Maintenance Protocols C - Implemented Maintenance Protocols	N/A	N/A	N/A
LD5 - Training	C – Conducted Project Planning & Design Training C – Staff Attended Training	A – Pre- and Post-Survey Results	N/A	N/A

C – An effectiveness assessment was conducted during fiscal year 2009-2010

A – It is anticipated that an effectiveness assessment may be conducted in future annual reports

N/A – This outcome level is not applicable for this control measure

The following is a general assessment regarding the effectiveness of the Planning and Land Development Program:

LD1 - Incorporation of Water Quality Protection Principles into City Procedures and Policies

- The Municipal Utilities Department reviews all CEQA documents, responding to checklist items under the Hydrology and Water Quality section. **(L1)**
- The City updated the Stormwater Management Control Ordinance during fiscal year 2008-2009. **(L1)**

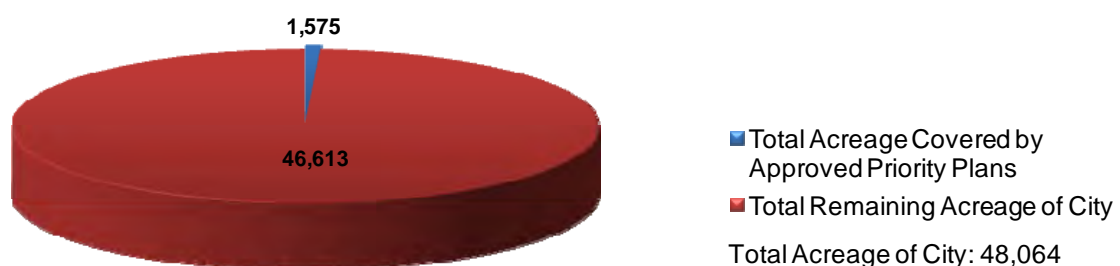
LD2 - New Development Standards

- Beginning in 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 are not in conflict with 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)**

LD3 - Plan Review Sign-Off

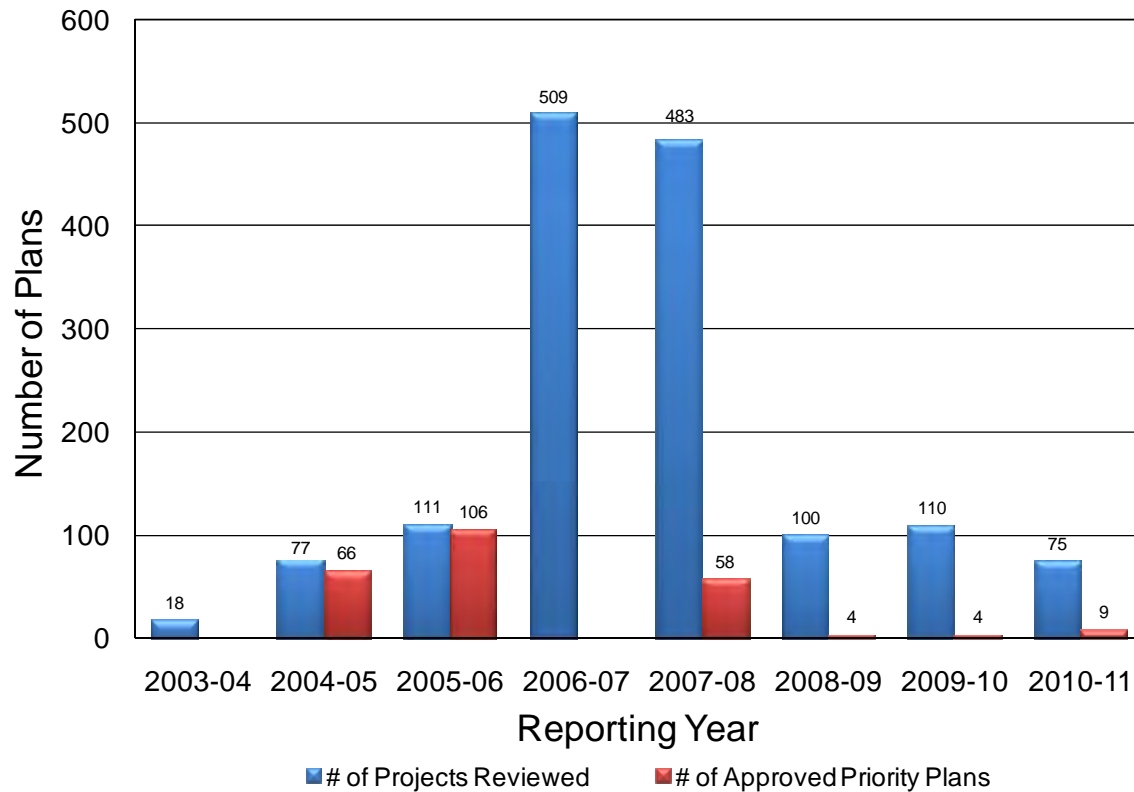
- The City continued to require submittal of a SWQCP that documents how the project is complying with the 2009 SWQCCP. The City also uses an Excel spreadsheet to document control measures proposed on the site plan. **(L1)**
- The City participated in 24 DRC meetings to ensure that post-construction stormwater quality controls are addressed and included during the planning of new priority projects. **(L1)**
- During 2010-2011, nine (9) Priority Project plans were reviewed (four were reviewed in 09/10, four were reviewed in 08/09, 67 were reviewed in 07/08, 229 were reviewed in 06/07; 111 were reviewed in 05/06; 77 were reviewed in 04/05; and 8 were reviewed in 03/04). **(L1)**
- As illustrated in the graph below, approximately 3.3% of the City's acreage is covered by approved priority plans. **(L1)**

**LD3 - Acreage Covered by Approved Development Plans
2007 - 2011**

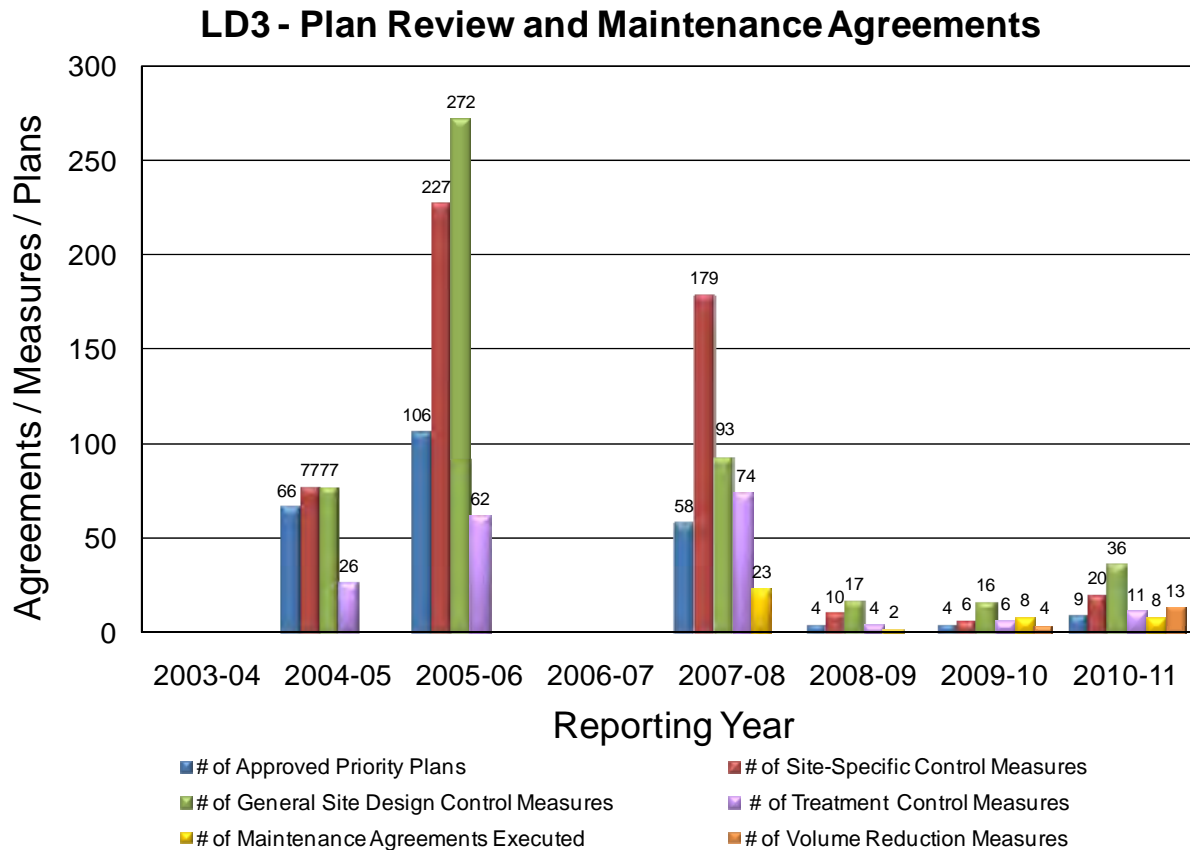


- Due to the current economic climate, the City continues to see a significant decrease in the number of development applications, including Priority Projects. This decrease is reflected in the graph below. (L1)

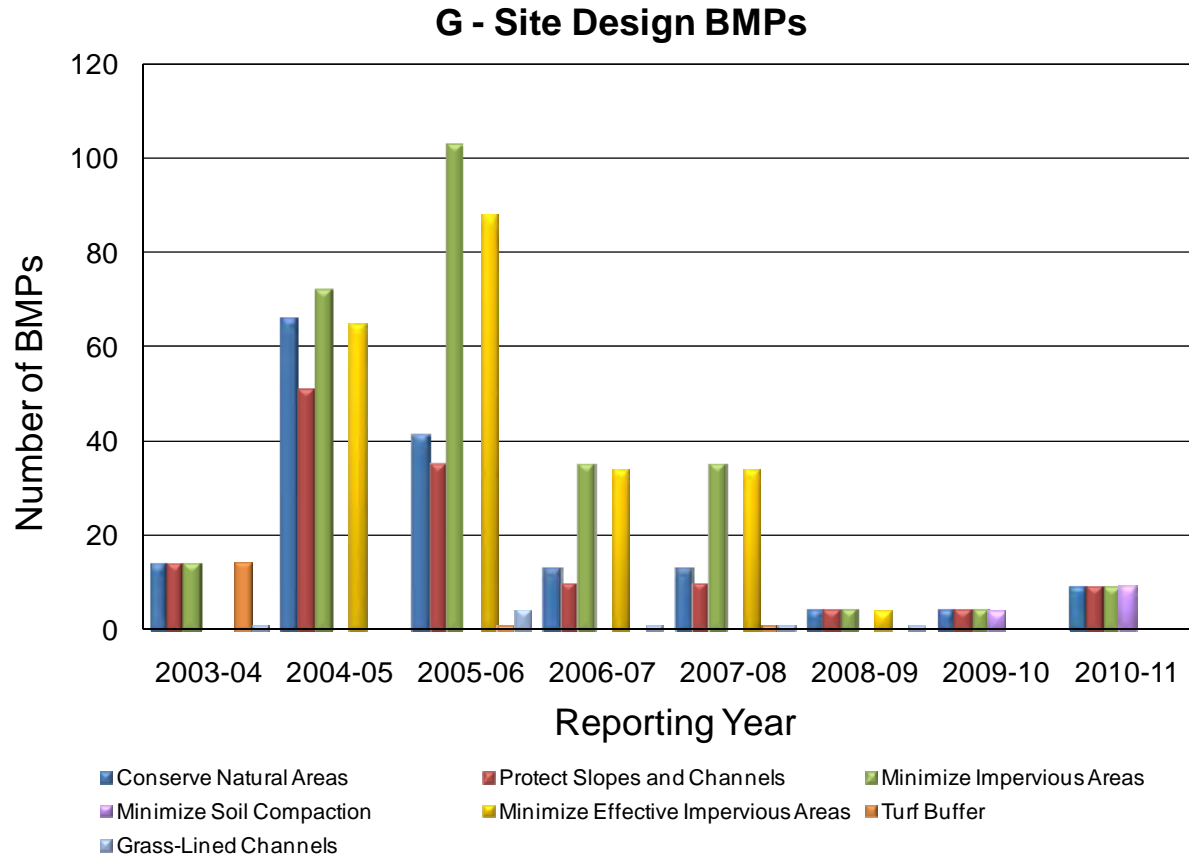
LD3 - Plan Review Sign Off



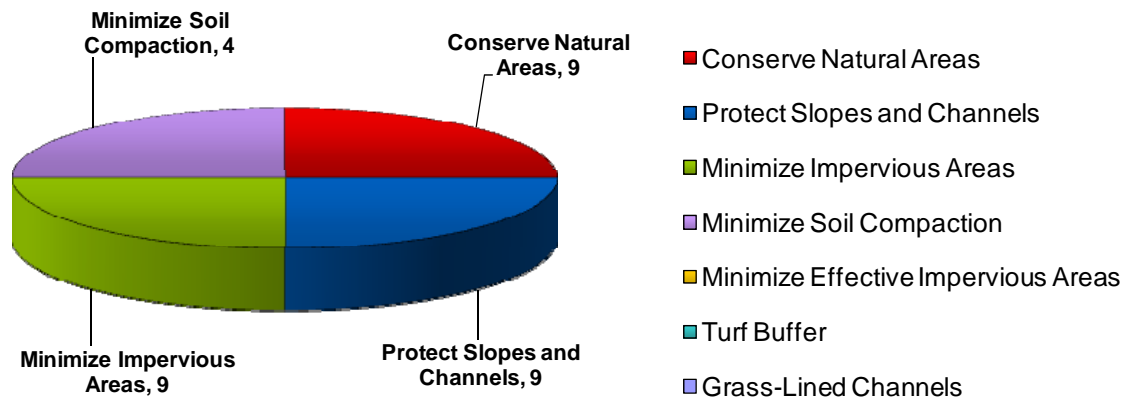
- Within the nine Priority Projects that were approved during 2010-2011, 36 Site Design Controls, 20 Source Controls, 13 Volume Reduction Measures, and 11 Treatment Control Measures were incorporated. **(L1)**
- The graph below illustrates the consistent use of a combination of site design, source control and treatment control measures over the years. **(L1)**



- In 2010-2011, a total of 36 Site Design Controls were approved for nine (9) Priority Projects. As the graph below illustrates, these Site Design Controls included nine Conserve Natural Areas, nine Protect Slopes and Channels, nine Minimize Soil Compaction, and nine Minimize Impervious Areas. (L1)



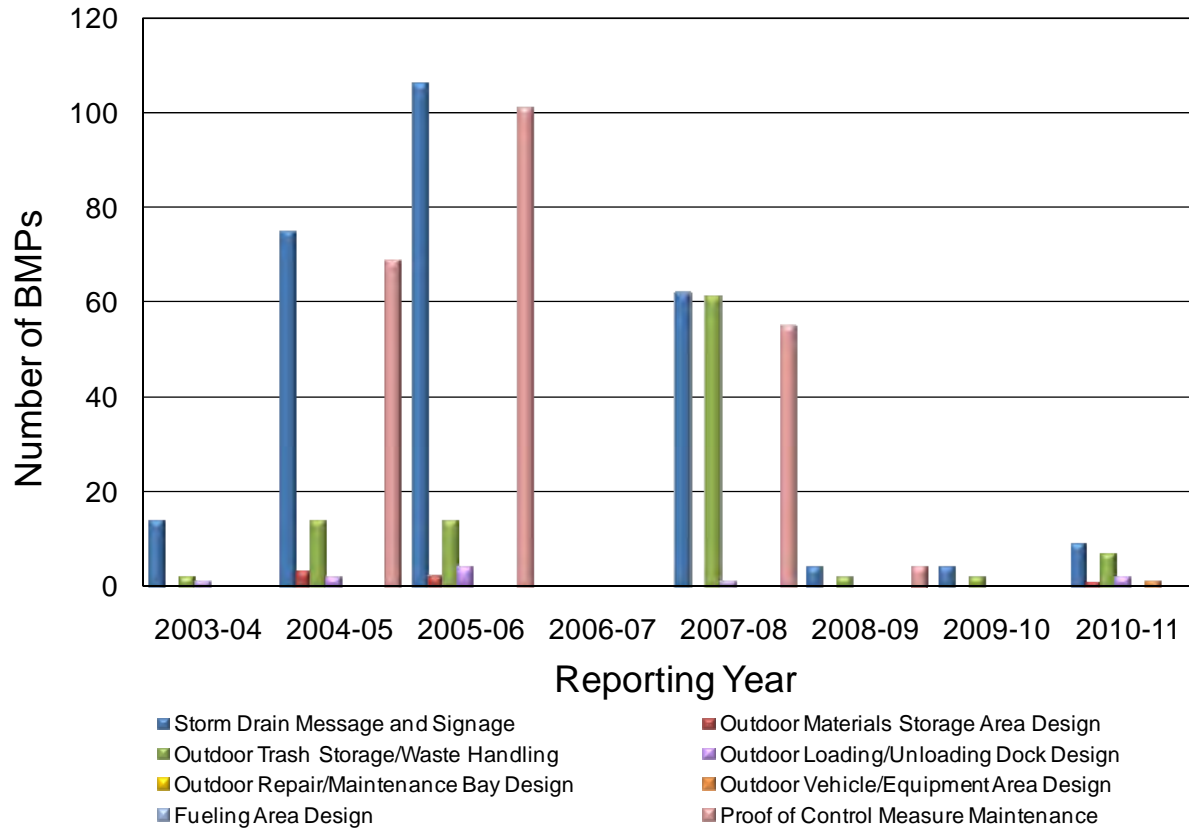
2010-2011 Site Design BMPs



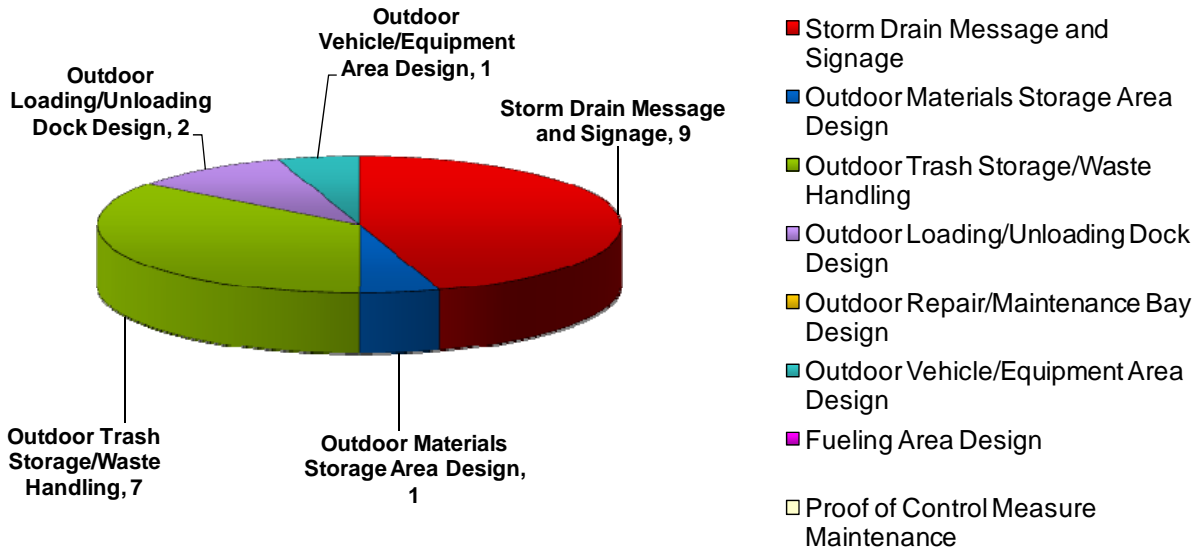
Total: 36 Site Design BMPs

- In 2010-2011, a total of 20 Source Controls were approved for nine Priority Projects. These Source Controls included nine Storm Drain Messaging and Signage, one Outdoor Materials Storage Area Design, seven Outdoor Trash Storage/Waste Handling, two Outdoor Loading/Unloading Dock Design, and two Outdoor Vehicle/Equipment Area Design. (L1)

S - Source Control BMPs



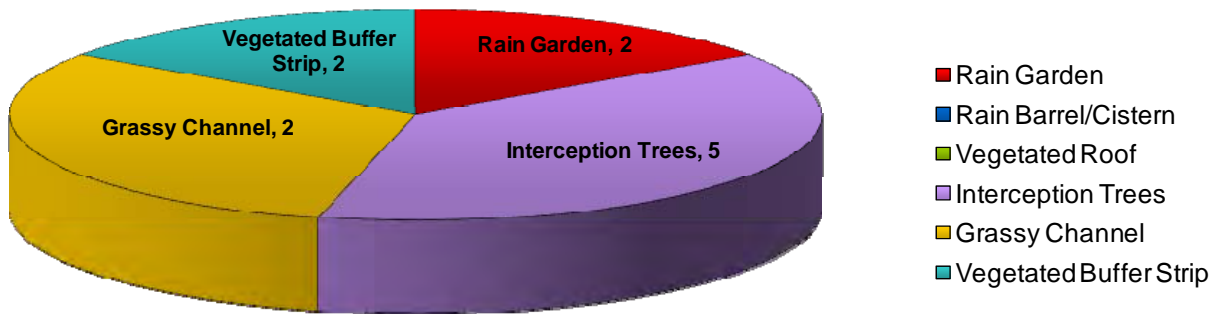
2010-2011 Source Control BMPs



Total: 20 Site Specific Source Control Measures

- In 2010-2011, a total of 11 Volume Reduction Measures were implemented for the nine Priority Projects. This includes two Vegetated Buffer Strips, two Rain Gardens, two Grassy Channels, and five Interception Trees. (L1)

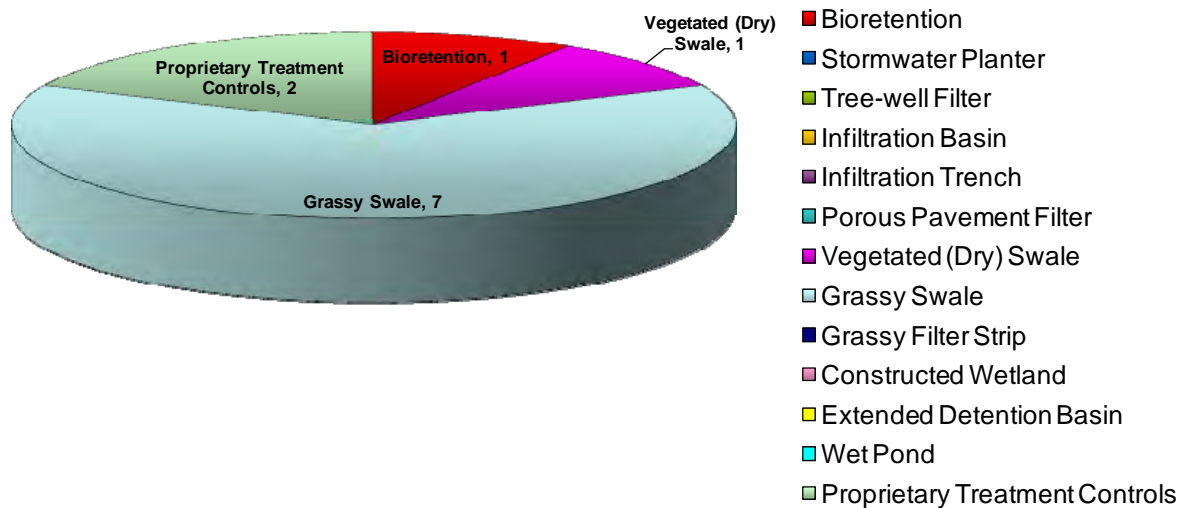
2010-2011 Volume Reduction Measures



Total: 11 Volume Reduction Measures

- In 2010-2011, a total of 11 Treatment Controls were implemented for the nine Priority Projects. This includes seven Grassy Swales, one Vegetated Swale, and one Bioretention. Two proprietary devices were implemented. In the past, Treatment Control Measures included a high percentage of proprietary control measures, so this may represent a shift in the types of Treatment Controls implemented within the City. (L1)

2010-2011 Treatment Control BMPs



Total: 11 Treatment Control Measures

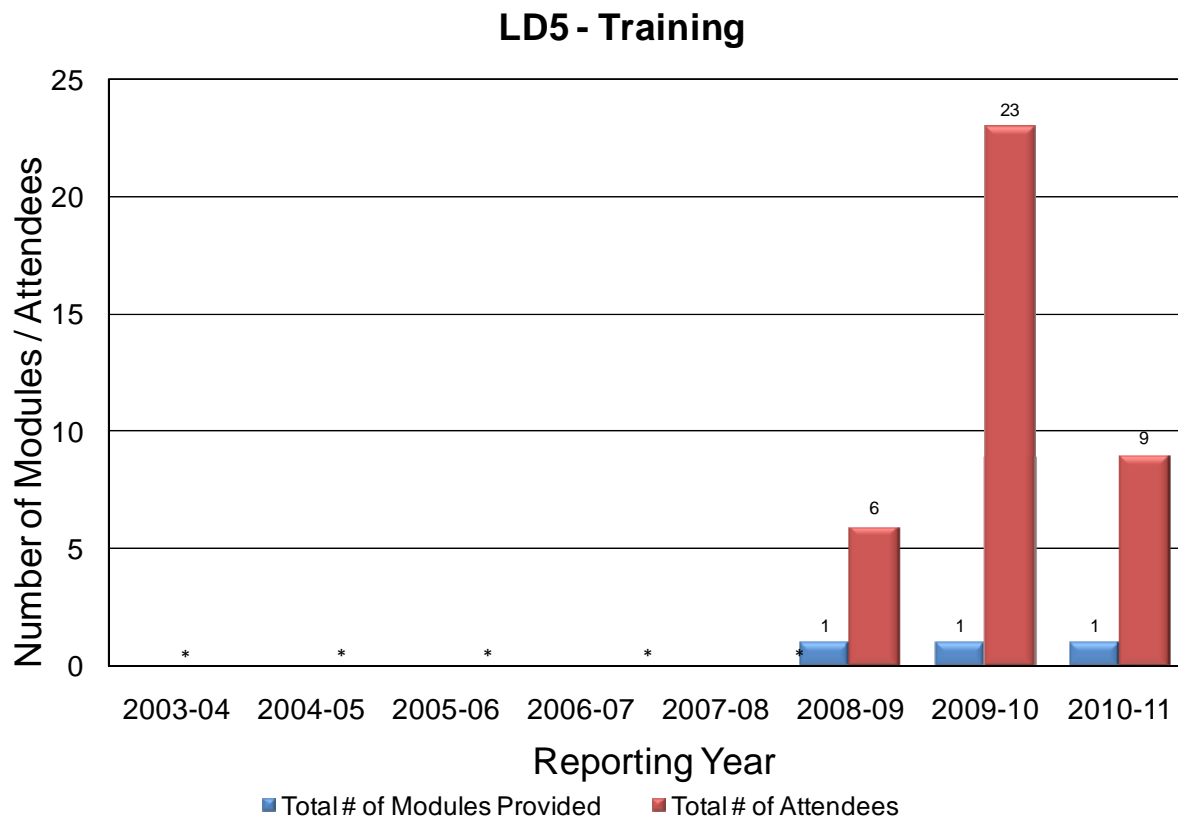
- The City completed the GIS layer of all permanent post-construction stormwater treatment devices that have been approved and constructed within the City to date. The City will continue to develop layers that identify devices maintained by the Consolidated Storm Drainage Maintenance Assessment District and identified the properties which receive benefit from those devices. (L1)
- Post-construction BMPs, whether City-maintained or privately maintained, are being inspected annually to ensure that all approved control measures have been implemented and are being maintained. (L1)

LD4 - Maintenance Agreement and Transfer

- Eight maintenance agreements were executed during the reporting period. All eight agreements will be privately maintained. (L1)
- The City finalized and implemented post-construction BMP maintenance oversight protocols. A letter was developed and sent to 68 owners of post-construction treatment devices to remind them of their maintenance responsibility and request documentation of maintenance activities. Responses 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)

LD5 - Training

- City staff attended an external training entitled “Construction General Permit Qualified SWPPP Developer (QSD) / Qualified SWPPP Practitioner (QSP).” (L1)



* Data not available.

7.9 PLANNING AND LAND DEVELOPMENT PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Planning and Land Development Program. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with Clean Water Act requirement to reduce the discharge of pollutants to the maximum extent practicable.

The program modifications that will be made to the Planning and Land Development Program during the next fiscal year (2011-2012) include the following:

- **Implement Post-Construction BMP Maintenance Oversight Protocols** – A second, more severe letter was generated and sent specifically to those owners who failed to respond to the first letter by November 5, 2010. This second letter indicates that failure to respond will result in an inspection completed by the City and that the owner will be invoiced for reimbursement of cost to the city as well as for any required maintenance. During 2011-2012, the City will follow up with those owners who have not responded to the second notice. The City will complete an inspection, and the owner will be invoiced for reimbursement of cost to the City as well as for any required maintenance.

Section 8

Water Quality Monitoring Program

The City of Stockton and County of San Joaquin NPDES municipal stormwater permit (Order No. R5-2007-0173) (Permit) requires monitoring of urban runoff and receiving waters as detailed in the Monitoring and Reporting Program (MRP). The MRP requires the characterization of runoff and receiving water, water column toxicity, as well as sediment toxicity. The MRP also requires an assessment of the effectiveness of control measures. Characterization elements are designed to monitor trends over long-term periods and to identify specific constituents of concern (COCs). As a component of the NPDES Permit, Water Quality Based Programs related to identified COCs including pesticides, pathogens, mercury, and low dissolved oxygen are used to identify the geographic and temporal scope of urban runoff impacts with respect to these constituents (see Section 9).

A brief description of the monitoring elements specified in each MRP section is provided in **Table 8-1**. For the purposes of the annual report, elements prescribed in Sections II.C through II.F are grouped under the title of “baseline monitoring”, following the structure of the MRP. Elements prescribed in Sections II.G, II.H, III.A, and III.B are grouped under the title of “supplemental monitoring”, since each of these elements has its own work plan and monitoring sites. Water Quality Based Programs prescribed in Section II.I are discussed in Section 9 of this Annual Report.

Table 8-1. Monitoring and Reporting Program Sections and Associated Programs

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, which is 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 Section 9)				X
III.A	Detention Basin Monitoring			X	
III.B	BMP Effectiveness Study			X	

8.1 BASELINE MONITORING ACTIVITIES

Baseline monitoring consists of urban runoff discharge, receiving water, and water column toxicity monitoring, as well as dry weather field screening. The urban runoff discharge, receiving water, and water column toxicity monitoring are coordinated activities so that monitoring for each occurs on the same day and receiving water and water column toxicity monitoring take place at the same sites. Baseline monitoring activities completed in 2010-2011 are summarized in **Table 8-2** and discussed in the following sections.

Table 8-2. 2010-2011 Baseline Monitoring and Reporting Program Accomplishments

BASELINE MONITORING	
Monitoring Activity	Status
Urban Runoff Discharge Characterization (see Section 8.1.2)	<ul style="list-style-type: none">• 1 wet weather event successfully monitored at 4 sites (11/19/10)• 2 dry weather events successfully monitored at 4 sites (4/4/11 and 5/25/11)• All events coordinated with receiving water monitoring
Receiving Water Monitoring (see Section 8.1.2)	<ul style="list-style-type: none">• 1 wet weather event successfully monitored at 4 urban sites (11/19/10)• 1 dry weather event successfully monitored at 2 upstream sites and 4 urban sites (4/4/11)• 1 dry weather event successfully monitored at 3 upstream sites and 3 urban sites (5/25/11)• All events coordinated with urban runoff discharge monitoring
Water Column Toxicity (see Section 8.1.3)	<ul style="list-style-type: none">• Toxicity monitoring completed during the same wet weather and dry weather events and at the same sites as receiving water monitoring (11/19/10, 4/4/11, 5/25/11)
Dry Weather Field Screening (see Section 8.1.4)	<ul style="list-style-type: none">• 20 outfalls screened (9/2/10 – 5/18/11)

8.1.1 Storm Tracking and Selection

Monitoring of stormwater runoff is a key component of the baseline monitoring program and requires a high level of coordination of equipment and field crews. Incoming storms are 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 will occur in the Stockton area. Wet weather monitoring is particularly challenging in the SUA, as 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 substantial rainfall, while southern Stockton remains dry, or vice versa.

Wet weather events are timed to capture urban runoff impacts with the highest possible representation of the targeted storm event (i.e., high percent capture) using flow-based composite samplers at urban discharge stations when possible. Grab sampling techniques, which are, when feasible, conducted near the peak of storm event hydrographs, are used at all receiving water stations. Due to standard method requirements, grab sampling is also used for the following constituents at urban discharge stations including:

- Oil and grease
- Indicator bacteria (*E. coli*, fecal coliform, and total coliform)
- Pesticides
- Mercury and methylmercury

During the 2010-2011 monitoring year (7/1/10 to 6/30/11), 16.7 inches of rainfall were recorded at the Stockton Metro Airport¹, and 16.5 inches were recorded at Stockton Fire Station². The Stockton Metro Airport is currently used for tracking storms. The daily total rainfall at Stockton Metro Airport is shown in **Figure 8-1** for 2010-2011. The total cumulative seasonal rainfall is also shown (compared to the historic average) as well as the timing of monitoring events. Historic average annual rainfall at the Stockton Metro Airport is 14 inches. The 2010-2011 monitoring year was wetter than the baseline, with total rainfall for the year at the Stockton Metro Airport 120% of historic rainfall.

Due to a lack of qualifying storms, **Figure 8-1** shows that only one storm event was monitored. A qualifying storm event is defined by the Permit as one with a predicted rainfall of at least 0.25 inches at a 70% probability of rainfall within 72 hours prior to the event. In addition, storm events must be preceded by at least 7 days of dry weather³ to be considered characteristic of wet weather. Although rainfall was above average, sampling qualifying storms proved to be difficult. There were numerous heavy storms which were not forecasted and several severe storms that dissipated. Furthermore, forecasted storms failed to produce sufficient rainfall. Finally, in some cases there were insufficient dry days between storm events.

¹ <http://mesowest.utah.edu/cgi-bin/droman/download.cgi?stn=KSCK&year1=2010&day1=20&month1=4&hour1=&timetype=LOCAL&unit=0>

² http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=SFS&dur_code=D&sensor_num=45&start_date=07/01/2009+00:00&end_date=06/30/2010+00:00

³ A dry day is defined as one with <0.1 inches rainfall

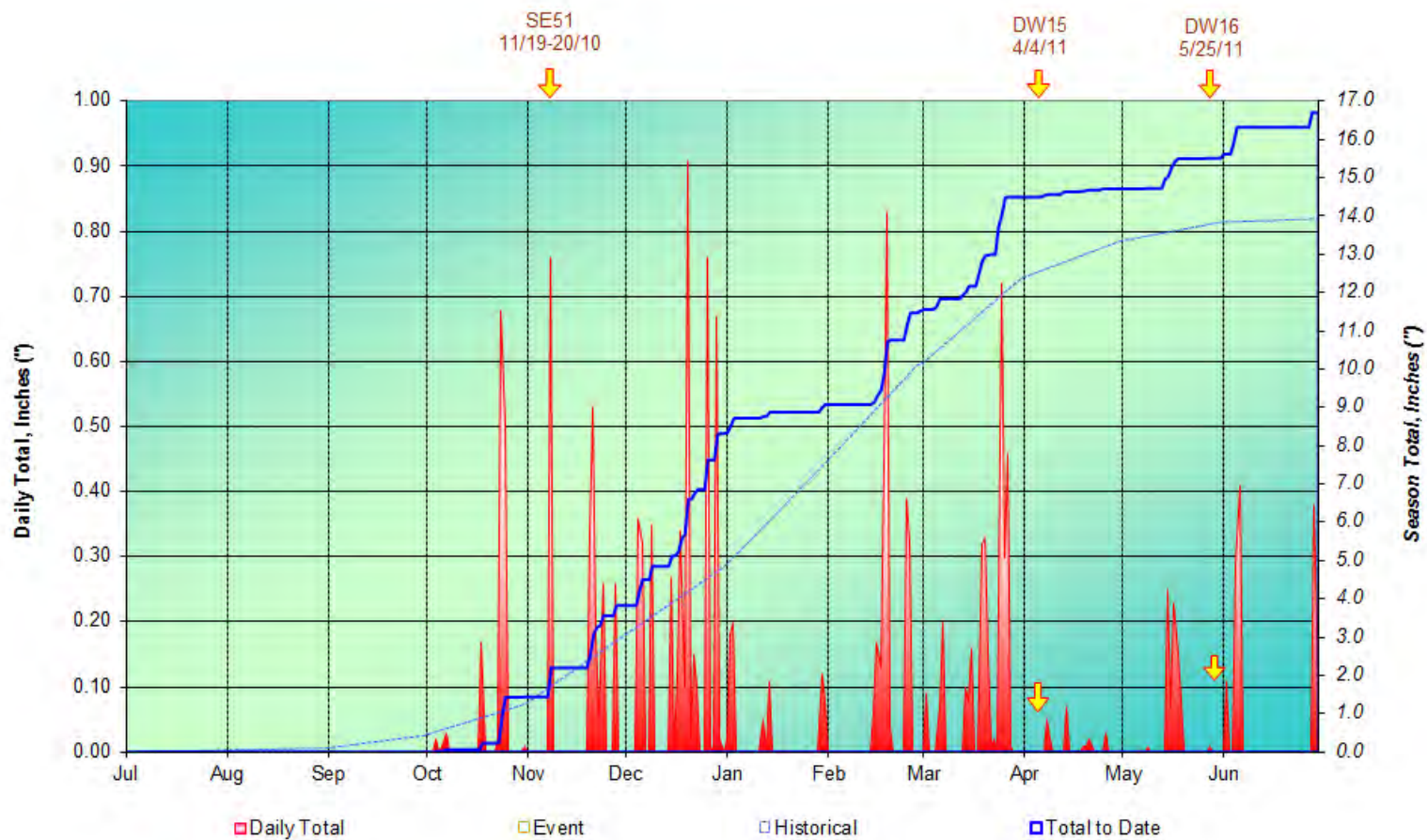


Figure 8-1. 2010-2011 Precipitation at Stockton Metro Airport and Captured Monitoring Events⁴

⁴ Precipitation data shown in these tables is taken from the Stockton Metro Airport. <http://mesowest.utah.edu/cgi-bin/droman/download.cgi?stn=KSCK&year1=2010&day1=20&month1=4&hour1=&timetype=LOCAL&unit=0>

8.1.2 Urban Runoff Discharge and Receiving Water Monitoring

Urban discharge monitoring characterizes the quality of urban runoff discharged directly to receiving waters within the SUA. Under the 2002-2007 permit, four receiving water sites were sampled downstream of the urban discharge sites to gauge the impact of discharge on receiving waters. These sites are termed urban receiving water sites because they characterize receiving water quality within the SUA. The Permit requires three additional receiving water sites upstream of urban discharge sites in order to characterize the quality of water entering the SUA. Three upstream sites rather than four are required because of the four waterways with urban discharge sites, only three extend upstream past the border of the SUA. The upstream receiving water sites were intended to be as close to the boundary of the SUA as possible, but waterbodies at the boundary of the SUA are often seasonally dry. Consequently, it was a challenge to keep sites near the SUA boundary, but at locations where flow was most likely to be present. However, even with this consideration, upstream sites were occasionally dry in 2010-2011. To increase the number of events where the Calaveras River was sampled upstream, the upstream receiving water site was moved to the Stockton Diverting Canal at the South Main Street Bridge in 2010-2011. A formal request for consideration was sent to the RWQCB during 2009-2010 to change the monitoring location. The Permittees received no response, but proceeded with the site change so as to collect more upstream samples.

The watersheds in which baseline urban discharge and receiving water monitoring sites are located are:

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

Urban discharge and receiving water sites that were sampled in 2010-2011 are shown in **Figure 8-2** (higher resolution maps are included in **Appendix H-1**). Urban receiving water sites are labeled with an “R” for receiving water. Sites upstream of the SUA are labeled with an “RUS” for receiving water, upstream. However, the Calaveras River upstream receiving water site is labeled CR-1 because it was moved from its previous location (CR-46RUS), to a preexisting monitoring location.

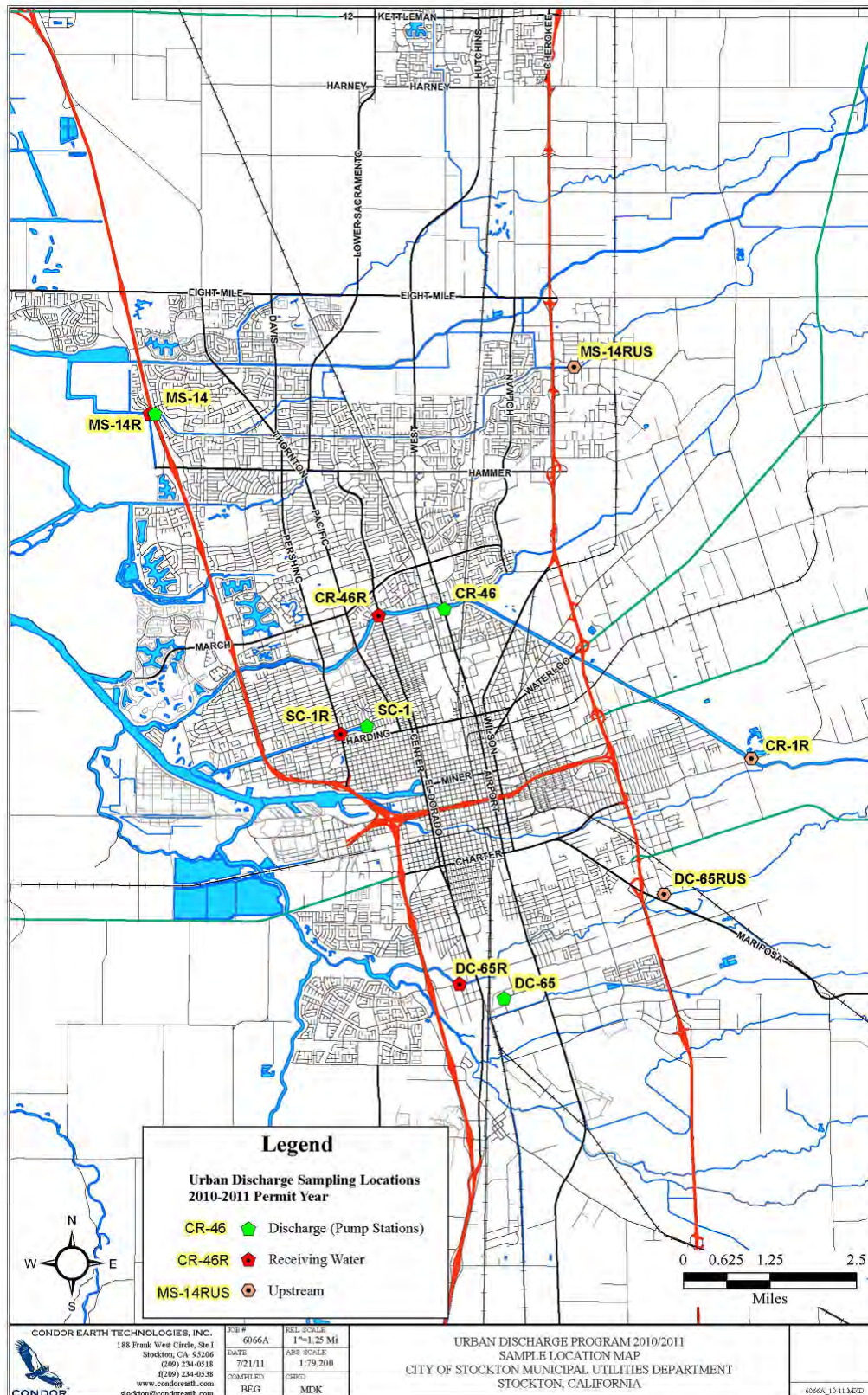


Figure 8-2. 2010-2011 Baseline Monitoring Locations Monitored in Stockton Urbanized Area

Urban discharge monitoring locations are outfalls representative of the various land uses within the urbanized area. These stations are summarized in **Table 8-3**. Receiving water locations are also listed in **Table 8-3**. The selected urban discharge monitoring stations are located at sites that are representative of commercial, industrial, residential, and mixed land uses, respectively. Land uses of receiving water monitoring locations are also shown in **Table 8-3**. A review of the table shows that the upstream sites may represent runoff from different land uses than urban sites.

Table 8-3. 2010-2011 Urban Discharge and Receiving Water Monitoring Sites

Monitoring Program	Station ID	Monitoring Site Location	Predominant Land Use	Watershed Area (acres)
Urban Discharge	MS-14	9211 Kelly Drive	Residential	533
	CR-46	4250 North West Lane	Commercial	169
	DC-65	555 Zephyr Drive	Industrial	343
	SC-1	840 Baker Place	Mixed use	1,866
Receiving Water	MS-14RUS	Mosher Slough at North Cole Drive	Residential / Agricultural	NA
	MS-14R	Mosher Slough at Mariners Drive Bridge	Residential	NA
	CR-1	Calaveras River at South Mainstream Bridge	Agricultural / Open space	NA
	CR-46R	Calaveras River at east side of the bridge for El Dorado St.	Commercial	NA
	DC-65RUS	Duck Creek at Stagecoach Road	Industrial / Agricultural	NA
	DC-65R	Duck Creek at Odell Ave. over-crossing	Industrial	NA
	SC-1R	Smith Canal at east side of the bridge for Pershing Avenue	Mixed use	NA

Monitoring was completed at each urban discharge and urban receiving water site once during the wet season and twice during the dry season, with the exception of Duck Creek. Monitoring was not completed at all upstream monitoring locations during some events due to lack of flow at the sampling sites, as discussed previously. Urban discharge sampling was not conducted during the one wet weather event on Duck Creek because the site historically used, DC65, was not discharging urban runoff. The discharge had been diverted to the sanitary sewer for the dry season as of 4/15/11 as part of the Permittees' Pollution Prevention Program. During this permit year, it was discovered that the pump discharge had been diverted to the sewer from roughly April 15 to September 15 since the mid-90s. It was determined that previous dry weather sampling had largely not been representative of urban discharge. The City and County, therefore, decided to select a new site for monitoring urban discharge on Duck Creek. However, at the time of these events, a new location had not been approved and no urban discharge sample was collected. A new site has been selected for the next permit year (See Section 8.6)

The timeline of the 2010-2011 events is shown in **Figure 8-1**. The sites that were sampled during each event are listed in **Table 8-4**. Wet weather events (labeled "SE" for storm event) and dry weather events

(labeled “DW” for dry weather) are numbered from the initiation of monitoring wet weather and dry weather events (in 1992 and 2004, respectively).

Table 8-4. Sites Sampled and Type of Sample Taken during 2010-2011 Monitoring Events

Monitoring Program	Station ID	SE51 11/19/10	DW15 4/4/11	DW16 5/25/11
Urban Discharge	MS-14	FWC	G	G
	CR-46	FWC	G	G
	DC-65	FWC	G	N
	SC-1	FWC	G	G
Receiving Water	MS-14RUS	I	I	G
	MS-14R	G	G	G
	CR-1	I	G	G
	CR-46R	G	G	G
	DC-65RUS	I	G	G
	DC-65R	G	G	G
	SC-1R	G	G	G

Notes:

FWC = Flow weighted composite

G = Grab

I = No sample taken due to insufficient flow

N = No sample taken as pump station discharge had been diverted the sanitary sewer as part of Permittees' Pollution Prevention Program

Details of 2010-2011 Urban Runoff Discharge and Receiving Water Wet Weather Monitoring Event

Each monitoring event is unique in terms of the antecedent weather conditions, flow in the waterbody, field conditions, etc. Wet weather events are particularly influenced by the amount and intensity of rainfall and time of sampling with respect to the rainfall hydrograph. While field notes are taken during dry weather events, more in-depth field measurements are taken to characterize wet weather events. Accordingly, field measurements for wet weather event SE51 are summarized in **Table 8-5**.⁵

⁵ Precipitation data shown in these tables is taken from the Stockton Metro Airport. Data for this site is available at: <http://mesowest.utah.edu/cgi-bin/droman/download.cgi?stn=KSCK&year1=2010&day1=20&month1=4&hour1=&timetype=LOCAL&unit=0>

Table 8-5. Details of Wet Weather Event SE51 on 11/19-20/10

Rainfall/Runoff	MS	CR	DC	SC
Time of first rain		21:23	11/19/10	
Time of last rain		2:55	11/20/10	
Total rain (in)		0.34		
Time of first sample	22:27	22:39	22:41	22:52
Time of last sample	02:24	02:41	01:14	02:37
Total runoff volume (kcf)	419.59	62.80	99.69	516.93
Percent storm capture	62	100	56	90
Number of successful aliquots	39	39	72	39
Total sampling time (hrs)	3:57	4:02	2:33	3:45
Grab sample time	23:45	23:13	23:50	22:34
Upstream Receiving Water Conditions				
Sampling time	Insufficient	Insufficient	Insufficient	No
Flow measurement time	flow to	flow to	flow to	upstream
Velocity (fps)	take	take	take	receiving
Width (ft)	upstream	upstream	upstream	water site
Depth (ft)	receiving	receiving	receiving	
	water	water	water	
	sample	sample	sample	
Downstream Receiving Water Conditions				
Sampling time	00:25	23:58	01:45	23:25
Flow measurement time	01:20	00:40	01:55	00:25
Velocity (fps)	1.0	0.01	6	0.3
Width (ft)	88	60	48	120
Depth (ft)	2.5	5.5	1.0	2.9
Antecedent Conditions				
Time of last precipitation		11/7/2010		
Date of last storm > .1		11/7/2010		
Time since last storm		12 days		
Date of last storm > .25		11/7/2010		
Time since last storm		12 days		
Cumulative rainfall to date (in)		2.54	(10/3/10 to 11/19/2010)	

Monitored Constituents and Analytical Methods

The analytical methods for urban discharge and receiving water monitoring are in accordance with the reporting limits (RLs) that are specified in the MRP. During the 2010-2011 events, samples were collected according to the constituent “schedule” shown in **Table 8-6**.

Table 8-6. Constituent Analysis for Urban Runoff Discharge and Receiving Water Monitoring

Constituent	EPA Method Used in Analysis	Target Reporting Limit	Units
Conventionals			
Turbidity	180.1	0.1	NTU
Total Suspended Solids	160.2	2	mg/L
Total Dissolved Solids	160.1	2	mg/L
Total Organic Carbon	415.3	1	mg/L
Biochemical Oxygen Demand	405.1	2	mg/L
Chemical Oxygen Demand	SM 5220D	20 - 900	mg/L
Alkalinity	310.1	2	mg/L
Oil and Grease	1664A	5	mg/L
Specific Conductance	120.1	1	µmhos/cm
pH	SM 4500-H+B	0.0 - 14.0	std. units
Temperature	Field	0.1	°C
Dissolved Oxygen	Field	0.1	mg/L
Nutrients			
Total Phosphorous	365.1	0.05	mg/L
Nitrate-Nitrite	300.0	0.1	mg/L
Total Ammonia-Nitrogen	350.1	0.1	mg/L
Total Kjeldahl Nitrogen	351.2	0.1	mg/L
Bacteria			
<i>E. coli</i> (fresh waters)	SM 9223B	10	MPN/100mL
Fecal coliform	SM 9221B	20	MPN/100mL
Total coliform	SM 9221B/9223B	20	MPN/100mL
Metals			
Aluminum (Al)	200.8	50	µg/L
Copper (Cu)	200.8	0.5	µg/L
Iron (Fe)	200.8	100	µg/L
Lead (Pb)	200.8	0.5	µg/L
Mercury (Hg)	1631E	0.5	ng/L
Methylmercury	Draft EPA 1630	0.05	ng/L
Zinc (Zn)	200.8	1	µg/L
Hardness	SM 2340H+B	2	µg/L
Pyrethroids	625mNCI	5	ng/L
Organophosphate Pesticides	625m		µg/L
Chlorpyrifos		0.01	µg/L
Diazinon		0.05	µg/L

Urban discharge and receiving water quality results for the constituents in **Table 8-6** are included as **Appendix H-2**, which contains information regarding:

- Sample location
- Station type (urban discharge [UD] or receiving water [RW])
- Sampling method (composite or grab)
- Sample date and time
- Sample result
- Method detection limits (MDLs)
- RLs
- Data qualifiers
- Comparison to the lowest applicable water quality objective (WQO)
- The analyzing lab

For analyses that were non-detect, the value is reported as less than the MDL where the MDL is provided by the lab; otherwise, the value is reported as less than the RL. **Table 8-7** through **Table 8-9** summarize urban discharge results for any constituent which caused a cause or contribute exceedance during this permit year. Urban discharge concentrations that exceeded the WQO are in bold in **Table 8-7** through **Table 8-9**. A discussion of data quality evaluation, Quality Assurance/Quality Control (QA/QC), is included in Section 8.3.

Table 8-7. Concentrations of Potential Constituents of Concern at Urban Discharge Sites during Wet Weather Event SE51 on 11/19/10

Constituent of Concern	Units	WQO	MS-14	CR-46	DC-65	SC-1
Aluminum, total	mg/L	200	120	660	1,900	1,100
Copper, total	µg/L	H	4.5	19	12	16
Iron, total	µg/L	300	160	1,200	2,600	1,600
Zinc, total	µg/L	H	27	210	210	110
Dissolved oxygen	mg/L	>6	10.89	16.01	10.3	6.93
Oil and grease	mg/L	0*	<5.0 ND	<5.0 ND	<5.0 ND	<5.0 ND
<i>E. coli</i>	MPN/100mL	235	3,255	1,674	3,873	14,136
Fecal coliform	MPN/100mL	400	23,000	3,000	11,000	130,000

Notes:

Values in **bold** exceed the water quality objective

* While the water quality objective for oil and grease is 0 mg/L, the method detection limit was 3 mg/L for this event. A non-detect (ND) result is therefore not considered an exceedance.

H = This WQO is hardness based, so the WQO is specific to the hardness measured at each site.

ND = This constituent was not detected in the discharge or receiving water and is given as less than the method detection limit.

Table 8-8. Concentrations of Constituents of Concern at Urban Discharge Sites during Dry Weather Event DW15 on 4/4/11

Constituent of Concern	Units	WQO	MS-14	CR-46	DC-65	SC-1
Aluminum, total	µg/L	200	32	170	910	55
Copper, total	µg/L	H	3.3	120	13	2.3
Iron, total	µg/L	300	110 M1	480 M1	1,400 M1	120 M1
Zinc, total	µg/L	H	6.9	140	30	7.4
Oil and grease	mg/L	0*	<1.3 ND	<1.4 ND	2.4 J	<1.3 ND
Dissolved Oxygen	mg/L	>5	5.71	2.96	4.74	9.38
<i>E. coli</i>	MPN/100mL	235	7,701	110	20	1,467
Fecal coliform	MPN/100mL	400	5,000	170	80	2,200

Notes:

Values in **bold** exceed the water quality objective

* While the water quality objective for oil and grease is 0 mg/L, the method detection limit for this event is 5 mg/L. A non-detect (ND) result is therefore not considered an exceedance.

H = This WQO is hardness based, so the WQO is specific to the hardness measured at each site.

M1 = The associated matrix spike and/or matrix spike duplicated were above acceptable limits due to matrix interference. This result should be considered an estimate.

ND = This constituent was not detected in the discharge or receiving water and is given as less than the method detection limit.

Table 8-9. Concentrations of Constituents of Concern at Urban Discharge Sites during Dry Weather Event DW16 on 5/25/11

Constituent of Concern	Units	WQO	MS-14	CR-46	SC-1
Aluminum, total	mg/L	200	14	190	77
Copper, total	µg/L	H	2.2	17	4.2
Iron, total	µg/L	300	50	620	190
Zinc, total	µg/L	H	5.1	72	14
Dissolved Oxygen	mg/L	5/6?	5.46	2.09	3.04
Oil and grease	mg/L	0*	<1.3 ND	<1.4 ND	<1.3 ND
<i>E. coli</i>	MPN/100mL	235	216	880	7,270
Fecal coliform	MPN/100mL	400	500	2200	80,000

Notes:

Values in **bold** exceed the water quality objective

* While the water quality objective for oil and grease is 0 mg/L, the method detection limit for this event is 5 mg/L. A non-detect (ND) result is therefore not considered an exceedance.

H = This WQO is hardness based, so the WQO is specific to the hardness measured at each site.

ND = This constituent was not detected in the discharge or receiving water and is given as less than the method detection limit.

A discussion of urban discharge water quality objective exceedances, which potentially caused or contributed to receiving water exceedance and a map of exceedance locations is included in Section 8.4.

8.1.3 Water Column Toxicity Monitoring

Water column toxicity monitoring was conducted at receiving water sites during one wet weather and two dry weather events in 2010-2011 in conjunction with baseline receiving water monitoring. Pacific EcoRisk tested the samples for toxicity. For each event, samples collected were compared to a control sample to determine if there was a statistically significant difference in *Ceriodaphnia dubia* survival and

reproduction and fathead minnow survival and growth between the control and the environmental samples.⁶ During SE51, pathogen related mortality (PRM) was observed in fathead minnow, so Pacific EcoRisk used an alternate testing method to that used in past years for the fathead minnow toxicity test. This method, known as the Geis method, was used for SE51 and for following events to prevent further PRM. This alternate method is approved by the Regional Water Board and the EPA. In addition, Pacific EcoRisk experienced significant problems with the *Ceriodaphnia dubia* cultures for samples collected on May 25, 2011 (DW16) and due to the laboratory control problems the toxicity data was not considered valid or in compliance with the Permit's requirements. Therefore a makeup event was conducted on June 17, 2011.

In accordance with the Permit, if 100% mortality of *Ceriodaphnia dubia* or fathead minnow is detected within 24 hours of test initiation, a dilution series must be conducted. If statistically significant toxicity is found at the end of a 6 day test for *Ceriodaphnia dubia* or a seven-day test for fathead minnow, a targeted Toxicity Identification Evaluation (TIE) is conducted. Finally, if a toxicant is identified through the targeted TIE process, a Toxicity Reduction Evaluation (TRE) is performed to identify the sources of toxicity and discuss appropriate BMPs to eliminate the causes of toxicity. Complete results of water column toxicity testing are given in **Appendix H-3**.

During 2010-2011, no samples demonstrated statistically significant toxicity.

8.1.4 Dry Weather Field Screening

Provision II.F of the Permit requires the Permittees to screen 20% of their outfalls annually to identify potential illicit connections and illegal discharges. In 2010-2011, 20 outfalls, roughly 20% of all 113 outfalls, were screened from 9/2/10 to 5/13/11. Outfalls screened in 2010-2011 are shown in **Figure 8-3** (higher resolution maps are included in **Appendix H-1**).

⁶ 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 lab control.

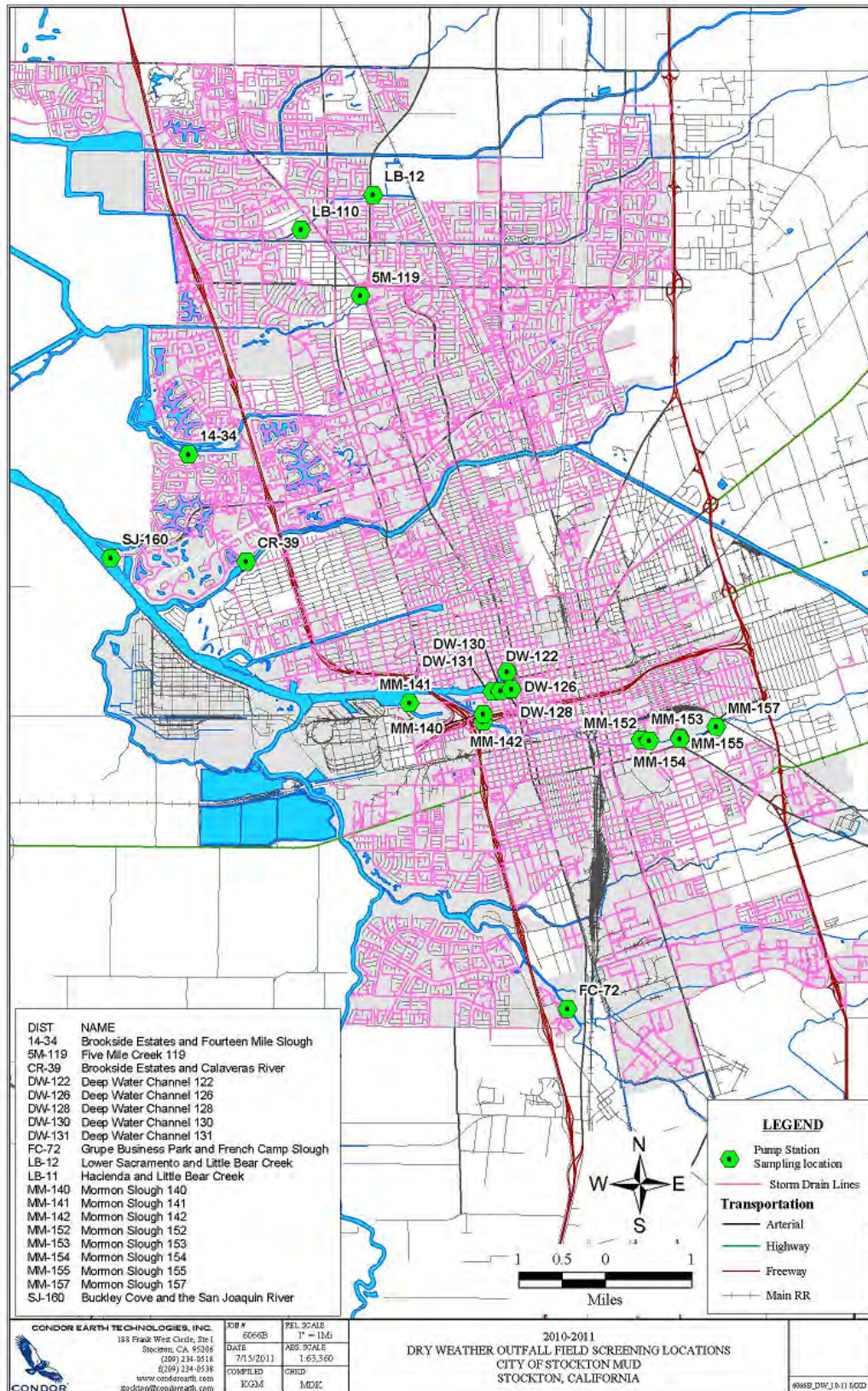


Figure 8-3. Dry Weather Field Screening Outfalls Monitored in 2010-2011

Of the 20 outfalls, two contained sufficient flow for field screening analysis. Samples from these outfalls were tested for temperature, pH, phenols, chlorine, total copper, electrical conductivity (EC), methyl blue activated substances (MBASs, which are detergents/surfactants), and turbidity. Action levels for these constituents set in the Permit are shown in **Table 8-10**. If these action levels are exceeded, a follow-up investigation is conducted.

Table 8-10. Dry Weather Field Screening Action Levels

Constituent	Units	Action Levels
Phenols	mg/L	>0.017
Total copper	mg/L	>2
Electrical Conductivity	µmhos/cm	>700
Methyl Blue Activated Substances (MBAS)	mg/L	>0.275
Turbidity	NTU	>55

Documentation of all the outfalls screened is given in **Appendix H-4**. The two sites with sufficient flow for sampling were 14-24 (Brookside Estates and Fourteen Mile Slough) and LB-12 (Lower Sacramento and Little Bear Creek). 14-34 exceeded action levels for EC at 1,051 µmhos/cm. LB-12 did not exceed any action levels. For each site with sufficient flow for sampling, a follow up event was conducted to sample the outfall a second time. Again 14-34 exceeded action levels for EC only at 1,057 µmhos/cm. LB-12 did not exceed any action levels.

Upstream source tracking was conducted for 14-34 on 5/12/11 immediately following the first exceedance of the EC action level. Source tracking locations and EC levels at these locations are shown in **Figure 8-4**. Upstream source tracking was also conducted the following day immediately following the second exceedance of the EC action level. Source tracking locations and EC levels at these locations are shown in **Figure 8-5**. Higher resolution maps are included in **Appendix H-1**.

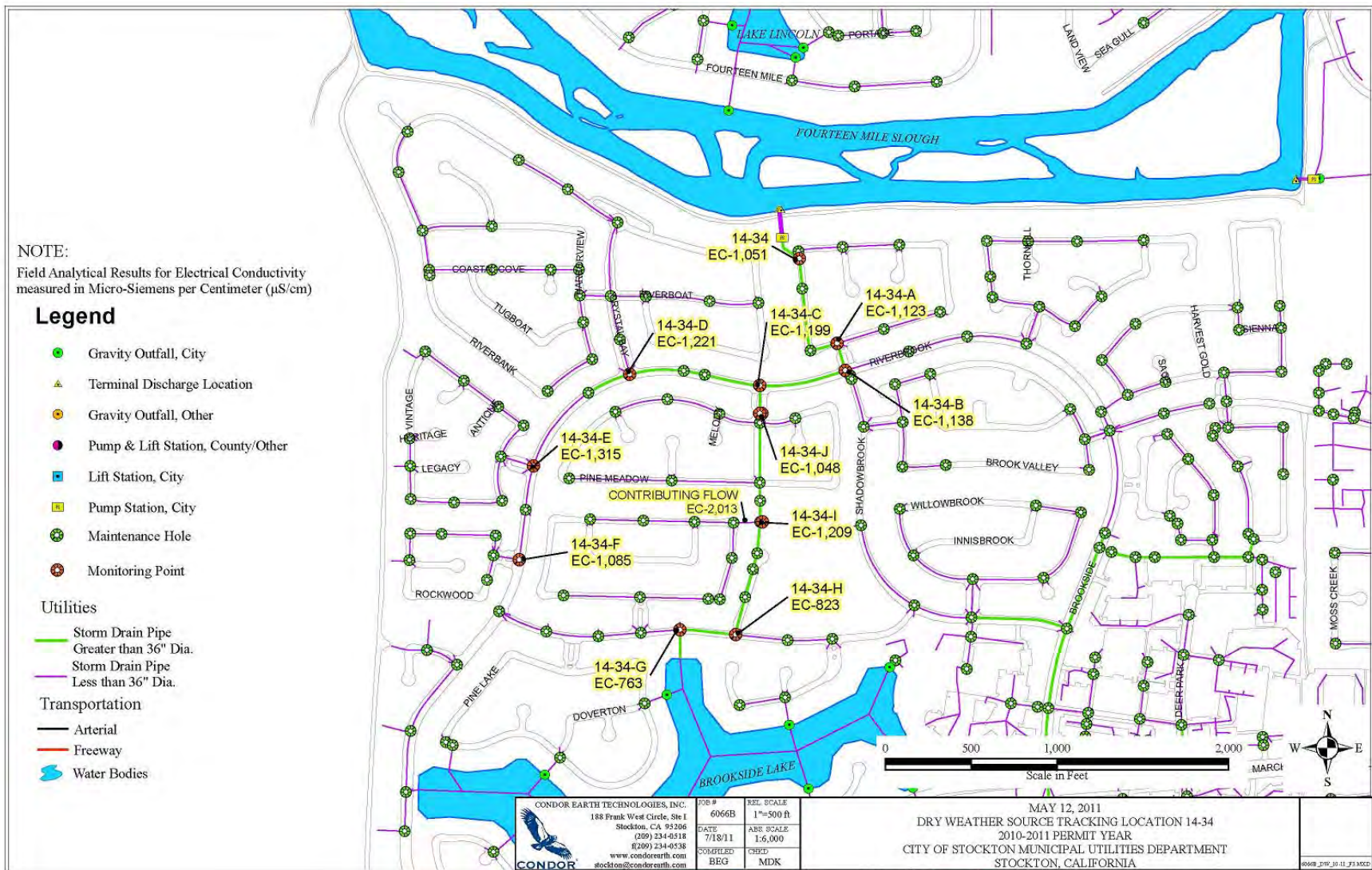


Figure 8-4. Initial Source Tracking Results Upstream of Outfall 14-34 on 5/12/11

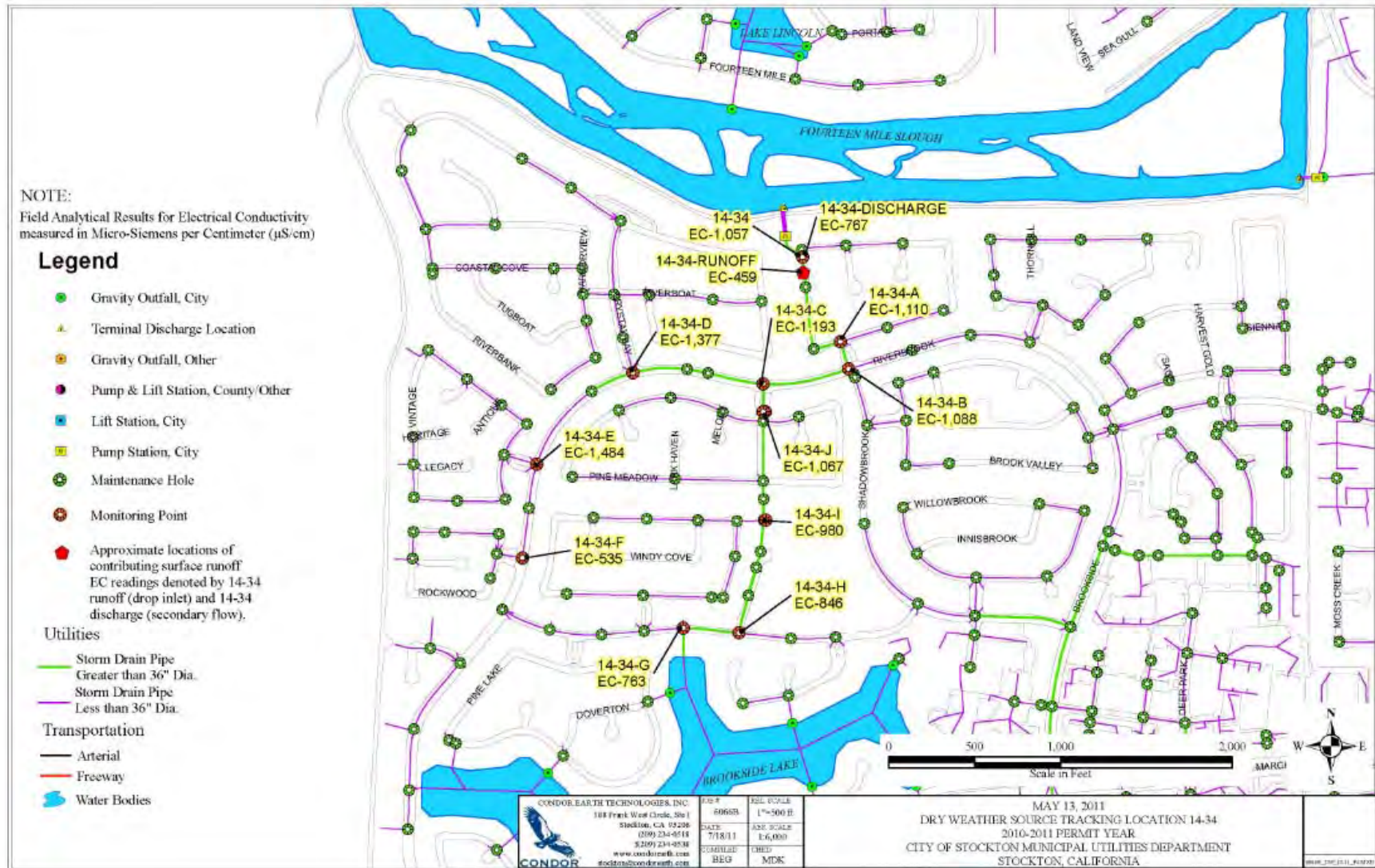


Figure 8-5. Follow-Up Source Tracking Results Upstream of Outfall 14-34 on 5/13/11

4-34 receives discharge from a series of lakeside residential gated communities. The area appears to have community recreation areas including a pool, golf course/park, and green space. In addition, a number of the residences have in-ground pools. 14-34 does receive discharge from Brookside Lake; however, the storm drain input from the lake, while still exceeding the action level, contained the lowest EC concentration (763 $\mu\text{mhos/cm}$) measured during both the initial source tracking event on 5/12/11 and the follow-up event of 5/13/11. Surface water runoff from domestic sprinkler systems did not appear to be a contributing factor (459 $\mu\text{mhos/cm}$ on 5/13/11). The highest EC measurement (2,013 $\mu\text{mhos/cm}$) was collected from contributing secondary flow from a gated community to the main storm drain system, as shown in **Figure 8-4**. Overall, field results of the follow-up inspections conducted on 5/13/11 were consistent with the initial field inspection results. The gated communities hampered the source tracking effort; however, it is suspected that the high EC concentrations were the result of residential landscaping activities. In 2005-2006 flow from this outfall also exceeded EC action levels and it was also concluded that irrigation runoff was a likely source. However, groundwater infiltration is also a likely source, and according to Permit Section B.2.c. uncontaminated groundwater infiltration is not prohibited.

As is discussed in Section 8.6, EC is the only action level that has been exceeded during the entire permit term's dry weather field screening activities and each case the source has been suspected not to be an illicit discharge.

Further discussion of measures taken to identify potential illicit discharges and illegal connections is included in Section 2 of this Annual Report.

8.2 SUPPLEMENTAL MONITORING

Supplemental monitoring completed in 2010-2011 is summarized in **Table 8-11**.

Table 8-11. 2010-2011 Supplemental Monitoring and Reporting Program Accomplishments

SUPPLEMENTAL MONITORING AND REPORTING	
Monitoring Activity	Status
Legion Park BMP Study (see Section 8.2.1)	<ul style="list-style-type: none">• Monitoring was completed in 2009-2010
BMP Effectiveness Study (see Section 8.2.2)	<ul style="list-style-type: none">• 1 wet weather event (11/19-20/10) monitored at Filterra unit
Bioassessment (see Section 8.2.3)	<ul style="list-style-type: none">• Monitoring was completed in 2009-2010
Sediment Toxicity Work Plan Toxicity Monitoring (see Section 8.2.4)	<ul style="list-style-type: none">• 1 dry weather event successfully monitored at 1 site (8/16/10)• 1 post wet weather event successfully monitored at 3 sites (11/10/10)• 1 dry weather event successfully monitored at 3 sites (6/16/11)
Detention Basin Monitoring (see Section 8.2.5)	<ul style="list-style-type: none">• 1 wet weather event successfully monitored influent and discharge (11/19-20/10)• 1 wet weather event successfully monitored sediment toxicity (12/8/10)• 1 dry weather event successfully monitored sediment toxicity and sediment chemistry (8/18/10)

8.2.1 Legion Park Best Management Practice (BMP) Study

Provision III.B of the Permit requires that two best management practice (BMP) effectiveness studies be conducted. The Permittees elected to meet the requirements for one of these studies by continuing to monitor the media filter stormwater treatment (MFST) system at the Legion Park Pump Station (LPPS). The goal of the project was to reduce the loading of constituents associated with urban runoff that is discharged from the LPPS into the Yosemite Lake/Smith Canal receiving water system.

The drainage area for the LPPS is approximately 1,860 acres. The LPPS includes five pumps that discharge from the station's wet well into Yosemite Lake. The LPPS also includes a 2,800 gallons per minute (gpm) 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 into the LPPS.

The MFST system was installed by the City in late 2005 and was monitored in 2006 and 2007 in response to requirements of the previous permit. Between June 2009 and June 2010, the LPPS MFST system influent and discharge were sampled for laboratory analysis of nutrients, bacteria, conventionals, metals, and pesticides. The environmental, quality assurance/quality control and field data for those events were provided as Appendix H-4 to the 2009-2010 Annual Report. Provision III.B of the Permit requires monitoring to continue until the effectiveness of the BMP can be determined; however, based on a preliminary analysis of these monitoring data, no clear trends regarding removal efficacy were evident. It

was determined that more time was needed for data analysis, and in the Annual Reports, the Permittees committed to conducting a review of the LPPS MFST system monitoring efforts by 12/31/10.

A memorandum entitled, “Evaluation of Legion Park Media Filter Stormwater Treatment System,” was submitted to the Regional Board on 12/21/10 (**Appendix H-5**).

8.2.2 BMP Effectiveness Study

The Permittees were required to identify and develop a Sampling and Analysis Plan (SAP) for a Low Impact Development (LID) BMP in 2008-2009. The Sampling and Analysis Plan indicated that the Permittees would sample five wet weather events in 2010-2011 and 2011-2012. The Permittees identified a Filterra unit that has recently been installed at the City’s Waterfront Promenade and Marina Redevelopment Project area for the BMP Effectiveness Study. Stormwater management for the Waterfront Marina is provided in part by a Filterra device that drains up to 0.42 acres of parking lot. The Filterra device is a pre-cast concrete box with a small tree planted in a bed filled with engineered soil media. It is installed along the edge of the parking lot and is designed to receive, retain, and treat stormwater runoff from the adjoining paved surfaces. The dimensions of the Filterra installed at the Downtown Marina are 6’ x 8’ and the soil media has an infiltration rate of approximately 100 inches per hour.

The Permittees developed a Sampling and Analysis Plan (SAP) for monitoring the Filterra unit and monitored one pilot event in 2009-2010 on 4/11/10 and one event in 2010-2011 on 11/19/10. During initial observation of the unit during the 4/11/10 storm event, heavy runoff from the surrounding area to the catch basin overwhelmed the treatment pipe and impacted treated discharge with untreated sheet flow. This remained a problem in 2010-2011.

Table 8-12 characterizes the 4/11/10 and 11/19/10 rainfall events monitored, respectively, and antecedent conditions to these events.

Table 8-12. Details of Wet Weather Events on 4/11/10 on 11/19/10

Rainfall/Runoff	4/11/10	11/19/10
Time of first rain	13:55	21:23 11/19/10
Time of last rain	17:55	2:55 11/20/10
Total rain (in)	0.29	0.34
Time of first sample	15:15	2:50 11/20/10
Time of last sample	17:45	2:50 11/20/10
Antecedent Conditions		
Time of last precipitation	4/5/2010 03:55	11/8/10
Date of last storm >0.1	4/4/2010	11/8/10
Time since last storm	7 days	11 days
Date of last storm > 0.25	4/4/2010	11/8/10
Time since last storm	7 days	11 days
Cumulative rainfall to date (in)	12.38 (7/1/09 to 4/10/2010)	2.2 (7/1/10 to 11/19/10)

During the 4/11/10 pilot event, sandbags and plastic sheeting were used to dam this untreated flow from entering the unit discharge as much as possible. However, because the discharge could not completely be isolated, the data collected did not appear representative of the BMPs removal capabilities. A solution to the problem was not found in 2010-2011; therefore, the data from 11/19/10 also did not appear representative.

The Filterra unit generally shows inconsistent removal of constituents with the exception of total metals. It appears to decrease EC levels slightly, but remove TDS inconsistently showing no trend in the reduction of ions in stormwater. It removed TSS, turbidity, and SSC inconsistently, so the removal of sediment is not proven effective. The unit appears to increase the amount of nitrite and nitrate but remove TKN, again giving inconclusive results. It does appear to increase the concentration of phosphorus and orthophosphate in discharge, so overall nutrient concentrations may be increased by the unit.

Samples were not analyzed for dissolved metals and mercury during the 4/11/10 event due to miscommunication with the lab, and one event is insufficient data to characterize dissolved metals and mercury removal. However, the unit does appear to remove total metals. Total copper, iron, lead, and zinc were removed by 13% to 90% during both events. Methyl mercury is removed inconsistently.

Samples were also not analyzed for diazinon during the 4/11/10 event due to miscommunication with the lab, so there is insufficient data to assess diazinon removal. Generally, the unit does not appear to affect pyrethroid concentrations. The concentrations of most pyrethroids are roughly similar in both influent and discharge. During the 2010-2011 event, the unit appeared to increase the amount of esfenvalerate and permethrin to such an extent (650% and 525% increase, respectively) that it is unlikely that the data is representative.

The inconsistency of percent removals suggests that the unit is either ineffective or the sampling procedure is unable to gather representative data, as explained previously. However, total metals do appear to be removed, based on a very limited number of monitoring events.

8.2.3 Bioassessment Report

Bioassessment monitoring was required by the 2002-2007 permit and was successfully completed in 2004 and 2005. 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). The SWAMP is a statewide effort to develop standardized measures and criteria for monitoring and assessing the physical and biological integrity of the state's waters with the goal of developing a regional IBI for each geographic region of California. In general, the ultimate goal of bioassessment is to assess the biological integrity of receiving waters, to detect biological responses to pollution, and to identify probable causes of biological responses not detected by more traditional chemical and physical water quality analyses.

The Permit calls for an assessment of the data collected in 2004 and 2005, which was included as Appendix H-4 in the 2007-2008 Annual Report. Given the limited amount of data, the report was only a preliminary analysis. The assessment recommended continued monitoring once a regional IBI is developed. As the development of an IBI may take some time, the Permittees opted to continue monitoring in 2009-2010. This monitoring was discussed in the 2009-2010 Annual Report and a complete report of the bioassessment activities was included as Appendix H-5 to the 2009-2010 Annual Report.

8.2.4 Sediment Toxicity Work Plan Monitoring

The City and County were required by Permit Provision D(26)(a-i) and Monitoring and Reporting Program (MRP), Provision II(G) to submit a sediment toxicity work plan (Sediment Toxicity Work Plan⁷) and to commence sediment quality characterization sampling to:

1. Characterize sediment toxicity within SUA subject to urban discharge
2. Assess the significance of the increase in urban pyrethroid usage
3. Based on the results, identify best management practices (BMPs) for controlling sources of sediment toxicity

During 2010-2011, sediment toxicity samples were collected at the Smith Canal, Five Mile Slough, and Calaveras River receiving water sites as shown in **Table 8-13**. Monitoring locations were based on site selection requirements summarized in Section 3.0 of the Sediment Toxicity Work Plan (Appendix H-8 of the 2009 SWMP). The requirements included sampling of sites downstream of discharges from developments of various ages and land uses.

Table 8-13. 2010-2011 Sediment Toxicity Work Plan Monitoring Locations

Waterbody	Monitoring Location ¹	Receiving Water Site ID	Land Use	Approximate Development Age
Smith Canal	Yosemite Lake	SC-5R	Residential/Commercial	> 25 years
Five-Mile Slough	Swenson Park Golf Course	5M-27R	Residential/Recreational	> 25 years
Calaveras River	West Lane Bridge	CR-46R	Mixed Use ²	5 to > 25 years

1. Nearest cross street or urban feature

2. Mixed Use = Residential/Commercial/Industrial Uses

The entire length of Smith Canal (approximately 2.3 miles from the San Joaquin River (SJR) confluence to its terminus at Yosemite Lake), approximately 1.3 miles of Five-Mile Slough (from Alexandria Place to Fourteen Mile Slough), and the entire urbanized length of the Calaveras River (approximately 5.8 miles from the SJR confluence to the Stockton Diversion Canal) have been classified as pesticide-impaired under the Federal Clean Water Act Section 303(d). The tidally influenced waterways receive flow from

⁷ Permittees' *Sediment Toxicity Work Plan*, dated 3/27/08, revised June 2009.

established (>25 years old) residential/commercial developments with contributing flow from recreational areas (golf courses and parks)

Sites in **Table 8-13** were sampled during one “post-first flush” storm event⁸ and one dry weather event. The relative placement of the 2010-2011 sediment toxicity sampling sites within the SUA is shown in **Figure 8-6**. SC-5R is located downstream of the Legion Park Pump Station outfall located in the northeast corner of Yosemite Lake. The Legion Park Pump Station drains approximately 62% of the Smith Canal watershed (approximately 1,866 acres). 5M-27R is located downstream of the 5M-27 pump station which receives discharge from a predominantly upscale residential area (approximately 670 acres), including a golf course and park. CR-46R is within 300 feet downstream of the CR-43 and CR-46 West Lane pump stations. These two West Lane pump stations discharge a mixed use area located between two Union Pacific Railroad lines whose development ranges in age from approximately five to older than 25 years.

Sediment samples were analyzed by using the EPA standardized ten-day sediment toxicity testing method (EPA/600/R-99/064) for freshwaters using the amphipod *Hyalella azteca*, and for total organic carbon (TOC), and grain size. If statistically significant toxicity⁹ is observed, follow-up testing consisting of chemical analyses for chlorpyrifos and pyrethroid pesticides is conducted.

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 typically 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.

⁸ 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.

⁹ Statistically significant toxicity is defined as a greater than or equal to 50% increase in *Hyalella azteca* mortality.



August 16, 2010 CR-46 Dry Weather Sediment Sampling Event

The Sediment Toxicity Work Plan calls for sampling of CR46R during both 2009-2010 and 2010-2011. During the 6/21/10 monitoring event, the incorrect site was sampled, and so an additional monitoring event at CR-46R was required during 2010-2011. A dry weather sampling event at CR-46R was conducted on 8/16/10 following 80 days of no measurable rainfall; 0.12 inches of rain was last recorded on 5/27/10. The water column in the sampling area was approximately one foot.

Sediment characterization and toxicity monitoring results from the August 2010 dry weather event are summarized in **Table 8-14**.

Table 8-14. 8/16/11 Dry Weather Event Sediment Toxicity (2009-2010 Make-Up Event)

Sample ID	Date	Sand (%)	Silt (%)	Clay (%)	Median Grain Size (mm)	TOC (mg/kg)	<i>Hyalella azteca</i> Survival Toxicity?
CR-46R	08/16/10	62.6	30.2	7.2	0.132	4,050	No

Notes:

FD = Field duplicate

TOC= Total Organic Carbon

mg/kg= Milligrams per kilogram =parts per million (ppm)

Statistically significant toxicity was not observed, so further chemical analyses were not conducted.

November 10, 2010 “Post-First Flush” Sediment Sampling Event

The “post-first flush” sediment toxicity sampling event was conducted on 11/10/10 at 5M-27R and SC-5R following a 0.76 inch rain event which occurred on 11/7/10. A field duplicate sample was also collected at SC-5R. At the time of sample collection, the water column at the 5M-27R and SC-5R was recorded at approximately 1 and 5.5 feet, respectively.

Sediment toxicity monitoring results from the 11/10/10 wet weather event are summarized in **Table 8-15**.

Table 8-15. 11/10/10 Wet Weather Event Sediment Toxicity (FY 2010-2011)

Sample ID	Date	Sand (%)	Silt (%)	Clay (%)	Median Grain Size (mm)	TOC (mg/kg)	<i>Hyalella azteca</i> Survival Toxicity?
5M-27R	11/10/10	31.4	54.2	14.4	0.032	>35,000	No
SC-5R	11/10/10	15.2	77.0	7.8	0.025	>36,000	No
SC-5R (FD)	11/10/10	15.0	77.1	7.9	0.025	>37,000	No

Notes:

FD = Field duplicate

TOC = Total Organic Carbon

mg/kg= Milligrams per kilogram =parts per million (ppm)

Toxicity was not statistically significant, so further chemical analyses were not conducted.

June 16, 2011 Dry Weather Sediment Sampling Event

On 6/16/11, a dry weather sampling event was conducted at 5M-27R and SC-5R. The event was preceded by 11 “dry¹⁰” days (less than 0.10 inches of measurable rainfall); 0.27 inches of rain was last recorded on 6/4/11. A field duplicate sample was also collected at 5M-27R. At the time of sample collection, the water

¹⁰ 0.03 inches of rainfall was recorded at the Stockton Airport on 6/5/11.

column at 5M-27R and SC-5R was recorded at approximately one and 4.5 feet, respectively. Sediment toxicity monitoring results from the 6/16/11 dry weather event are summarized in **Table 8-16**.

Table 8-16. 6/16/11 Dry Weather Event Sediment Toxicity (FY 2010-2011)

Sample ID	Date	Sand (%)	Silt (%)	Clay (%)	Median Grain Size (mm)	TOC (mg/kg)	<i>Hyaella azteca</i> Survival Toxicity?
5M-27R	6/16/11	45.6	45.1	9.4	0.058	>38,000	No
5M-27 (FD)	6/16/11	43.9	46.8	9.3	0.053	37,900	No
SC-5R	6/16/11	22.7	65.7	11.6	0.024	>38,000	No

Notes: FD = Field duplicate TOC = Total Organic Carbon mg/kg= Milligrams per kilogram =parts per million (ppm)

Statistically significant toxicity was not observed, so further chemical analyses were not conducted.

Sediment toxicity reports are included in **Appendix H-6**.

8.2.5 Detention Basin Monitoring

The Permittees monitor a detention basin, La Morada Basin, which 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. It discharges through 4 pumps which switch on when the detention basin is full at sequential levels to achieve the draw down time of 24 hours for the ten year storm as follows:

- Pump 1 Off: Elevation 0.5 ft.
- Pump 1 On: Elevation 6.6 ft.
- Pump 2 Off: Elevation 6.6 ft.
- Pump 2 On: Elevation 12.75 ft.
- Pump 3 Off: Elevation 12.75 ft.
- Pump 3 On: Elevation 13.71 ft.
- Pump 4 Off: Elevation 6.5 ft.
- Pump 4 On: Elevation 0.5 ft.

The drainageshed¹¹ of the basin comprises three separate storm drain systems which have separate inlets to the detention basin. Each system drains a primarily residential area. Samples are taken at the three inlets and the one outlet to Mosher Slough.

Detention basin monitoring is designed to evaluate the effectiveness of the detention basins in removing COCs. A Detention Basin Monitoring Work Plan was included in Appendix H-5 of the 2009 SWMP and described influent and effluent wet weather monitoring, dry weather sediment chemistry monitoring, and sediment toxicity monitoring during both wet and dry weather. This monitoring was scheduled to occur during 2008-2009 and 2010-2011. A 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.

¹¹ A drainageshed is the area that drains to a given point, here La Morada Basin.

The Sampling and Analysis Plan calls for monitoring of influent and effluent during two wet weather events. As discussed previously, there was a lack of qualifying storm events in 2010-2011, so only one wet weather event was sampled.

Influent and effluent water samples are monitored for the following constituents.

- Conventional
- Bacteria
- Chlorpyrifos and diazinon
- Pyrethroids
- Total mercury
- Methylmercury

Sediment chemistry monitoring is conducted during one dry weather event and includes the following constituents.

- Chlorpyrifos and diazinon
- Total mercury
- Pyrethroids

Sediment was collected from the detention basins during one post wet weather event and one dry weather event for toxicity testing with *Hyalella azteca*. The sediment chemistry event was coordinated with the dry weather sediment toxicity event, as directed by the SAP. The following sections discuss influent and discharge monitoring followed by sediment monitoring. Complete data from 2010-2011 are given in **Appendix H-7**.

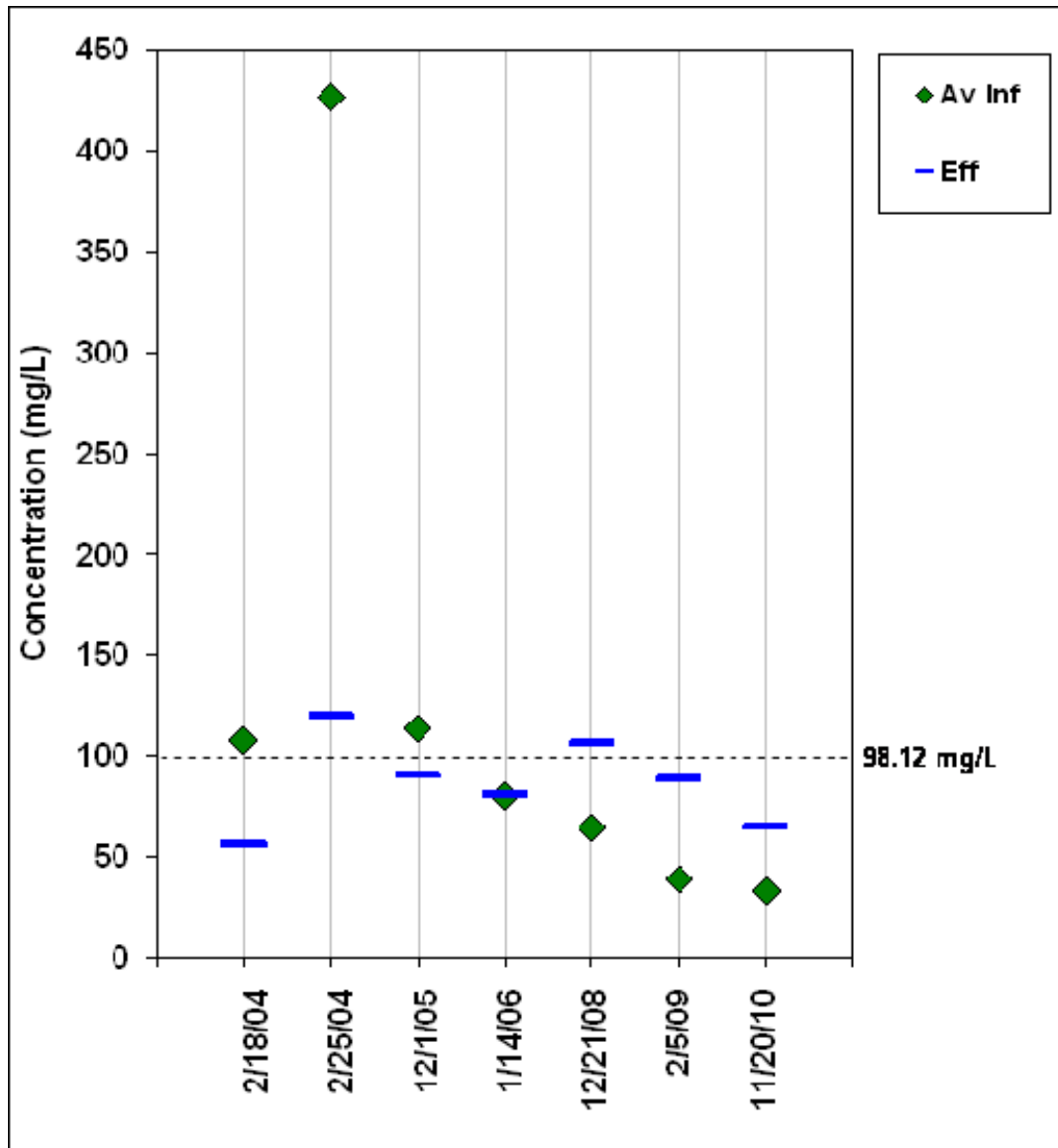
Influent and Effluent Monitoring

Influent and effluent detention basin monitoring was conducted at La Morada Basin during 2003-2004 and 2005-2006 in accordance with the 2002-2007 permit. During the 2002-2007 permit term the influent and discharge were sampled for conventionals, bacteria, chlorpyrifos, and diazinon. Pyrethroid and mercury monitoring were added in the 2007-2012 Permit.

Influent and effluent data from 2008-2009 and 2010-2011 is compared to 2003-2004 and 2005-2006 data for those constituents that were monitored during both permit terms, as a more sound analysis can be conducted from several events than the three monitoring events from 2008-2009 and 2010-2011 (2 in 2008-2009 and 1 in 2010-2011). However, QAQC of chlorpyrifos data from 2003-2004 and 2005-2006 indicated that this data may not be representative and chlorpyrifos is excluded from this discussion. QAQC also indicated that the *E. coli* data from 2/25/04 may not be representative and data from this event was excluded. However, sufficient data from other events is available for analysis. Therefore the available data for the following constituents are graphed:

- **Figure 8-7** - TDS
- **Figure 8-8** - TSS
- **Figure 8-9** - Turbidity
- **Figure 8-10** - Diazinon
- **Figure 8-11** - *E. coli*
- **Figure 8-12** - Fecal coliform
- **Figure 8-13** - Total coliform

Influent concentrations from the three inlets are averaged in the following graphs, as the inlets drain similar land use areas. The graph key labels influent “Av Inf.” For samples that were non-detect, half the MDL for that sample is used to calculate the average. If all the influent samples are non-detect, then the influent is shown on the graph as “Av Inf – ND” at half the MDL. Samples analyzed for bacteria were sometime above the upper MDL. In this case influent samples were averaged with the upper MDL used. If all the influent samples exceeded the upper MDL, the influent is shown on the graph as “Av Inf – AD” for “above detection”. Finally, the graphs are shown with a line denoting the median concentration of effluent from studied detention basins sampled in the US.¹²



¹² Data is synthesized from the International Stormwater BMP Database (<http://www.bmpdatabase.org/ResearchToolsMasterDB.htm#MasterDB>), which currently consists almost entirely of studies from the US, with Sweden as the only other contributing country.

Figure 8-7. TDS Concentrations in Detention Basin Influent and Effluent

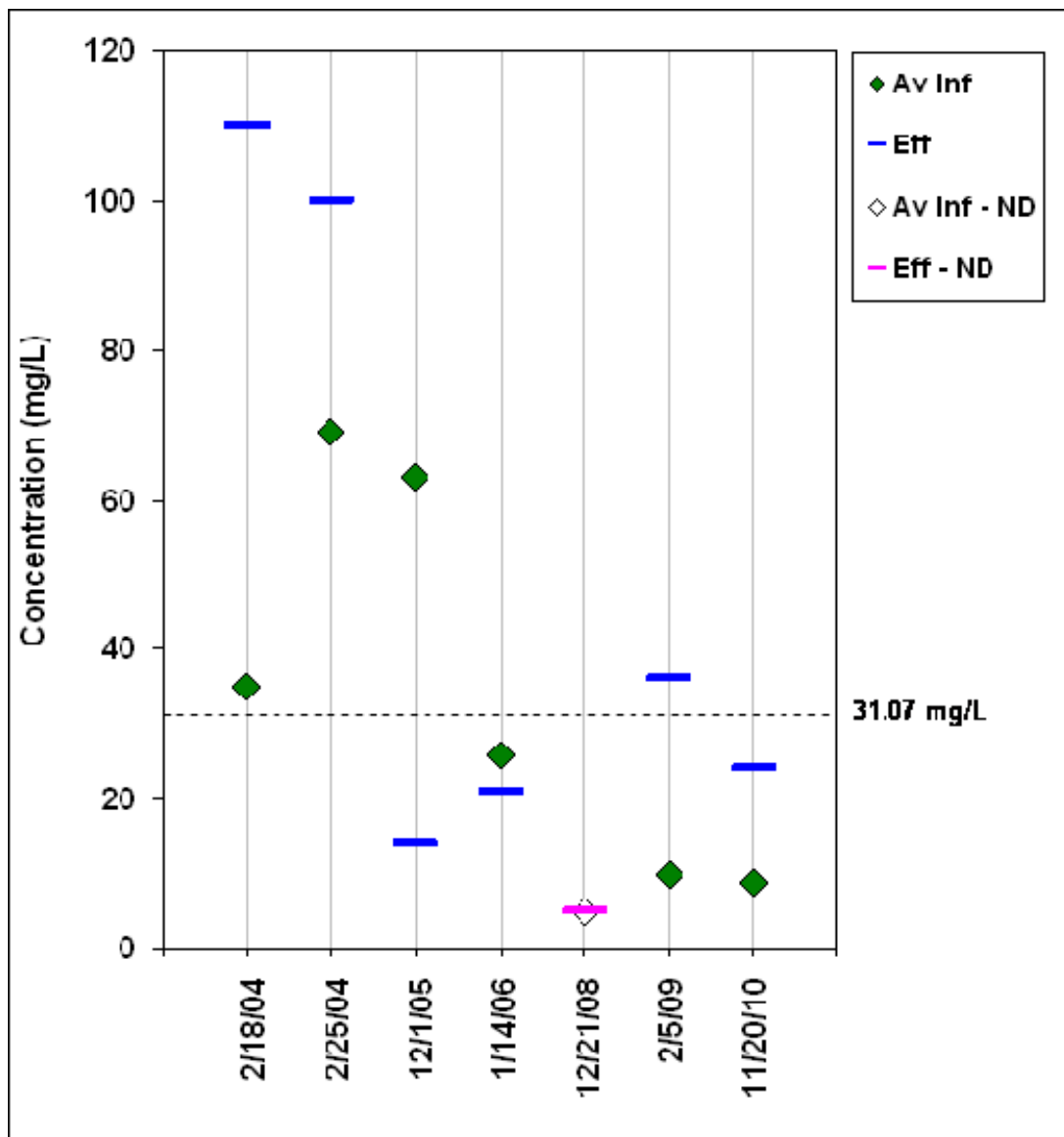


Figure 8-8. TSS Concentrations in Detention Basin Influent and Effluent

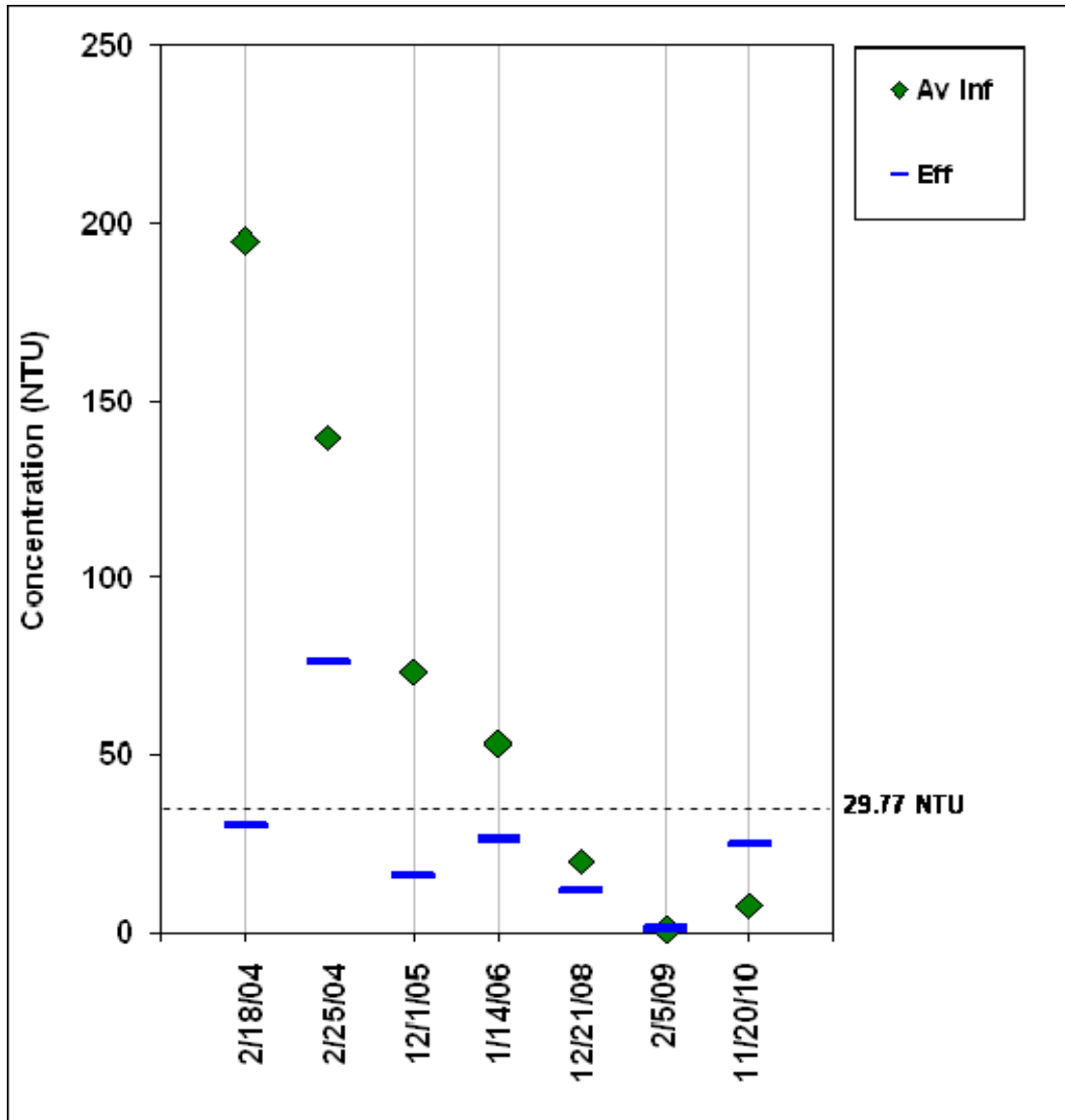


Figure 8-9. Turbidity Concentrations in Detention Basin Influent and Effluent

La Morada Basin does not appear to remove TDS effectively, as would be expected given that detention basins are not designed for this purpose. However, effluent was near the median of national data available. The basin appeared to remove TSS in 2005-2006, but effluent was above the average influent concentrations in other years. Again, effluent was near to the median of national data available in 2005-2006 and following years. The basin did remove turbidity during the majority of events, although the difference in influent versus effluent concentrations was less pronounced in 2008-2009 and turbidity in effluent was slightly higher than in influent in 2010-2011. The detention basin had generally better quality than the median of national data available. For TSS and turbidity, lower removal in 2009-2010 and 2010-2011 may be due to relatively “cleaner” influent allowing for less notable removal.

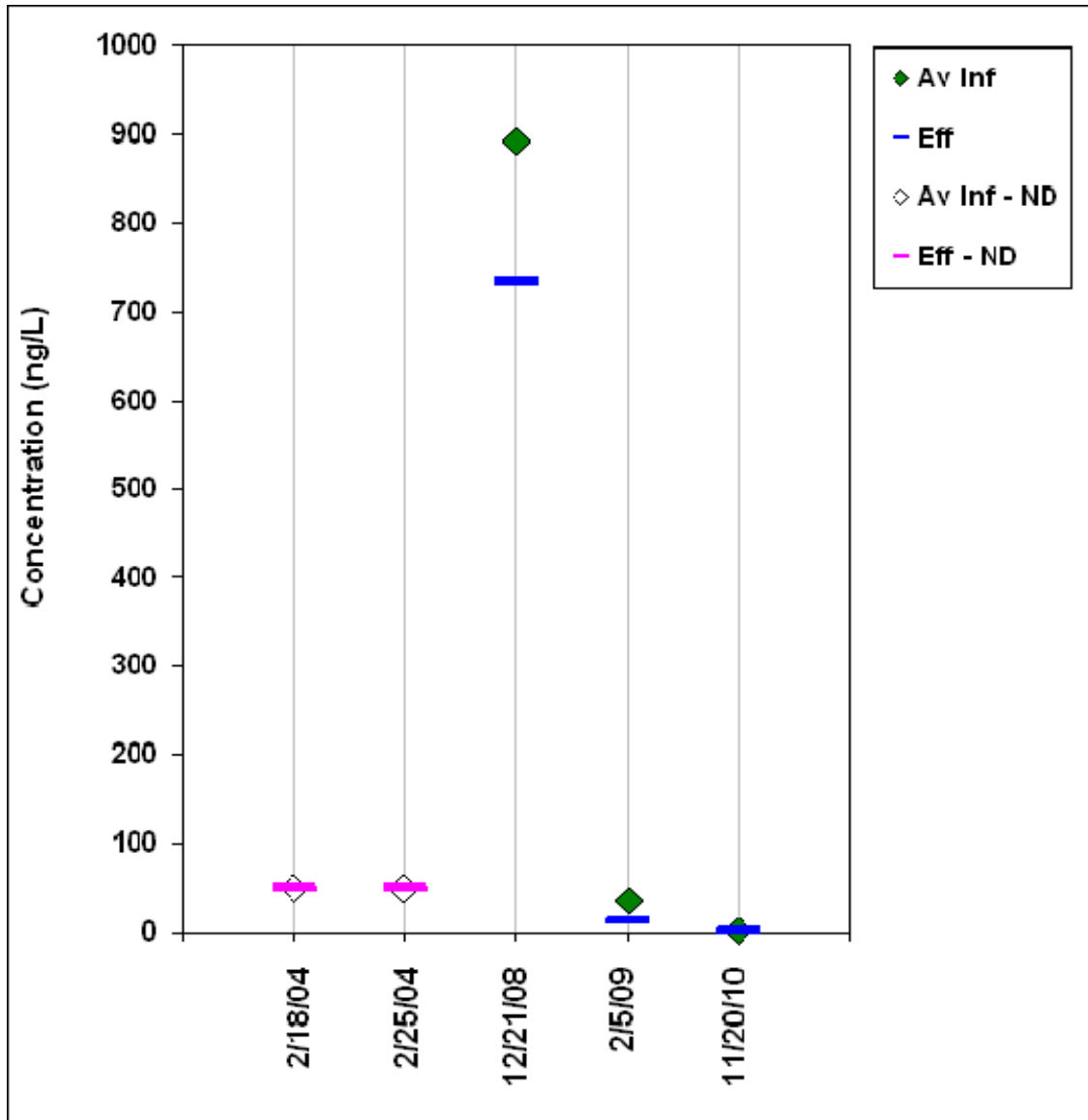


Figure 8-10. Diazinon Concentrations in Detention Basin Influent and Effluent

Diazinon was not detected in basin influent and effluent in 2003-2004, likely due to higher method detection limits than in following years. The basin removed diazinon inconsistently during 2008-2009 and 2010-2011, but lower removal on 2/5/09 and 11/20/10 again may have been due to relatively “clean influent” (especially during the 2010-2011 event). There were no national data available for effluent quality comparison.

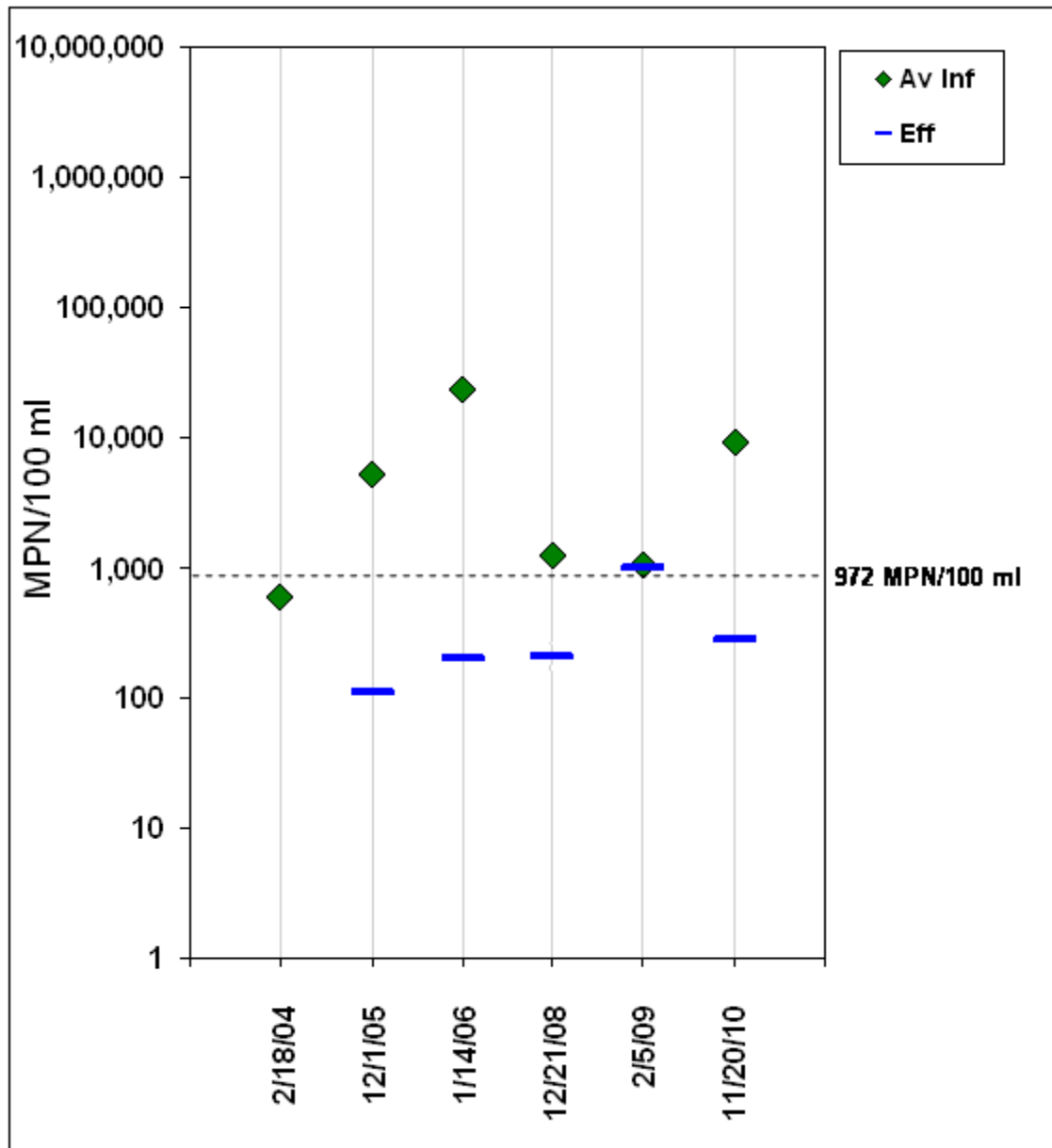


Figure 8-11. *E. coli* Concentrations in Detention Basin Influent and Effluent

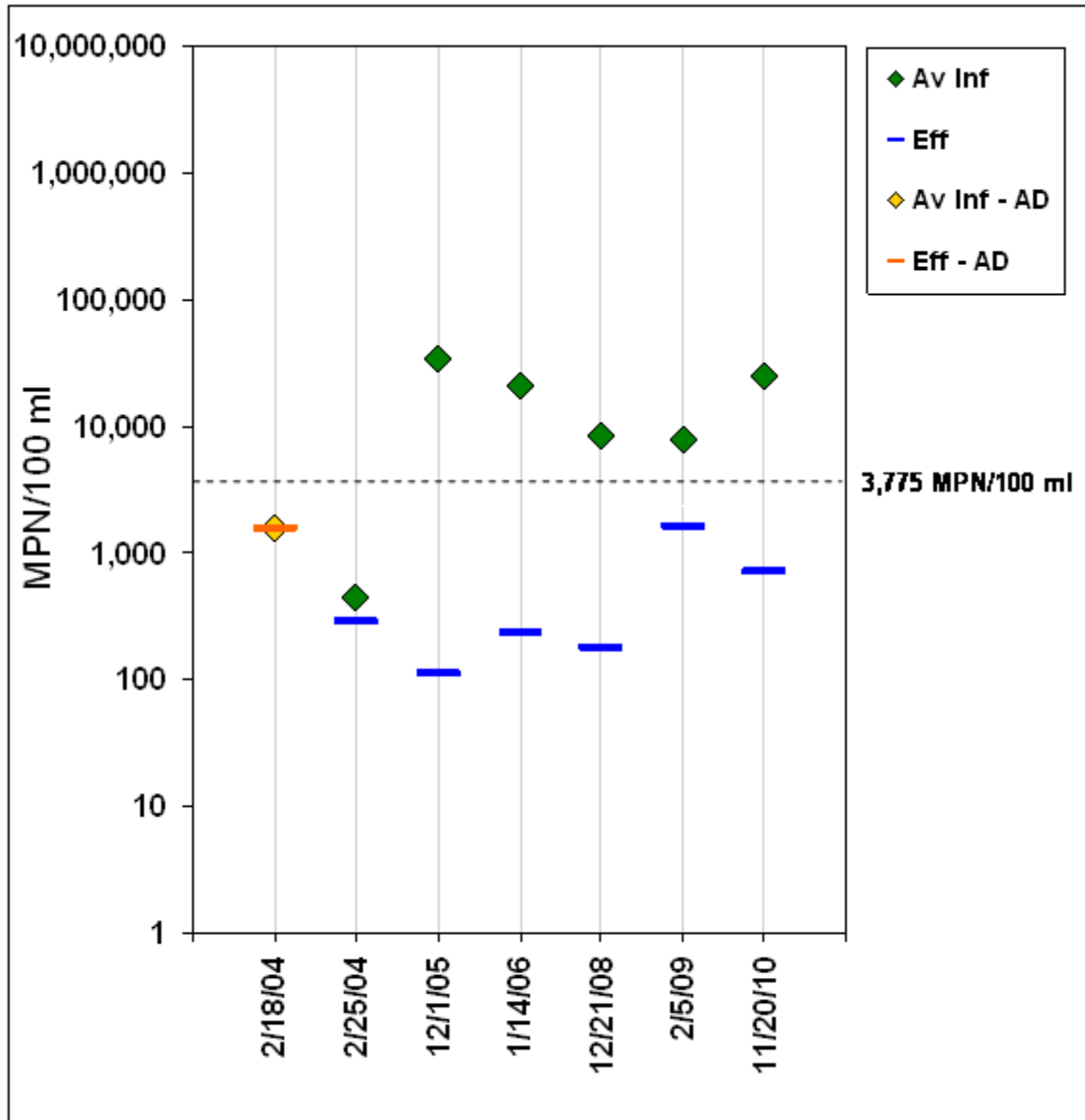


Figure 8-12. Fecal Coliform Concentrations in Detention Basin Influent and Effluent

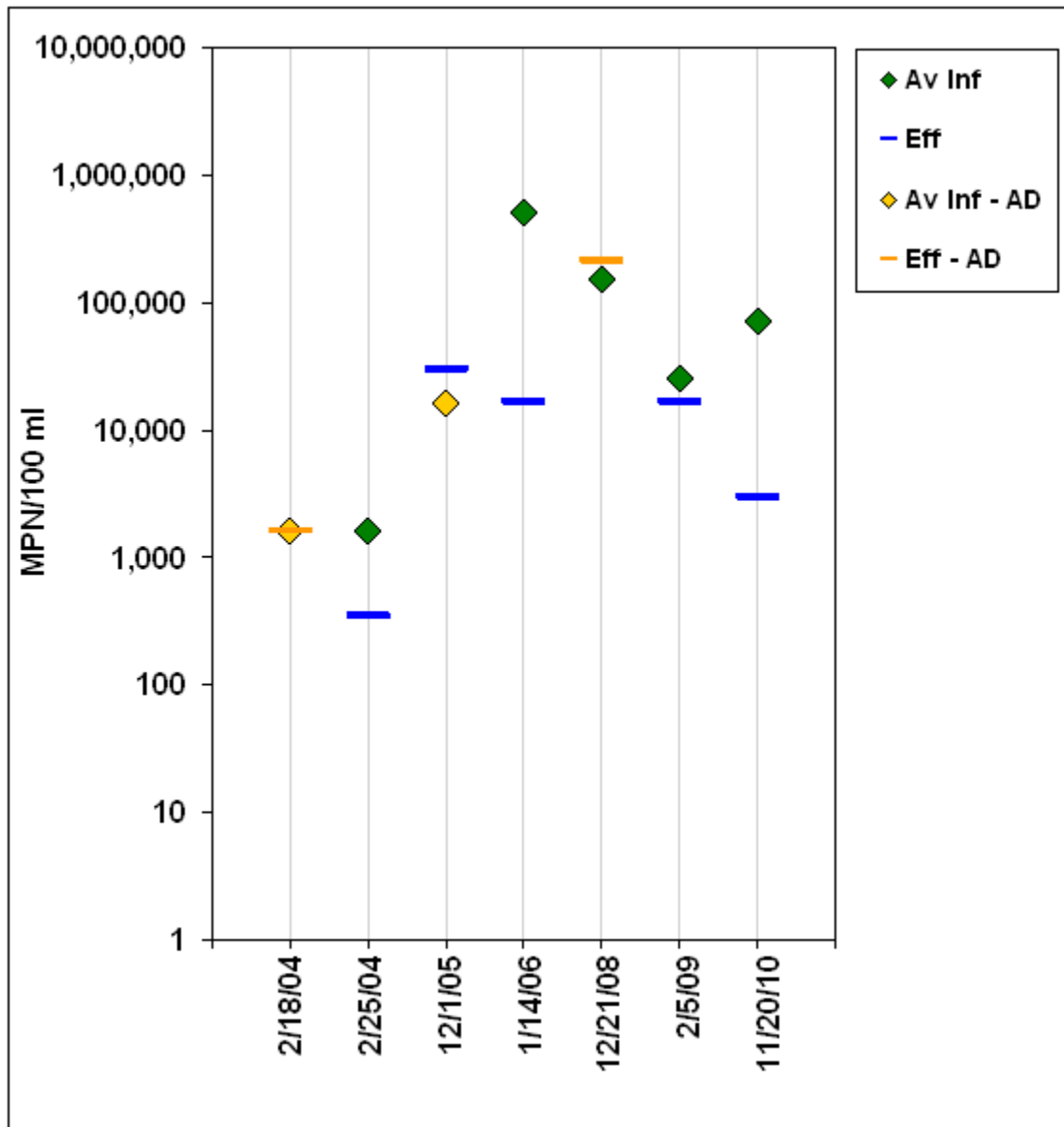


Figure 8-13. Total Coliform Concentrations in Detention Basin Influent and Effluent

QAQC determined 2/18/04 *E. coli* effluent data was unreliable. However, other data indicates that the basin removes *E. coli* well. A detected influent concentration exceeded an associated effluent concentration in only one case on 2/5/09. The basin removed fecal coliform in all cases. Generally La Morada effluent had better water quality than the median of available national data for *E. coli* and fecal coliform. Finally, the basin removed total coliform in all cases. There were no national data available for comparison to other detention basins effluent water quality for total coliform.

Sediment Chemistry and Toxicity

Sediment toxicity tests did not indicate statistically significant toxicity¹³ during either 8/18/10 or 12/8/10 sediment toxicity monitoring events. No pyrethroids were detected in sediment chemistry data collected on 8/18/10, with the exception of bifenthrin. Mercury was detected below the reporting limit, at an estimated value of 11.0 µg/kg. Grain size data for both sediment toxicity events are given in **Table 8-17**.

Table 8-17. Sediment Toxicity Event Associated Sediment Composition

Date	Sand (%)	Silt (%)	Clay (%)	Median Grain Size (mm)	TOC (mg/kg)
8/18/10	18	56	26	0.016	1,700
12/8/10	9	67	24	0.013	30,000

As discussed in the sediment chemistry section, TOC and grain size impact the toxicity of sediment. As TOC increases, the bioavailability of many hydrophobic pesticides (e.g., pyrethroids) 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. In this case, despite finer sediments and clay composition, the samples did not demonstrate statistically significant toxicity. The range of TOC concentrations did not appear to affect toxicity either.

8.3 DATA QUALITY EVALUATION

Quality assurance/quality control (QA/QC) refers to the process of reviewing lab and “field” initiated checks on the sampling and analytical process. These checks –which include field blanks, method blanks, field duplicates, lab duplicates and matrix spike/matrix spike duplicates (MS/MSD) - and data review are used to confirm that collected data are of high quality and suitable for future use. Lab reports are initially screened by the field monitoring contractor for missing analytical data (both environmental and QA/QC), holding time violations, discrepancies in analytical methods or detection limits, and any apparent out-of-range environmental results. If the analytical work appears to be missing any requested analysis, the lab is asked to complete the missing analysis if it is possible to do so within the specified holding time. Periodically data analyses are requested even if missed samples exceed the hold time. Data qualifiers are appended to the environmental data points where appropriate by applying the data quality objectives provided by the laboratories.

Primarily, the QA/QC analysis process identifies isolated incidents of out-of-range lab and sampling performance, but more importantly identifies potential long term trends in lab and sampling performance. An important and ongoing component of the QA/QC program is to report and correct these problems as they arise.

Overall, no significant problems with data quality were identified. There were isolated instances of constituents detected in field blanks, field duplicates not meeting relative percent difference standards (RPD), and lab QAQC issues. However, when conducting such a large monitoring and reporting program, it is normal for field, lab, and/or analytical issues to arise for a small number of samples. In general, the data collected and reported here are considered of high quality and suitable for future use with the qualifications noted in the **Appendix H-2** data report. **Table 8-18** summarizes the main qualifiers used.

¹³ Significant toxicity is defined as a 50% reduction in *Hyalella azteca* survival or reproduction as compared to the laboratory control.

Table 8-18. Definition of Common QAQC Qualifiers and Instances of Application to 2010-2011 Data

Qualifier	Definition of Qualifier	Data to Which Qualifier Applies
FB	The concentration of a given constituent was detected in the field blank. The associated environmental sample taken at the same site is considered an estimate.	<ul style="list-style-type: none"> • A field blank was taken at one site for all constituents during each baseline monitoring event. There were 1 to 5 constituents with FB qualifications during each event. • A field blank was taken at the Filterra influent site. There were 4 FB qualifications • The Sediment Toxicity Plan does not include collection of field blanks • A field blank was taken during the one detention basin influent and effluent monitoring event. There were 4 FB qualifications for this event. • A field blank was also taken during the one detention basin sediment chemistry monitoring event. There was one FB qualification for this event.
FD	The relative percent difference (RPD) between the concentrations of a given constituent in the field duplicate and the associated environmental sample was outside the acceptable limit. This indicates that the duplicability and precision of the results for this constituent may be low.	<ul style="list-style-type: none"> • A field duplicate was taken at one site for all constituents during each baseline monitoring event. There were 1 to 2 constituents with FD qualifications during 2 events. • A field duplicate was not taken during Filterra monitoring this year. QAQC for this program is rotated so that a field blank, method blank, and lab duplicate were analyzed instead for this event. • Two field duplicates were taken as part of the Sediment Toxicity Plan. There were no resulting qualifications. • A field duplicate is taken during the one detention basin influent and effluent monitoring event. There were four FD qualifications during this event • A field duplicate is also taken during the one detention basin sediment chemistry monitoring events. There was one FD qualification during this event
H	The hold time allowed for analysis of the given constituent was exceeded. Accordingly, results are considered an estimate.	<ul style="list-style-type: none"> • One event in the baseline monitoring program resulted in 2 H qualifications. • There were no H qualifications for the Filterra event. • There were no H qualification for the Sediment Toxicity Plan

Table 8-18. Definition of Common QAQC Qualifiers and Instances of Application to 2010-2011 Data (Cont.)

Qualifier	Definition of Qualifier	Data to Which Qualifier Applies
J	The concentration of a given constituents is between the method detection limit (MDL) and the reporting limit (RL) and is therefore an estimate. The J qualifier does not indicate poor data quality because all the RLs used meet permit requirements.	<ul style="list-style-type: none"> The J qualifier is common in all data in the monitoring program.
ND	A given constituent was not detected and is given as < MDL. The ND qualifier does not indicate poor data quality but rather that a constituent was simply not detected.	<ul style="list-style-type: none"> The ND qualifier is common in all data in the monitoring program.

8.4 REPORT OF WATER QUALITY EXCEEDANCES

Pursuant to Monitoring and Reporting Program and Permit Provision C.3, the Permittees must provide a summary of the monitoring data, including the identification of water quality improvements or degradation, and recommendations for improvements to the Stormwater Management Plan. To support this effort, all receiving water monitoring data are compared with applicable water quality objectives 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 Regulations¹⁴

Provision C.3 requires the Permittees to develop a Report of Water Quality Exceedances (RWQE) when the Permittees determine that their stormwater discharges have likely caused or are likely causing an exceedance of applicable water quality objectives (WQO).¹⁵ A relatively simple but straight-forward approach is used to address these Permit requirements. The approach consisted of three steps:

Step 1: Measured *receiving water* concentrations were compared against the relevant WQOs from the Basin Plan, the CTR, and/or the Title 22 drinking water maximum contaminant levels (MCLs).

¹⁴ It should be noted that 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 (SWRCB) 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 utilized herein for the purposes of this report.

¹⁵ The term “water quality objectives” is used interchangeably with “water quality criteria”.

Step 2: When the reported receiving water concentrations exceeded the WQOs, the urban runoff concentrations as monitored from upstream outfalls were compared to the WQOs. Based on these comparisons, the WQO exceedances were classified as “likely caused or contributed to by urban runoff” if both urban discharge and urban receiving water concentrations exceed the lowest applicable WQO.

Step 3: When water quality exceedances were determined to be “likely caused or contributed to by urban runoff,” upstream receiving water exceedances were reported to characterize any upstream input into the waterways that may also have caused or contributed to the exceedance.

Pursuant to the RWQE Permit requirements, the Permittees must address those constituents that are identified as potentially causing or contributing to an exceedance of a water quality objective. It should be noted, however, that simple comparisons of receiving water constituent concentrations to the WQO do not consider the *duration* of exceedances. The duration of wet weather event exposure depends on the hydrology of the waterbody, which can be very dynamic, and thus, more likely that an acute (instantaneous) exposure to a contaminant would occur. In contrast, an exposure on human health (longer term) timescale is less likely, but, where applicable, human health criteria are used. As a result of the lack of duration data and the relatively few data points available, the approach used in this Annual Report should be viewed as a planning-level effort to assess WQO exceedances.

All monitoring data, along with comparisons to WQOs, are presented in **Appendix H-2**. At the end of this section, summaries of all potential “cause and contribute” WQO exceedances for each site are summarized by site:

- Mosher Slough: **Table 8-21** (wet weather)
- Calaveras River: **Table 8-22** (wet weather) and **Table 8-23** (dry weather)
- Duck Creek: **Table 8-24** (wet weather) and **Table 8-25** (dry weather)
- Smith Canal: **Table 8-26** (wet weather) and **Table 8-27** (dry weather)

There were no cause and contribute exceedances on Mosher Slough during dry weather.

The table listed above show that the following constituents may be contributing to receiving water exceedances:

- Metals (total aluminum, total iron, total copper, and total zinc)
- Pathogen indicators (*E. coli* and fecal coliform)
- Low dissolved oxygen

The number of cause and contribute exceedances for each of these constituents is summarized in **Table 8-19** (wet weather) and **Table 8-20** (dry weather).

Table 8-19. Total Number of Exceedances on Each Waterbody during One Wet Weather Event (SE51)

Constituent	Waterbody			
	Mosher Slough	Calaveras River	Duck Creek	Smith Canal
Aluminum (total)	0	0	1	1
Iron (total)	0	0	1	1
Zinc (total)	0	0	1	0
<i>E. coli</i>	1	1	1	0
Fecal Coliform	1	1	1	0

Table 8-20. Total Number of Exceedances on Each Waterbody during Two Dry Weather Events (DW15 and DW16)*

Constituent	Waterbody			
	Mosher Slough	Calaveras River	Duck Creek	Smith Canal
Aluminum (total)	0	0	1	0
Copper (total)	0	0	1	0
Iron (total)	0	2	1	0
Dissolved oxygen	0	0	0	1

* Except for Duck Creek where only one dry weather event was sampled at the urban discharge site

Table 8-21. Mosher Slough Wet Weather Water Quality Objective (WQO) Analysis from 2010-2011

Constituent	Units	WQO	Upstream Receiving Water	SE51	
				Urban Discharge	Urban Receiving Water
<i>E. coli</i>	MPN/100mL	235	NA	3,255	2,461
Fecal Coliform	MPN/100mL	400	NA	23,000	3,000

Notes:

NA = Upstream water samples were not taken during this event due to insufficient flow for sampling

Table 8-22. Calaveras River Wet Weather Water Quality Objective (WQO) Analysis from 2010-2011

Constituent	Units	WQO	Upstream Receiving Water	SE51	
				Urban Discharge	Urban Receiving Water
<i>E. coli</i>	MPN/100mL	235	NA	1,674	269
Fecal Coliform	MPN/100mL	400	NA	3,000	700

Notes:

NA = Upstream water samples were not taken during this event due to insufficient flow for sampling.

Table 8-23. Calaveras River Dry Weather Water Quality Objective (WQO) Analysis from 2010-2011

Constituent	Units	WQO	DW15			DW16		
			Upstream Receiving Water	Urban Discharge	Urban Receiving Water	Upstream Receiving Water	Urban Discharge	Urban Receiving Water
Iron (total)	µg/L	300	410	400	630	440	620	540

Table 8-24. Duck Creek Wet Weather Water Quality Objective (WQO) Analysis from 2010-2011

Constituent	Units	WQO	SE51		
			Upstream Receiving Water	Urban Discharge	Urban Receiving Water
Aluminum (total)	µg/L	200	NA	1,900	19,000
Iron (total)	µg/L	300	NA	2,600	24,000
Zinc (total)	µg/L	H	NA	210 FB	120
<i>E. coli</i>	MPN/100mL	235	NA	3,873	1,250
Fecal Coliform	MPN/100mL	400	NA	11,000	3,000

Notes:

H = WQO is based on receiving water hardness adjusted acute CTR water quality objective and assumed default translator.

NA = Upstream water samples were not taken during this event due to insufficient flow for sampling.

FB = Zinc was detected in the field blank above the reporting limit. This result is an estimate.

Table 8-25. Duck Creek Dry Weather Water Quality Objective (WQO) Analysis from 2010-2011

Constituent	Units	WQO	DW15		
			Upstream Receiving Water	Urban Discharge	Urban Receiving Water
Aluminum (total)	µg/L	200	1,100	910	1,900
Copper (total)	µg/L	H	6.3	13	7.6
Iron (total)	µg/L	300	1,800	1,400	2,700

Notes:

-- = There were no urban discharge water quality exceedances which likely contributed to receiving water quality exceedances.

H = WQO is based on receiving water hardness adjusted chronic CTR water quality objective and assumed default translator.

Table 8-26. Smith Canal Wet Weather Water Quality Objective (WQO) Analysis from 2010 - 2011

SE51				
Constituent	Units	WQO	Urban Discharge	Urban Receiving Water
Aluminum (total)	µg/L	200	1,100	340
Iron (total)	µg/L	300	1,600	590

Table 8-27. Smith Canal Dry Weather Water Quality Objective (WQO) Analysis from 2010-2011

DW15					DW16	
Constituent	Units	WQO	Urban Discharge	Urban Receiving Water	Urban Discharge	Urban Receiving Water
Dissolved oxygen	µg/L	>5.0	--	--	3.04	4.72

Notes:

-- = There were no urban discharge water quality exceedances which likely contributed to receiving water quality exceedances. The following sections discuss each constituent which caused a cause or contribute exceedance.

8.4.1 Metals

For most metals, two aquatic life based toxicity criteria exist and depend upon the duration of the exposure: acute and chronic. Chronic criteria refer to 4-day average concentrations while acute criteria refer to the highest concentration to which aquatic life can be exposed for a short period (e.g., 24 hours). Consequently, chronic criteria are typically lower than acute criteria. Due to the dynamic hydrology during wet weather events and because the duration of the metals WQO exceedances in the receiving waters is unknown, it is reasonable to use the acute criterion for assessing the impact of wet weather discharges, and the chronic criterion for assessing dry weather inputs.

For aluminum and iron, the WQO is based on Title 22 maximum contaminant levels (MCLs). Title 22 MCLs are classified as primary or secondary, based on whether they protect long-term human health during consumption of water or simply drinking water taste and odor, respectively. For constituents that have both primary and secondary MCLs, the secondary MCL is often significantly lower. It is highly unlikely that any of the concentrations measured during urban discharge and receiving water monitoring represent levels at which long-term human health exposure occurs. As a result, it is unclear whether human health WQOs should be used for stormwater quality assessments. Nonetheless, the more conservative approach of comparing aluminum monitoring results to secondary MCLs was used for both wet and dry weather discharges.

Total Aluminum

All total aluminum exceedances occurred on Duck Creek: once during the first-flush storm event and during DW15 (the only dry weather event where urban discharge was monitored on Duck Creek). Aluminum is one of the most common naturally occurring components of soil.¹⁶ Consequently, it

¹⁶ Hausenbuiller, R. L. *Soil Science: Principles and Practices*. Dubuque, Iowa: WM. C. Brown Company, 1974. Print.

is not surprising that the first-flush event, which is likely to cause erosion, would often result in aluminum exceedances. Control of naturally occurring aluminum is difficult and there are no specific stormwater program source control programs for aluminum. However, the stormwater program has a number of control measures and BMPs that address erosion. In the 2009 Stormwater Quality Control Criteria Plan (SWQCCP)¹⁷, Low Impact Development policies and objectives are given for new development and redevelopment sites. For example, the SWQCCP specifically discourages development in areas that are susceptible to erosion and encourages minimization of impervious cover. Reductions in impervious cover increase infiltration and decrease the velocity of runoff thereby preventing erosion. In addition, the City also requires BMPs to minimize and/or eliminate the discharge of sediment from construction sites (see **Section 6**). The City requires that all construction sites disturbing one or more acres comply with the State Water Resources Control Board's General Construction Permit.

The stormwater program also has control measures and BMPs that address metals in general. These control measures include street sweeping, catch basin cleaning, industrial and commercial inspections, illicit discharge elimination, household hazardous waste collection, and public education.

Total Iron

Total iron exceedances occurred on Duck Creek and Smith Canal during the first flush event and on the Calaveras River and Duck Creek during dry weather. The program elements described in the previous section are designed to control erosion and therefore also reduce iron concentrations in stormwater. The stormwater program also has many control measures and BMPs that address metals in general and are described in the following section.

Total Copper

One total copper exceedance occurred on Duck Creek during DW15. Copper can be introduced through atmospheric deposition, erosion, and water supply. Direct anthropogenic sources of copper include:

- Brake pads
- Tailpipe emissions
- Vehicle washing
- Motor oil
- Corrosion
- Auto repair/body shops
- Radiator repair
- Machine shops
- Metal finishers
- Metal fabricators
- Coil coaters
- Industrial facilities
- Wineries
- Food processors
- Printers
- Laboratories
- Dentists
- Medical service
- Plumbers
- Carpet cleaners
- Dry cleaners
- Pools and spas
- Restaurants
- Food waste
- Human waste
- Household products
- Root control
- Surface cleaners
- Laundry gray water
- Roof runoff
- Illegal dumping

¹⁷ The SWQCCP is available on the City's website at:
<http://www.ci.stockton.ca.us/mud/General/stormwater/SQCCP.cfm>

Since copper can collect on streets due to tailpipe emissions, atmospheric deposition, and wear on brake pads, street sweeping is effective in preventing copper from entering storm drains. Catch basin and detention basin maintenance also removes sediments that enter the storm drains from street runoff. Because motor oil contains copper, the Permittees promotion of the used oil collection center, household hazardous waste collection, and curbside collection of used oil target residential automotive sources of copper. In addition, BMPs directed at auto repair/body shops and promoted through the stormwater program address a number of automotive sources of copper.

Zinc

A zinc exceedance occurred once on Duck Creek during the first flush event. Sources of zinc in urban runoff include atmospheric deposition, erosion, paint, vehicle maintenance facilities, metal finishers, laboratories, surface cleaners, and brake pads. General metal control measures and BMPs such as street sweeping, catch basin cleaning, industrial and commercial inspections, illicit discharge elimination, and public education address zinc exceedances in stormwater. The Permittees help collect zinc-containing materials such as paint and surface cleaners through their household hazardous waste events.

8.4.2 Low Dissolved Oxygen

Urban receiving water and urban discharge on Smith Canal were below the WQO for dissolved oxygen during DW16. Low DO has been a recurring issue in Smith Canal and is likely due to limited flushing action and tidal exchange with the San Joaquin River in the slough and its relative shallowness. During dry weather events such as DW16, the elevated temperature of the shallow water is also an exacerbating element. Laboratory analytical data collected during the Smith Canal Plan¹⁸ indicated that overall concentrations of oxygen demanding substances in urban runoff, while potentially a contributor, do not appear to cause an immediate DO impact in the receiving waters of Smith Canal. However, Permit Provision D. 28.b required the City and County to develop a Low Dissolved Oxygen Plan (DO Plan). This plan was developed and submitted to the Regional Board as Appendix I-5 to the 2008-2009 Annual Report. The City and County are currently implementing the plan which includes additional monitoring of Smith Canal.

8.4.3 *E. coli* and Fecal Coliform

During epidemiological studies conducted by the USEPA in the early 1980s, total coliform and fecal coliform were deemed unreliable indicators of human health risks. Instead, *E. coli* and enterococcus were recommended as the preferred indicators for fresh and marine waters, respectively. In response to implementation guidance published by USEPA in 2003, a Basin Plan amendment was adopted by the Regional Water Board in 2003, which recommended that for protection of recreational water uses (REC-1), the single sample maximum objective of 400 MPN/100mL for fecal coliform be replaced with a single sample maximum objective for *E. coli* of 235 MPN/100mL. The amendment has yet to be approved by the State Water Board.

USEPA guidance also recommends the use of geometric mean concentrations, as opposed to single samples, for long-term waterbody assessments. However, the geometric mean is generally calculated with multiple samples collected within a 30-day period. For less frequent sampling, as conducted under the MRP, comparison to single sample WQOs is considered more appropriate. Thus, for the potential cause or contribute analysis herein, measured *E. coli* and fecal coliform concentrations were compared to the single sample maximum WQOs for protection of recreational waters.

¹⁸ The *Smith Canal Drainage Area Analysis - Dissolved Oxygen Work Plan* submitted and subsequently approved by the Regional Water Board in a letter dated 12/16/03.

The typical sources of indicator bacteria are:

- Soils
- Birds
- Wildlife
- Pet and livestock waste
- Sewage from leaks, spills, and illicit connections
- Trash and food waste
- Homeless encampments
- Diaper cleaning and disposal
- Regrowth of bacteria in soils and sediments

During the first flush storm, concentrations of *E. coli* and fecal coliform exceeded WQOs on all waterbodies except Smith Canal. During dry weather, exceedances occurred on Duck Creek only. The stormwater program has in place control strategies that directly address indicator bacteria concentrations in urban runoff. The existing programs include street sweeping, storm drain system cleaning and stenciling, illicit discharges inspection and elimination, and pet waste stations at City parks.

Parallel to the urban and receiving water characterization effort, the City of Stockton and the County of San Joaquin have a pathogen water quality based monitoring program that focuses on pathogen indicators including *E. coli* and fecal coliform¹⁹. The monitoring program includes source characterization and identification monitoring followed by targeted best management practices (BMP) implementation and effectiveness assessment. The program uses a phased approach that focuses on specific waterways each year.

Characterization monitoring has been completed on both Smith Canal and Mosher Slough. Source identification monitoring in Smith Canal and Mormon Slough using *Bacteroidales* genetic markers to identify the source of fecal bacteria has indicated that other pathogen sources are agriculture (horse and/or cow), humans, and dogs. Agricultural sources may be largely upstream and outside of the City and County's jurisdiction. The City has installed additional pet waste signs in existing parks in the Smith Canal and Mormon Slough drainage areas to address pet waste. Both the City and County have also installed pet waste stations along the Marina as part of the Keep the Delta Clean program. In a March 2011 article entitled *Protecting Water Quality* included in the City's utility bill insert, the City highlighted the importance of properly bagging and disposing of pet waste. These inserts were distributed to all residents and businesses.

The City has also updated its website this year. The website includes factsheets about kennel BMPs for businesses and boat BMPs and BMPs "outside your home" for residents. Kennel BMPs include dry cleanup methods and proper pet waste disposal to prevent pathogens from entering the storm drain. Boat BMPs include proper disposal of tank wastes. BMPs "outside your home" include proper pet waste disposal. For more information on public outreach, see **Section 3**.

The City and County have initiated characterization monitoring on the Calaveras River and Duck Creek to further understand the sources specific to these waterbodies. (See **Section 9** for a detailed discussion of the Pathogen Plan.)

¹⁹ See Pathogen Plan, City of Stockton/San Joaquin County, April 2009 (Appendix I-2 of respective City and County Final Stormwater Management Plans). This is the most recent version of the Plan, which has been revised from the original submitted to the Regional Water Board on 8/18/04.

8.5 MONITORING ON DUCK CREEK DURING DRY WEATHER EVENT DW16

As explained previously, urban discharge sampling was not conducted on Duck Creek because the site historically used, DC65, was not discharging urban runoff. The discharge had been diverted to the sanitary sewer for the dry season as of 4/15/11 as part of the Permittees' Pollution Prevention Program. During this permit year, it was discovered that the pump discharge had been diverted to the sewer from roughly April 15 to September 15 since the mid-90s. It was determined that previous dry weather sampling had largely not been representative of urban discharge. The City and County, therefore, decided to select a new site for monitoring urban discharge on Duck Creek. However, at the time of these events, a new location had not been approved and no urban discharge sample was collected. A new site has been selected for the next permit year.

Monitoring was conducted at receiving water sites on Duck Creek during DW16 and is presented in **Table 8-27**. Receiving water concentrations that exceeded WQOs are shown in bold. However, cause and contribute exceedances cannot be determined without urban discharge data.

Table 8-27. Water Quality Objective Exceedances in Duck Creek Receiving Waters during Dry Weather Event DW16 on 5/25/11

Analyte	Units	WQO	Upstream Receiving Water	Downstream Receiving Water
Aluminum (total)	µg/L	200	760	570
Aluminum (dissolved)	µg/L	200	10,000	4,700
Copper (total)	µg/L	3.9/4.3 H	14	8.8
Iron (total)	µg/L	300	13,000	6,400
Lead (total)	µg/L	0.9/1.0 H	5.9	3.8
Dissolved Oxygen	mg/L	5	4.52	3.77
pH	Std. units	6.5 - 8.5	7.29	6.45
<i>E. coli</i>	MPN/100mL	235	327	884
Fecal coliform	MPN/100mL	400	230	1,100

H = Hardness-based WQO. The copper WQO for DC65RUS is based on the upstream receiving water hardness of 36 mg/L and the WQO for DC65 and DC65R is based on the downstream receiving water hardness of 40 mg/L.

8.6 PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan for the upcoming fiscal year. In addition to the anticipated tasks identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, to determine if any additional program modifications are necessary to comply with the Clean Water Act requirement to reduce the discharge of constituents to the maximum extent practicable. The program modifications that were identified during 2010-2011 are described in the following sections.

Urban Discharge and Receiving Water Monitoring Frequency

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 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.

Recommendation:

- Reduce urban discharge and receiving water monitoring from two wet weather and two dry weather monitoring events to one first flush event and one dry weather event during 2011-2012.

Water Column Toxicity Monitoring Frequency

During the 2002-2007 permit term, water column toxicity testing was required at receiving water sites twice per permit term. Therefore, the last water column toxicity testing event in the former permit term occurred in 2005-2006. In this permit term, water column toxicity testing is required annually. In order to evaluate trends in water column toxicity, results from 2010-2011 are compared to the previous three years and 2005-2006 in **Table 8-28**. During 2005-2006, fathead minnow growth was evaluated to determine toxicity. However, in the current permit, significant toxicity is not assessed using fathead minnow growth.

In **Table 8-28**, a “No” indicates that there was no significant toxicity. During 2005-2006, upstream receiving water sites did not exist so an “NA” is given for those sites for that year. Other codes indicate the type of toxicity that was observed, which is listed in the table notes. As explained in Section 8.1.2, upstream receiving water sites were not always sampled during this permit term due to insufficient flow. When sites were not sampled, a “--” is used.

Table 8-28. Comparison of Water Column Toxicity Detected in 2005-2006, 2008-2009, and 2009-2010, and 2010-2011

Event	Date	Urban Sites				Upstream Sites		
		MS-14R	CR-46R	DC-65R	SC-1R	MS-14RUS	CR-46RUS / CR-1	DC-65RUS
2005-2006								
SE39	12/1/05	No ¹	No ¹	--	--	NA	NA	NA
SE40	2/26/06	No	--	No	No	NA	NA	NA
SE41	3/20/06	--	No	No	--	NA	NA	NA
SE42	4/12/06	--	--	--	No	NA	NA	NA
DW05	5/10/06	No	No	No	No	NA	NA	NA
DW06	6/5/06	FG	No	CS	CR	NA	NA	NA
2008-2009								
SE47	11/1/08	No	No	CS	No	No	--	--
DW11	2/4/09	FS	--	No	FS	--	--	No
SE48	2/5/09	FS	No	No	No	--	--	No
DW12	5/20/09	No	No	CR	No	No	FS	No
Makeup	6/4/09	No	No	--	No	--	--	--
2009-2010								
SE49	10/13/09	No	No	CS	No	FS	CS, FS	--
DW13	2/17/10	No	No	No	No	--	--	No
SE50	4/11/10	No	No	No	No	CS	--	No
DW14	6/8/10	No	No	No	CR	No	No ¹	No
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
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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.

NA = Not applicable because site did not exist in 2002-2007 permit.

No = No significant toxicity.

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

A review of **Table 8-28** shows that water column toxicity decreased at urban receiving water sites in 2009-2010 and 2010-2011 and was not present in 2010-2011. In 2005-2006, 25% of urban samples demonstrated toxicity. In 2008-2009, this number increased to 33%. In 2009-2010, only 17% demonstrated toxicity and in 2010-2011, 0% demonstrated toxicity.

Follow-up TIEs in 2005-2006, 2008-2009, and 2009-2010 indicated that toxicity was rarely persistent in samples. Although no toxicity was observed in 2010-2011, a summary of the possible causes of toxicity in past years is given in **Table 8-29** for reference. Only those events where toxicity was detected are listed.

Table 8-29. Possible Sources of Toxicity Observed in 2005-2006, 2008-2009, and 2009-2010

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

NA = Not applicable because site did not exist in 2002-2007 permit.

No = No significant toxicity.

1. Pathogen related mortality 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.

Water column toxicity has largely not identified COCs, as shown in **Table 8-29**. Most often, the toxicity has not been persistent and the source of toxicity has been broadly defined and largely speculative. 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 yielded very useful data and has not resulted in additional pollution prevention.

- Reduce water column toxicity monitoring from two wet weather and two dry weather events to one first flush event and one dry weather event in conjunction with receiving water monitoring

Urban Discharge and Receiving Water Monitoring and Associated Water Column Toxicity Monitoring Site Locations

During both wet and dry weather, the baseline monitoring program has included sampling at the DC-65 pump station at Duck Creek at Odell Ave. over-crossing and the DC-65R urban receiving water site as well as the DC-65RUS upstream receiving water site. During this permit year, it was 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, it was determined that previous dry weather sampling has largely not been representative of urban discharge. However, wet weather sampling has been representative of wet weather discharge as the pump has been discharging during the wet weather season.

Recommendation:

- Replace DC-65 Duck Creek urban discharge site with DC-66 urban discharge site at Airport way, which is not diverted to the sanitary sewer, during the dry weather season only. To capture representative downstream impact, replace DC-65R with downstream location closer to DC-66 which will be called DC-66R.

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 is now representative of dry weather urban discharge to Duck Creek.

Urban Discharge and Receiving Water Monitoring Constituents

During this and the previous permit term, there have been no cause and contribute exceedances of nutrients. In addition, organophosphate pesticides (OP) have been phased out and there have been no cause and contribute exceedances of diazinon or chlorpyrifos during this permit term. Additional monitoring of these constituents is unlikely to yield new information. The Low DO Plan is a program dedicated to measuring dissolved oxygen, biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in order to monitor dissolved oxygen trends. Therefore, there is unnecessary duplication of monitoring in the urban discharge and receiving water monitoring program

Recommendation:

- Discontinue urban discharge and receiving water monitoring of nutrients (total phosphorus, nitrate-nitrite, total ammonia, and total kjeldahl nitrogen), OP pesticides (diazinon and chlorpyrifos), dissolved oxygen, BOD, and COD during 2011-2012.

Dry Weather Field Screening

During this permit term, the City screened 90 of its 115 outfalls. As shown in **Table 8-31** over the course of the permit term most years only two or three outfalls have had sufficient flow for sampling. In 2009-2010, eight outfalls had sufficient flow for sampling, but none exceeded numeric action levels. In other years, zero to two have exceeded action levels. In each case, the action level exceeded is for EC and the source has not been suspected to be illicit discharge. Instead, suspected sources have been groundwater infiltration, runoff, and alum added to a residential lake. Overall, only three EC action level exceedances have occurred this permit term and subsequent upstream screening has only revealed potential sources.

Table 8-30. Dry Weather Field Screening History during this Permit Term (2007-2011)

Year	Number of Outfalls Screened	Number of Outfalls with Sufficient Flow for Initial Screening	Number that Exceeded Action Level	Names of Outfalls with Sufficient Flow for 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 and pool maintenance activities
Total	90	15	3	14	3	

Recommendation:

- Discontinue dry weather field screening during 2011-2012

BMP Effectiveness Study

The Permittees were required to identify and develop a Sampling and Analysis Plan (SAP) for a Low Impact Development (LID) BMP in 2008-2009. The Permittees determined there were three BMPs on public land that qualified as LID. A swale, porous pavement, and a Filterra unit were evaluated and the swale and porous pavement sites were determined to be constructed in such a way that monitoring of influent versus discharge would not be possible.

As discussed in depth in Section 8.2.2, monitoring results have not shown any clear trends in the effectiveness of the Filterra unit. Most likely this is because the design of the unit also does allow for accurate sampling protocol, and results indicate that this may be the cause of inconsistencies in the data.

In the coming ROWD, the Permittees will reevaluate the approach to BMP effectiveness monitoring. Potential options include identifying a pilot project during the next permit term, obtaining consistent permit requirements in order to collaborate with other municipalities, to contribute to a research project, or to focus efforts on other program elements.

Recommendation:

- Discontinue BMP Effectiveness Study until next permit term

Section 9

Water Quality Based Programs

9.1 OVERVIEW

The purpose of the Water Quality Based Programs is to address specific pollutants that have been identified as impacting or potentially impacting local receiving water quality in the SUA. Special studies addressing these pollutants are designed to characterize their fate and transport and to assist with source identification and selection of control measures. The individual pollutant-based plans are summarized in **Table 9-1**. Over the course of the reporting year, the following pollutant-specific plans were implemented:

- Pesticide Plan (continued from the 2002-2007 Permit)
- Pathogen Plan (continued from the 2002-2007 Permit)
- Mercury Plan (developed from the 2007-2012 Permit)
- Low Dissolved Oxygen Plan (continued from the 2002-2007 Permit)

A progress summary for each of the plans is provided below along with a summary of the findings from the monitoring that was completed and the activities implemented through June 30, 2011.

Table 9-1. 2010-2011 Efforts Completed for Water Quality Based Programs

Pollutant Specific Plan	Status
Pesticide Plan (Section 9.2)	<ul style="list-style-type: none"> • Provided public education/outreach to promote safe pesticide handling and uses of safer pesticide alternatives • Promoted integrated pest management (IPM) in municipal and public pest management practices • Monitored one storm event and once during the dry season, for chlorpyrifos, diazinon, and pyrethroids
Pathogen Plan (Section 9.3)	<ul style="list-style-type: none"> • Continued to implement three-phased approach to mitigate high indicator bacteria levels in six SUA waterbodies • Continued Phase I BMP Implementation • Began Phase II BMP Implementation • Began Phase III Characterization Monitoring
Mercury Plan (Section 9.4)	<ul style="list-style-type: none"> • Promoted proper handling and disposal of mercury-containing products through public education/outreach • Continued BMPs to minimize erosion, and transport of sediment-associated mercury • Monitored total mercury and methylmercury during 3 storm events and 2 dry weather sampling events
Low Dissolved Oxygen Plan (Section 9.5)	<ul style="list-style-type: none"> • Collected monthly grab samples at each active receiving water and corresponding urban discharge monitoring location for oxygen-demanding substances and nutrient analyses • Installed <i>in-situ</i> recorders at the following locations: Mormon Slough (MR-4R), Five-Mile Slough (5M-25R), and the Calaveras River (CR-42R upstream and CR-39R downstream). • Performed continuous analysis of water quality parameters using <i>in-situ</i> recorders

9.2 PESTICIDE PLAN PROGRESS REPORT

The Permittees previously identified organophosphate pesticides (and in particular diazinon and chlorpyrifos) as problematic pollutants that impact local waterbodies. In order to address the organophosphate (OP) pesticide impairment of urban streams, and as specified in Provision D.18.a.v. of the second term NPDES Permit, the Permittees developed a Pesticide Plan that addressed the use of diazinon and chlorpyrifos by the City/County and others. The Pesticide Plan was provided to the public, interested parties, and the Regional Water Board for review, and after addressing submitted comments, finalized with an addendum letter to Regional Water Board on September 22, 2004.

According to requirements in the second term permit, the following elements were incorporated into the Pesticide Plan:

- Public education and outreach programs
- Coordination with Household Hazardous Waste collection agencies
- Assessment of the relative contribution of urban stormwater runoff to diazinon and chlorpyrifos levels in waterbodies of concern within the City's jurisdiction
- A diazinon and chlorpyrifos mitigation program should City stormwater be a significant contributor

The City has implemented the Pesticide Plan since 2004. The results of the pesticide monitoring during the 2003-2007 Permit term were summarized in detail in the 2005-2006 Annual Report and 2007 ROWD. Results suggested that diazinon and chlorpyrifos were no longer stormwater POCs in the SUA.

In December 2007, the Permittees received their third term municipal stormwater permit (Order No. R5-2007-0173) which included a requirement for the continued implementation of the Pesticide Plan (specified in Provision D.28.a). The focus of the plan is public outreach and integrated pest management (IPM), to protect water quality and promote safe, and minimal, pesticide use. The Permit also requires the Permittees to continue to monitor diazinon, chlorpyrifos and pyrethroids. An updated pesticide plan was submitted to the Regional Water Board on June 1, 2008 with the 2008 SWMP. The updated plan was subsequently revised, and submitted to the Regional Water Board on April 15, 2009 with the 2009 SWMP.

The Pesticide Plan continues to focus on public outreach and the promotion of IPM that was implemented during the 2004-2007 Plan, and extends its monitoring efforts to validate that organophosphate (OP) pesticides are no longer POCs. The Pesticide Plan includes the following components:

- Public education and outreach;
- Municipal operations;
- Effectiveness assessment; and
- Water quality monitoring.

The Pesticide Plan Approach is summarized in **Figure 9-1**. The Pesticide Plan components implemented during the 2010-2011 reporting year are summarized in sections 9.2.1-9.2.5.

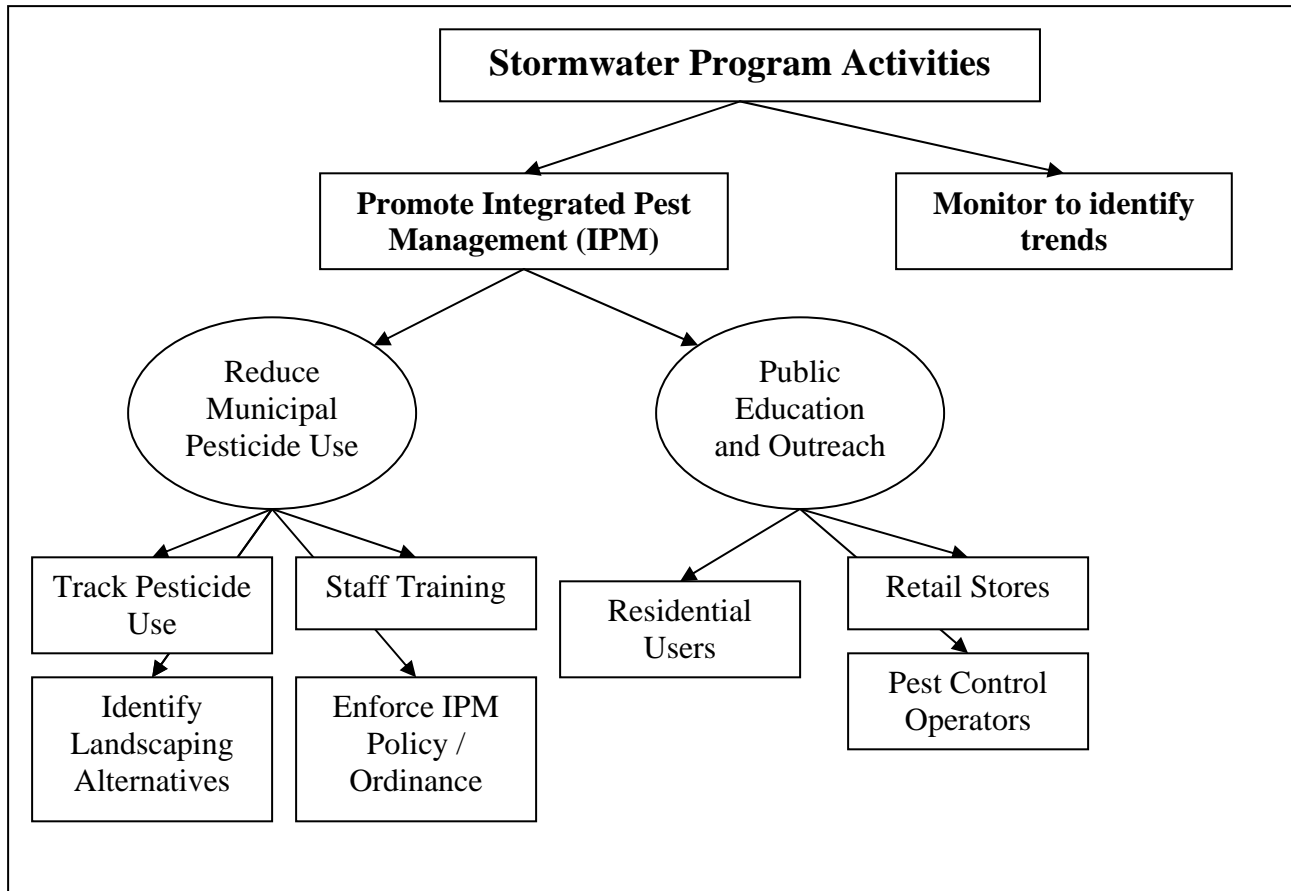


Figure 9-1. The Pesticide Plan Approach

9.2.1 Public Education and Outreach

The Pesticide Plan relies heavily on education and outreach efforts that promote less toxic pest control methods and use of IPM. As outlined in Section 3.0, education and outreach efforts have focused on public outreach to residential users via outreach materials distributed at local hardware stores, public events, and the web site. Public education and outreach includes the following components:

- “Our Water Our World” program outreach,
- Annual public outreach messages,
- Pest control workshops,
- Survey of pesticides available to the public, and
- Coordination with Household Hazardous Waste collection.

9.2.1.1 “Our Water Our World” Program Outreach

The Permittees participate in the University of California (UC) Statewide Integrated Pest Management Program with Orchard Supply Hardware (OSH) to encourage the use of less toxic products and proper disposal of pesticides. Known as the “Our Water Our World” (OWOW) program, the program is now supported in all 82 California OSH stores (including OSH at 1015 West Hammer Lane, Stockton). 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 Permittees' focus is specifically at the sole Stockton store. The OWOW program is also part of the outreach efforts at community events.

During 2010-2011, on behalf of the Permittees, the County distributed 400 OWOW Fact Sheets in English and Spanish which target the general public. The County maintains aisle displays, product markers and OWOW fact sheets. Our Water Our World program materials were also made available during Senior Awareness Day 2011.

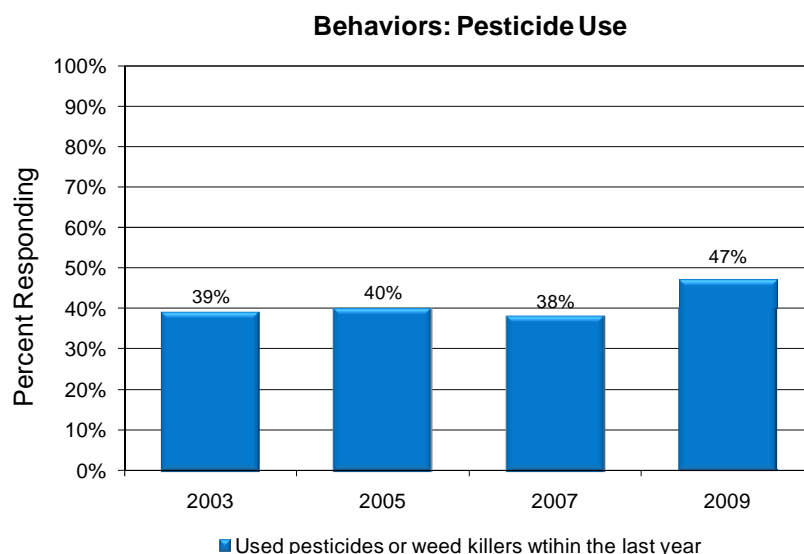
9.2.1.2 Annual Public Outreach Messages

The City promoted educational materials through its website to encourage IPM practices. The materials that were available are summarized in more detail in Section 3 of the Annual Report.

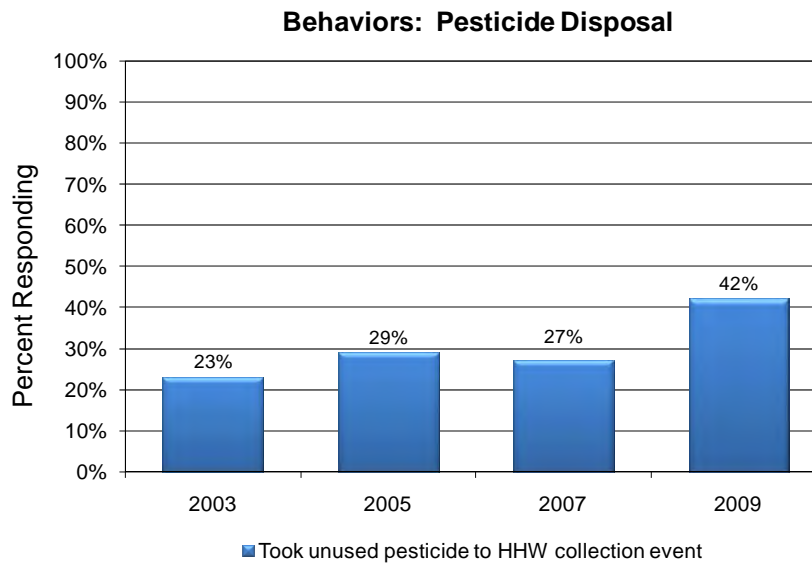
In addition, the City maintains an electronic IPM kiosk. The kiosk is located in City Hall and provides residents with information on IPM, proper use and disposal of pesticides, pest identification, runoff, and water conservation. The kiosk also holds literature racks with additional fact sheets from the "Our Water Our World" Program. During the reporting period, IPM Kiosk located in City Hall was stocked with IMP brochures.

Public surveys are used to evaluate the effectiveness of the Permittees' public outreach efforts. The City and County 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. 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.



9.2.1.3 Pest Control Workshops

The Pesticide Plan indicates that the Permittees will hold annual public workshops in the summer in order to promote safer pest control. These workshops will follow a similar format to the Our Water Our World program classes, but will be more widely advertised and will target the general public. Municipal staff and/or consultants will provide training on safer pesticide use, less-toxic pesticide alternatives, and the use of native plants to minimize the need for pesticides and reduce water use. Workshops targeting the public have not yet been implemented, but will be evaluated during the ROWD for the next Permit term.

9.2.1.4 Survey of Pesticides Available to the Public

The Permittees are required to conduct a survey of the regional sales of residential and commercial pesticides which are available for the public on a bi-annual basis (i.e. once every two years). This survey will allow the Permittees to identify potential pesticide use and impacts before they occur. The survey was developed during 2008-2009¹, and the first survey was completed during the 2009-2010 reporting year. The second survey will be conducted during 2011-2012.

The Permittees designed a three-tiered approach to address this requirement. The three components of the pesticide survey are as follows:

- Residential pesticide sales, assessed through shelf surveys of local retailers (completed November 2009 and planned for fall 2011);
- Residential pesticide use, assessed by pesticide-specific questions in a telephone Public Opinion Survey (completed December 2009 and planned for the next Permit term); and
- Commercial pesticide use, assessed through collaboration with the County Agriculture Commissioner's office and Department of Pesticide Regulation (DPR). These records were obtained for 2008 and will be obtained for 2010.

¹ 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

The approach and results of each of the three survey components were summarized in the 2009 Pesticide Survey Assessment, included as an appendix to the 2009-2010 Annual Report. The next survey will be completed by December 1, 2011. The 2011 survey will include an assessment of residential pesticide sales through a shelf survey, along with a commercial pesticide use assessment from DPR records. The Public Opinion Survey has been postponed until the next Permit term.

9.2.1.5 Coordination with Household Hazardous Waste Collection

The City promotes the County's Household Hazardous Waste Program on its Web site. During 2010-2011, the Household Hazardous Waste Program, a joint effort of the City and County, collected pesticide liquids and solids, as described in Section 3 of the Annual Report. The Web site also links to the San Joaquin County Household Hazardous Waste Facility. Links for pollution prevention regarding specific activities are listed, including: In Your Home, In Your Garden, In Your Garage, On Your Boat, and Paints and Solvents.

9.2.2 Municipal Operations

The Permittees' efforts to track annual pesticide use and utilize IPM are described below. The Permittees' current and future municipal operations activities include the following:

- Review of pesticide application protocols,
- Implementation of IPM protocols, and
- Training for municipal employees.

9.2.2.1 Review of Pesticide Application Protocols and Landscaping Standards

During 2009-2010, the Permittees reviewed and modified their IPM protocols, including pesticide, herbicide, and fertilizer application protocols at park sites, landscaped medians, and golf courses. The City is working to formalize IPM protocols in an administrative directive. The City Manager administrative directive P&R-03 establishes standard procedures for the administration and use of pesticides, herbicides and fertilizers on City rights-of-way and other 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 insure that employees and/or contractors will utilize IPM and alternatives to pesticides whenever applicable. A supplementary IPM Guide refers to IPM policies in greater detail. The draft administrative directive and IPM Guide was included as an appendix to the 2009-2010 Annual Report.

In addition, contract language was developed to specify that contracted pesticide applicators will utilize IPM. 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 the use Integrated Pest Management practices, principals, and concepts and least toxic methods of pest control to achieve the expected/specified results. Contractor is 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."

In 2010-2011, these protocols were utilized by City staff, as well as by contractors hired by the City.

9.2.2.2 Implementation of IPM Protocols

The IPM approach focuses on the long-term prevention and elimination of pests through a combination of approaches. The number of City owned acres utilizing IPM during previous reporting years are summarized in **Table 9-2**. The City no longer has a dedicated Parks and Recreation Department. The City's Public Works Department is now responsible for a limited amount of maintenance of City acreage. Park maintenance, including medians and landscape buffers, is contracted out. During 2010-2011, the City reevaluated how it requests and collects information regarding implementation of the IPM Program from outside contractors on the maintenance done for City-owned parks and landscape medians and golf courses. Specifications for all new contracts starting January 1, 2011, and later require the contractors to submit a written report by July 15 of the Integrated Pest Management practices, principles, and concepts and least toxic methods of pest control used during the previous year.

Table 9-2. City Acres Utilizing IPM

Year	Number of Acres Utilizing IPM		
	City Parks	City Golf Courses	Total City acres
2008-2009	646	388	1034
2009-2010		N/A ¹	
2010-2011	112	400	512

Note:

1. This information was not available from the contractors for 2009-2010. In 2010-2011, the City will reevaluate how it requests and collects information from outside contractors on the maintenance done for City-owned parks and landscape medians and golf courses.

During 2010-2011, the City implemented protocols for routine and non-routine use of pesticides and fertilizers. In general, the City follows these procedures:

- Chemicals are stored in a central facility, meeting OSHA, HAZMAT, and County Agricultural Commissioner's requirements by providing secure storage and spill control.
- Landscaping is performed to maintain a healthy landscape, and a regular fertilizer program ensures healthy turf.
- Pesticides are used as a last resort, conforming to a sound integrated pest management program.
- To maximize the benefit of applications, all chemicals are applied at the minimum dose while avoiding runoff and wind drift.
- Native plants and trees are used whenever possible to reduce water needs while promoting resistance to disease and pests.

The City continues to implement the Landscaping Standards (Stockton Municipal Code Sections 16.56.040 and 16.72.240), which contain language that addresses water conservation and reduction of herbicide and pesticide use by means of appropriate plant selection and usage. Pesticide use by the Department of Public Works is reported in Section 4 of the Annual Report. To evaluate its municipal pesticide use over time, the City will maintain and expand its internal inventory on pesticide use and continue to track pesticide use by the Department of Public Works.

9.2.2.3 Training for Municipal Employees

Due to recent restructuring within the City departments, municipal employees are no longer directly responsible for pesticide application. The City's Public Works Department is responsible for a limited amount of maintenance of City acreage, but park maintenance, including medians and landscape buffers, is contracted out. 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.

9.2.3 Effectiveness Assessment

Municipal pesticide use and acreage operated under IPM are tracked yearly to assess the effectiveness of the municipal component of the Pesticide Plan. In general, the types of data that are collected to assess the effectiveness of the Pesticide Plan include the following:

- Number of retail stores supporting OWOW or similar programs,
- Distribution of outreach messages, including numbers of brochures, television commercials, and newspaper articles, with an estimation of the number of people who were reached,
- Number of public workshops, with comments collected from attendees, and
- Number of pest control operators and municipal employees who participated in training workshops.

Data for these components is reported in Section 4. The effectiveness of the Pesticide Plan will be assessed as part of the ROWD.

9.2.4 Water Quality Monitoring

The Permittees submitted a Pesticide Plan Update in April 2009 with the 2009 SWMP, which included revised monitoring efforts to reflect requirements in the third term permit. Monitoring began in July 2008 and continued through the 2010-2011 monitoring year.

Consistent with the 2004 Pesticide Plan, 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). Monitoring is no longer required for Mormon Slough. The monitoring locations are shown in **Figure 9-2**. Monitoring was conducted for chlorpyrifos, diazinon and pyrethroids in urban runoff/discharges and within waterbodies during the following time periods:

- 1 Storm event during the dormant spray season: December – March
- Once during the dry Season: June – October

The storm event planned for the post-dormant spray season was not captured during 2010-2011. Although 2010-2011 was a wet season overall, there were few qualifying storms forecasted sufficiently, forecasted storms failed to produce sufficient rainfall in Stockton, and there were insufficient dry days between storm events.

The schedule of monitoring events completed during 2010-2011 is summarized in **Table 9-3**. The monitoring requirements allow the Permittees to discontinue monitoring if the Regional Water Board is satisfied that water quality objectives are met (see Section 9.2.5).

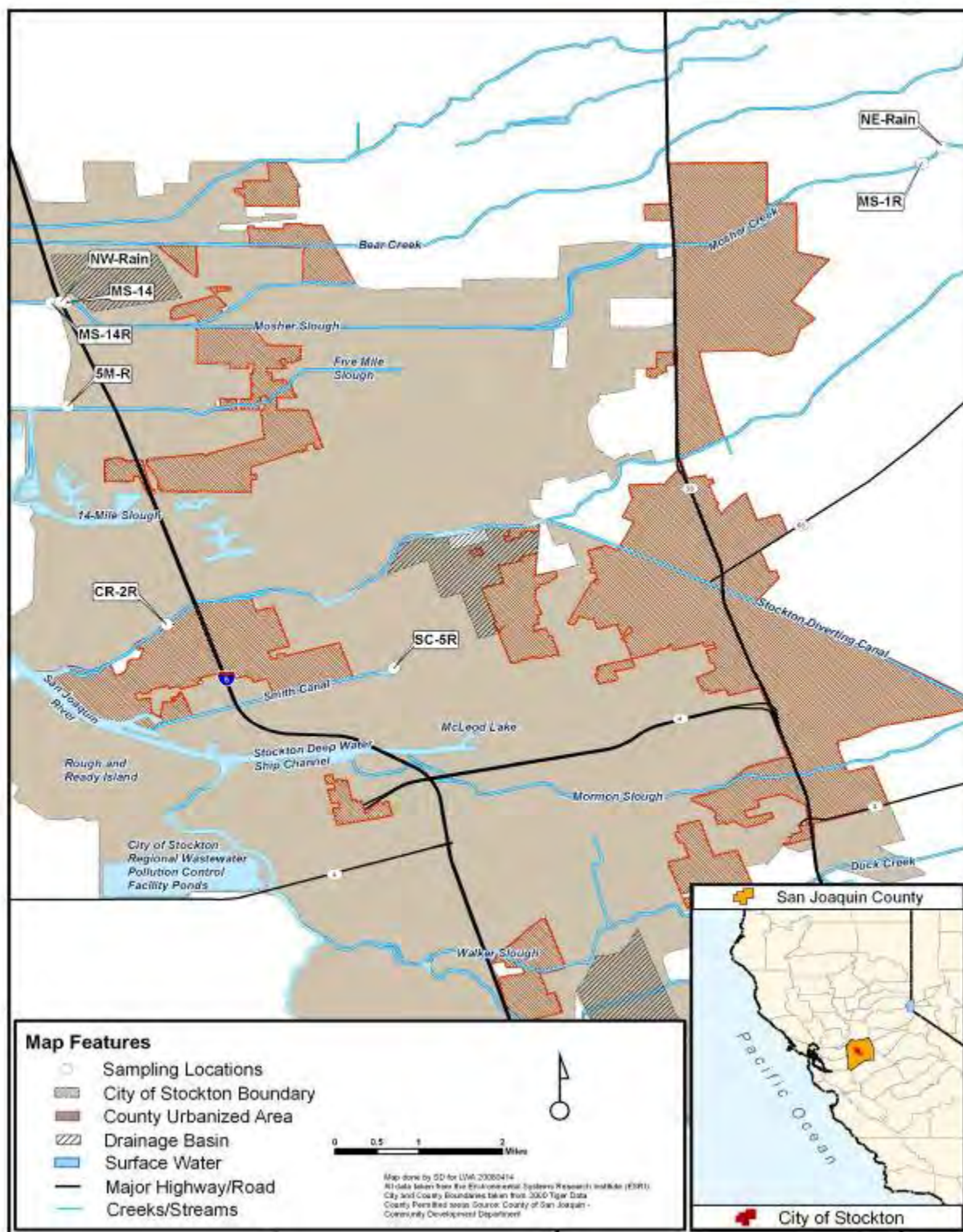


Figure 9-2. Pesticide Plan Monitoring Locations for 2007-2012.

MS=Mosher Slough, 5M=Five-Mile Slough, CR=Calaveras River, SC=Smith Canal; R=Receiving Water

Table 9-3. Timing and Frequency of Pesticide Plan Monitoring Events

Waterbody	Site Type and Name	2010-2011 Monitoring Season	
		Dormant Spray Season Storm (3/2/11)	Dry Season (6/20/11)
Mosher Slough – urban discharge	Pump Station: MS-14	√	√
Mosher Slough – upstream	Receiving Water: MS-1R/MS-14RUS	--- ^a	√
Mosher Slough – downstream	Receiving Water: MS-14	√	√
Five Mile Slough	Receiving Water: 5M-1R	√	√
Calaveras River	Receiving Water: CR-2R	√	√
Smith Canal	Receiving Water: SC-5R	√	√
Rainwater Within City Limits	Rainwater collection site: NW Rain	--- ^b	--- ^c
Rainwater Outside City Limits	Rainwater collection site: NE Rain	--- ^b	--- ^c

Notes:

a= Not sampled due to dry channel

b= Insufficient rainfall during storm event to collect rainwater samples

c= Rainwater is not sampled during dry events

9.2.4.1 Pesticide Plan Monitoring Results

During 2010-2011 a total of 11 samples were collected and analyzed for diazinon, chlorpyrifos, and pyrethroids, as shown in **Tables 9-6, 9-7, and 9-8**, respectively. Complete 2010-2011 monitoring data are included in **Appendix I-1**. In cases of non-detection, results are reported as “less than” the reporting limit. Samples from 3/2/11 were analyzed by McCampbell Analytical, Inc., and samples from 6/20/11 were analyzed by TestAmerica.

The frequency of detection and the rate of WQO exceedances are shown in **Table 9-4**. The WQOs for diazinon and chlorpyrifos were the California Department of Fish and Game (CDFG) revised criteria of 0.16 µg/L and 0.025 µg/L (acute), and 0.10 µg/L and 0.015 µg/L (chronic) respectively, which are also the targets for the SSJD Diazinon and Chlorpyrifos Total Maximum Daily Load (TMDL). There are currently no WQOs for pyrethroids. During 2010-2011 pesticide monitoring, there were no detections of diazinon or chlorpyrifos. Pyrethroids were detected in 36% of samples, which is similar to their detection rate in the previous monitoring year.

Table 9-4. Frequency of Detections and WQO Exceedances during the Pesticide Plan 2010-2011 Monitoring Year

Pesticide	Number of Samples	Number of Detections	Detection Rate	Number of Samples above the WQO^a	WQO Exceedance Rate
Diazinon	11	0	0%	0	0%
Chlorpyrifos	11	0	0%	0	0%
Pyrethroids	11	4 ^b	36%	NA ^c	NA

Notes:

a = WQOs for diazinon and chlorpyrifos are 0.16 µg/L (acute)/0.10 µg/L(chronic) and 0.025 µg/L (acute)/ 0.015 µg/L (chronic), respectively.

b= Number of samples where one or more pyrethroids were detected

c = Not Applicable. There are no applicable water quality objectives for pyrethroids.

Trends in pesticide detections throughout the Permit term will be discussed in greater depth in the 2012 ROWD. However, it is useful to briefly examine the frequency of detections and WQO exceedances during Pesticide Plan monitoring from 2008-2010, to put the 2010-2011 monitoring results in context. During the Permit term, the WQOs for diazinon and chlorpyrifos were regularly achieved in the monitored waterbodies. This was especially the case for diazinon, which was detected in 47% of samples but only exceeded the WQO in 1.8% of samples. The one WQO exceedance for diazinon occurred in rainwater collected outside of the SUA. Chlorpyrifos was detected in fewer samples (20%), but exceeded the WQO in most samples where it was detected. Most detections of diazinon and chlorpyrifos occurred during the 2009-2010 monitoring year.

Table 9-5. Frequency of Detections and WQO Exceedances during the Pesticide Plan (2008-2010)

Pesticide	Number of Samples	Number of Detections	Detection Rate	Number of Samples above the WQO^a	WQO Exceedance Rate
Diazinon	55	26	47%	1 ^b	1.8%
Chlorpyrifos	55	11	20%	9	16%
Pyrethroids	55	21 ^c	38%	NA ^d	NA

Notes:

a = WQOs for diazinon and chlorpyrifos are 0.16 µg/L (acute)/0.10 µg/L(chronic) and 0.025 µg/L (acute)/ 0.015 µg/L (chronic), respectively.

b = The WQO exceedance occurred in rainwater that was collected outside of the Stockton Urbanized Area.

c = Number of samples where one or more pyrethroids were detected

d = There are no applicable water quality objectives for pyrethroids.

Table 9-6. Diazinon Concentrations Observed during Pesticide Plan Monitoring (µg/L)

Waterbody	Site Type and Name	2010-2011 Monitoring Season	
		Dormant Spray Season Storm (3/2/11)	Dry Season (6/20/11)
Mosher Slough – urban discharge	Pump Station: MS-14D	< 0.01	< 0.01
Mosher Slough – upstream	Receiving Water: MS-14RU	---	< 0.01
Mosher Slough – downstream	Receiving Water: MS-14R	< 0.01	< 0.01
Five Mile Slough	Receiving Water: 5M-3R	< 0.01	< 0.01
Calaveras River	Receiving Water: CR-2R	< 0.01	< 0.01
Smith Canal	Receiving Water: SC-5R	< 0.01	< 0.01
Rainwater Within City Limits	Rainwater collection site: NW Rain	---	---
Rainwater Outside City Limits	Rainwater collection site: NE Rain	---	---

Notes:

--- = No sample collected on this date

Table 9-7. Chlorpyrifos Concentrations Observed during Pesticide Plan Monitoring (µg/L)

Waterbody	Site Type and Name	2010-2011 Monitoring Season	
		Dormant Spray Season Storm (3/2/11)	Dry Season (6/20/11)
Mosher Slough – urban discharge	Pump Station: MS-14D	< 0.01	< 0.014
Mosher Slough – upstream	Receiving Water: MS-14RU	---	< 0.014
Mosher Slough – downstream	Receiving Water: MS-14R	< 0.01	< 0.014
Five Mile Slough	Receiving Water: 5M-3R	< 0.01	< 0.014
Calaveras River	Receiving Water: CR-2R	< 0.01	< 0.014
Smith Canal	Receiving Water: SC-5R	< 0.01	< 0.014
Rainwater Within City Limits	Rainwater collection site: NW Rain	---	---
Rainwater Outside City Limits	Rainwater collection site: NE Rain	---	---

Notes:

--- = No sample collected on this date

Table 9-8. Pyrethroid Concentrations Observed during Pesticide Plan Monitoring (µg/L)

Waterbody	Site Type and Name	2010-2011 Monitoring Season	
		Dormant Spray Season Storm (3/2/11)	Dry Season (6/20/11)
Mosher Slough – urban discharge	Pump Station: MS-14D	Bifenthrin, 0.016 Permethrin, 0.03	Bifenthrin, 0.0037 Prallethrin, 0.00081
Mosher Slough – upstream	Receiving Water: MS-14RU	---	ND
Mosher Slough – downstream	Receiving Water: MS-14R	ND	ND
Five Mile Slough	Receiving Water: 5M-3R	ND	Bifenthrin, 0.0041
Calaveras River	Receiving Water: CR-2R	ND	ND
Smith Canal	Receiving Water: SC-5R	Permethrin, 0.0082	ND
Rainwater Within City Limits	Rainwater collection site: NW Rain	---	---
Rainwater Outside City Limits	Rainwater collection site: NE Rain	---	---

Notes:

--- = No sample collected on this date

* = Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit.
Reported value is estimated

ND = Sample was non-detect for pyrethroids, with the following reporting limits (µg/L):

Pyrethroid	RL 3/2/11	RL 6/20/11	Pyrethroid	RL 3/2/11	RL 6/20/11
Allentrin	0.005	0.0048	Esfenvalerate	0.005	0.0048
Bifenthrin	0.005	0.0048	Fenvalerate	0.005	0.0048
Cyfluthrin	0.005	0.0048	Fluvalinate	0.005	0.0048
Cypermethrin	0.005	0.0048	L-Cyhalothrin	0.005	0.0048
Danitol	-----	0.0048	Permethrin	0.005	0.0048
Deltamethrin	0.005	0.0048	Prallethrin	0.005	-----

Spatial and Temporal Trends Observed during Pesticide Plan Monitoring

To display the chlorpyrifos, diazinon, and pyrethroid data collected during the Pesticide Plan, and elucidate spatial and temporal variations in pesticide concentrations, a geographic information systems (GIS) tool was utilized, as shown in **Figures 9-3, 9-4, and 9-5**. A few general trends were observed, as discussed in the sections below.

Chlorpyrifos

Spatial and temporal trends observed for chlorpyrifos during 2010-2011 Pesticide Plan monitoring are shown in **Figure 9-3**. During 2010-2011, chlorpyrifos was not detected in any samples.

Chlorpyrifos data collected during the previous 2009-2010 monitoring season indicated that chlorpyrifos detections increased during 2009-2010 relative to prior years. During the post dormant storm on March 21, 2010, chlorpyrifos levels exceeded WQOs for rainwater, urban discharge, and receiving water. For the season, three of the four rainwater samples contained chlorpyrifos at levels above the DFG acute WQO. The pump station MS-14D, located on the western border of Stockton adjacent to agricultural areas, had chlorpyrifos levels exceeding the DFG acute WQO during both storm events. The upstream receiving water location on Mosher Slough, MS-14RU, exceeded the chlorpyrifos DFG acute WQO during the dry season event. Since the majority of detections are from upstream and agricultural locations in Stockton, the increased detections may be attributed to agricultural use. However, the increased detections and WQO exceedances of chlorpyrifos during 2009-2010 were not present during 2010-2011.

Previous monitoring results prior to 2009 had indicated infrequent detection of chlorpyrifos in receiving water and absence of detection in urban runoff, suggesting that the phase-out by the USEPA (completed in 2005) had been effective in reducing chlorpyrifos impacts by stormwater. The 2010-2011 monitoring results confirm this trend.

Diazinon

Spatial and temporal trends observed for diazinon during 2010-2011 Pesticide Plan monitoring are shown in **Figure 9-4**. As discussed above, and consistent with previous monitoring results, data collected indicate that WQOs for diazinon are consistently attained in Stockton waterways. Diazinon was not detected in any samples during 2010-2011.

Similar to chlorpyrifos, diazinon detections had increased during the previous 2009-2010 monitoring season relative to prior years. As with chlorpyrifos, diazinon was detected most frequently in both rainwater sampling locations, at the upstream location MS-14RUS, and the discharge and receiving water locations MS-14D and MS-14R bordering agricultural areas west of Stockton. The consistent presence of diazinon in rainwater after the phase-out of diazinon by the USEPA was surprising, and suggests that in some cases rainwater may have already been enriched above the DFG WQO before it even falls to the ground.

However, all detections of diazinon during the current Permit term (except for the one rainwater sample on December 21, 2008) have been at levels below relevant WQOs. The lack of detections during 2010-2011, in combination with prior monitoring results, offer further evidence that diazinon is no longer a pollutant of concern in Stockton waterways.

Pyrethroids

Pyrethroids were monitored in water column samples from urban discharge and receiving water. Spatial and temporal trends are shown in **Figure 9-5**. Pyrethroids were only detected at three sites, and did not show a trend of greater detection during either wet or dry events. 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 storm event) and prallethrin was detected once (at MS-14D). In contrast, a greater range of pyrethroids had been detected at multiple locations during the previous 2009-2010 monitoring year, and had been more frequently detected during storm events.

Pyrethroids were most prevalent at the urban discharge location on Mosher Slough, MS-14D, which was also the case during prior monitoring years. Pyrethroids were detected at this location during both sampling events, with 3 different compounds detected. However, pyrethroids were not detected in 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 storm event in both rainwater sampling locations in 2010. Due to low rainfall during the 3/2/11 storm event, sufficient rainfall was not collected for analysis. However, rainfall will continue to be sampled in 2011-2012 to assess rainfall as a source of pyrethroids to the water column.

Most studies on pyrethroids to date have focused on pyrethroids in sediment samples, as pyrethroids tend to bind with sediments. 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 Valley². The Pesticide Plan 2010-2011 results confirm that pyrethroids are present in Stockton area waterways, and continued Pesticide Plan monitoring should focus on pyrethroids.

² 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.

Map Features

- Sampling Locations
- Water Body
- Stream or River
- Drainage Basin
- City Boundary

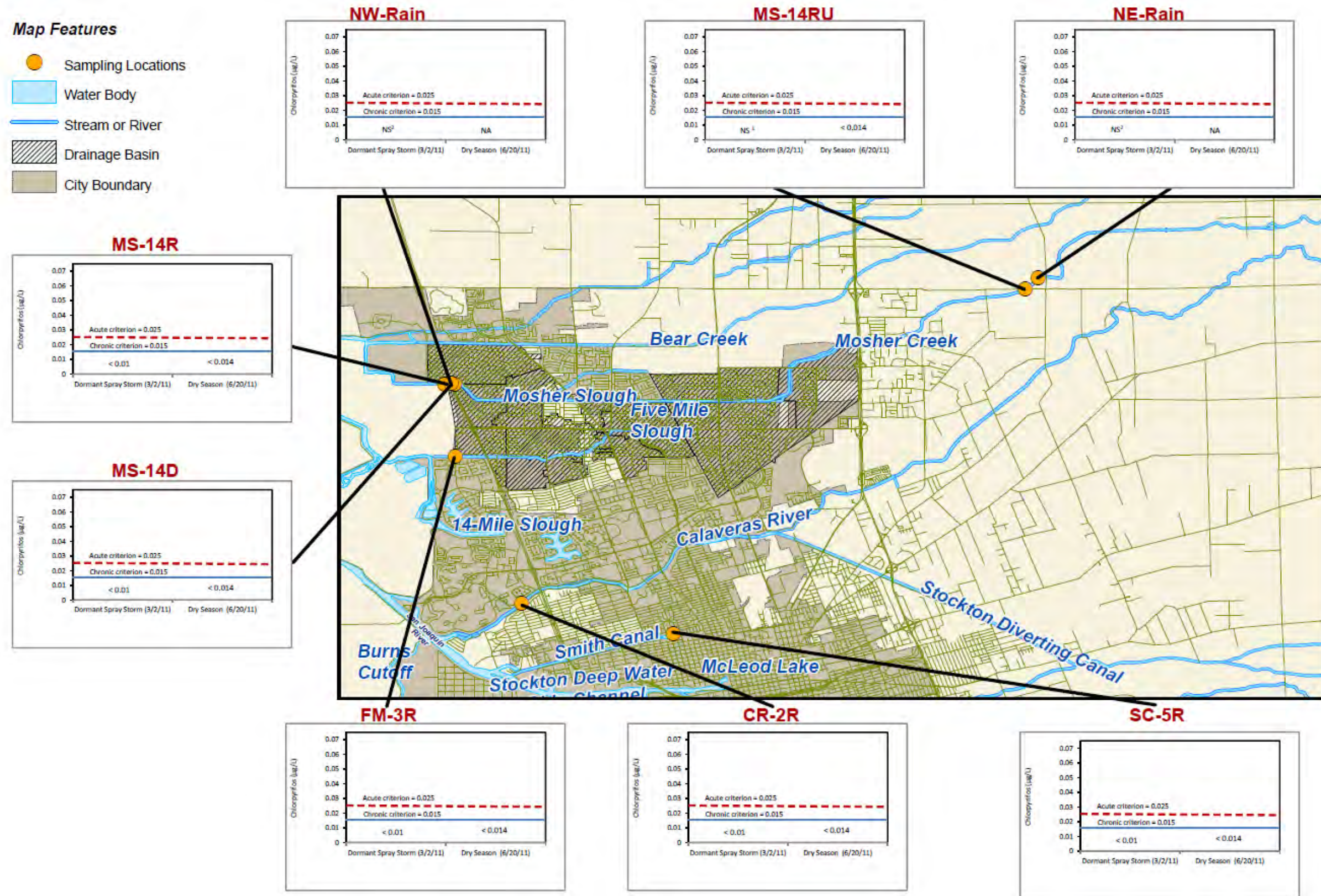


Figure 9-3. Chlorpyrifos Concentrations Observed During 2010-2011 Pesticide Plan Monitoring

Map Features

- Sampling Locations
- Water Body
- Stream or River
- Drainage Basin
- City Boundary

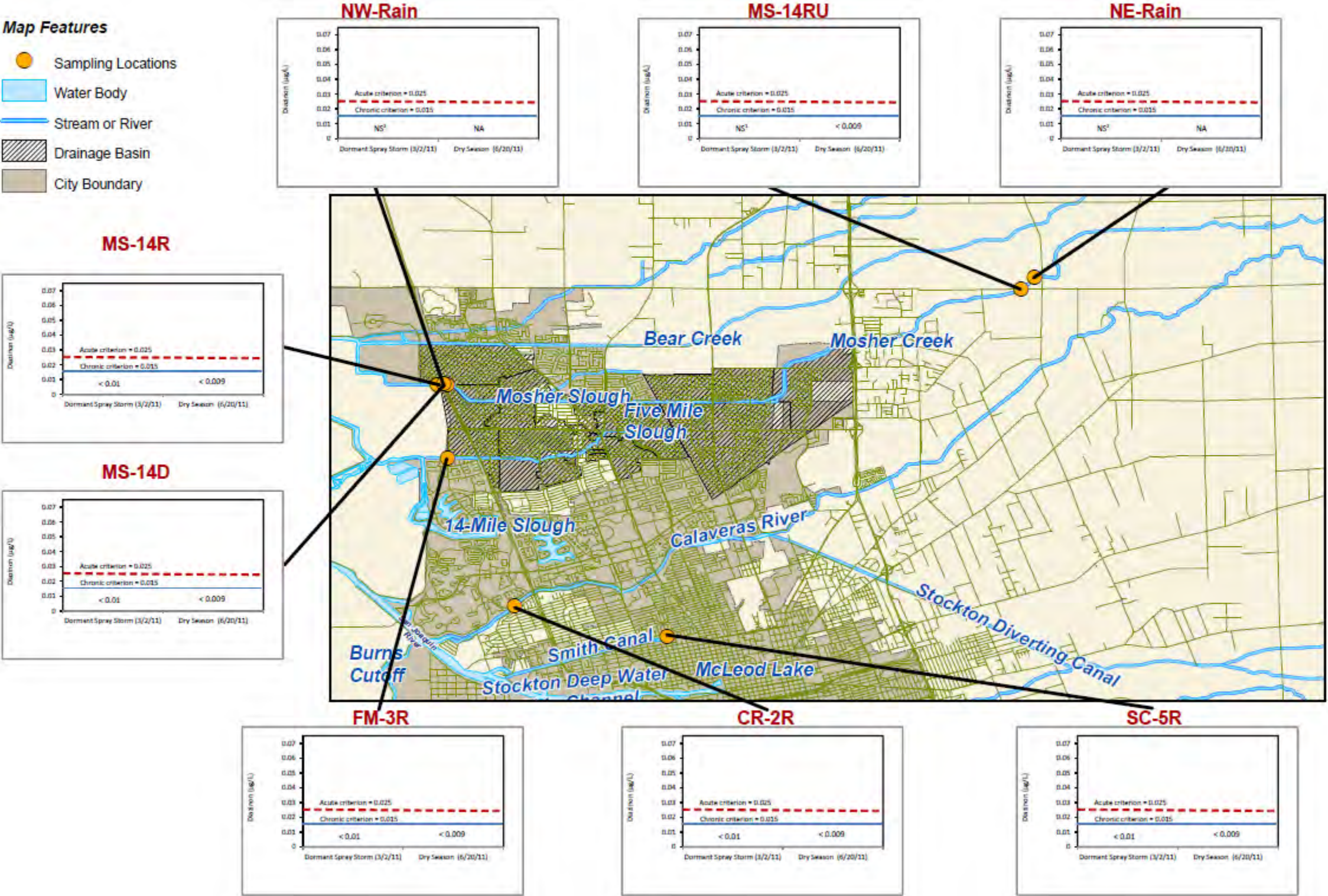


Figure 9-4. Diazinon Concentrations Observed During 2010-2011 Pesticide Plan Monitoring

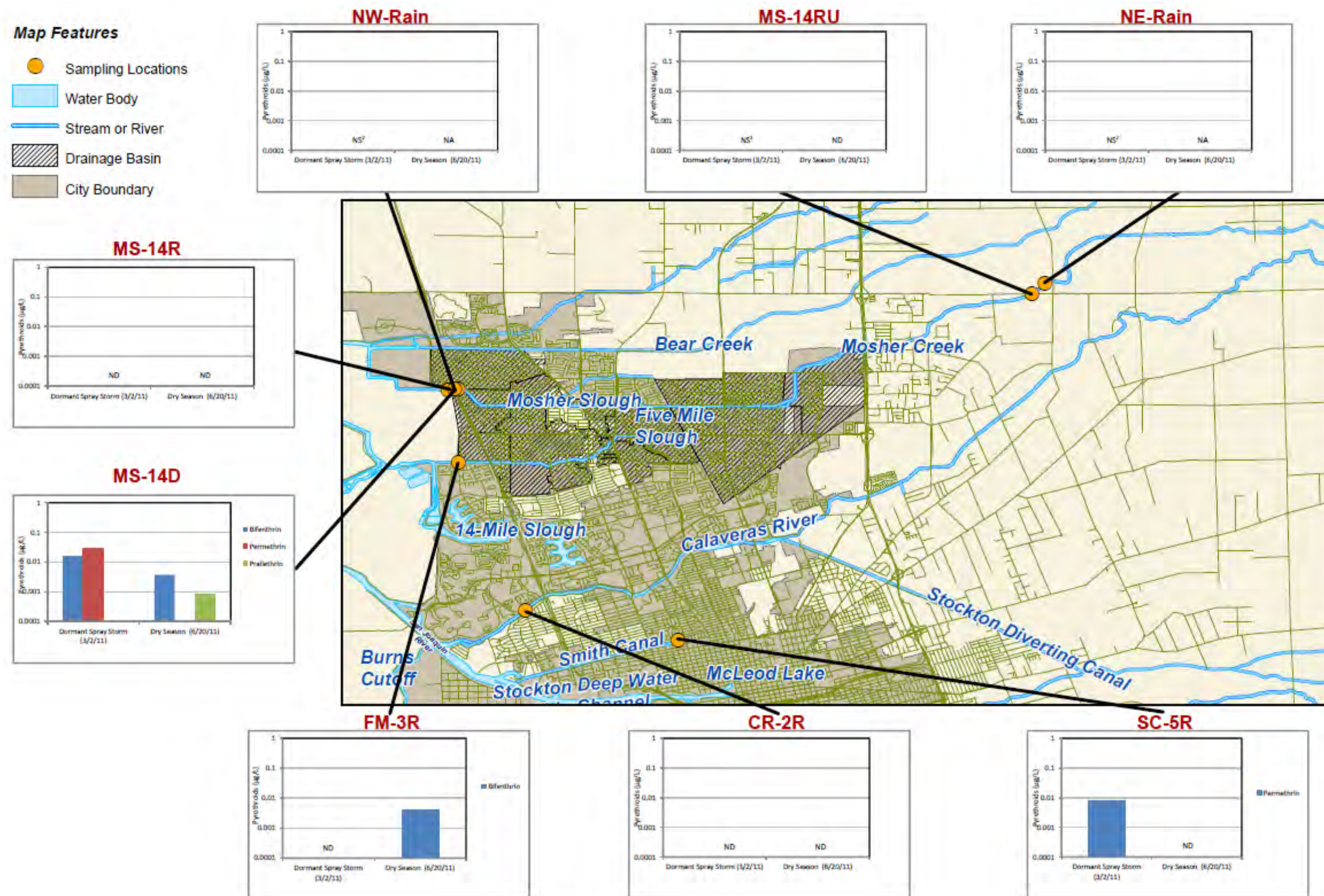


Figure 9-5. Pyrethroid Concentrations Observed During 2010-2011 Pesticide Plan Monitoring

9.2.5 2011-2012 Pesticide Plan Activities

Pesticide Plan activities for the 2011-2012 reporting year will include the following:

- **Public Outreach:** Continue OWOW outreach and annual public outreach messages.
- **IPM and Municipal Operations:** Formally adopt IPM/pesticide application protocols, implement IPM protocols, and enforce IPM standards for contracted landscapers.
- **Effectiveness Assessment:** Continue to track pesticide use and acreage managed under IPM, pest control workshops and training, public outreach and OWOW participation. Perform effectiveness assessment as part of the ROWD.
- **Monitoring:** Continued monitoring for chlorpyrifos and pyrethroids at monitoring locations at the Calaveras River, Mosher Slough, Five-Mile Slough, and Smith Canal.

9.2.6 Pesticide Plan Program Modifications

Every April, the City submits an annual work plan for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Water Quality Based Programs. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary.

The program modifications that were identified during 2010-2011 include the following:

- **Public Outreach:** Public workshops will not be implemented this Permit term, and will be evaluated as an outreach tool during the ROWD. Public outreach has been successfully conducted through OWOW outreach and annual public outreach messages.
- **Public Outreach:** The second Public Opinion phone survey will be deferred to the next Permit term. The second Pesticide survey will consist of a shelf survey to assess pesticide availability to the public, and an assessment of commercial pesticide use will be conducted using DPR pesticide use records.
- **Municipal Operations:** Pesticide training for municipal employees will be discontinued. Due to recent restructuring within the City departments, municipal employees are no longer directly responsible for pesticide application. The City's Public Works Department is responsible for a limited amount of maintenance of City acreage, but park maintenance, including medians and landscape buffers, is contracted out. Because pesticide application is now primarily performed by outside contractors, training for municipal employees on proper pesticide application protocols is no longer necessary.
- **Monitoring:** Discontinue OP pesticide monitoring. Monitoring requirements for the Pesticide Plan specify that the Permittees shall conduct pesticide monitoring until they can demonstrate that the WQOs are being met or that the cause of exceedances of WQOs is not related to the Permittees' discharge. Pesticide monitoring results from the previous permit term indicated that OP pesticides are no longer POC's in Stockton, and 2010-2011 monitoring results indicated that OP pesticides were not detected in Stockton waterways. In particular, diazinon has only exceeded the WQO once. Therefore, diazinon monitoring will be discontinued for 2011-2012. Chlorpyrifos monitoring will continue for an additional year, and pyrethroids will be the focus of Pesticide Plan monitoring.

9.3 PATHOGEN PLAN PROGRESS REPORT

The focus of the Pathogen Plan is the San Joaquin River tributaries within the SUA that are classified as impaired due to the presence of fecal indicator bacteria. The City and County developed a Pathogen Plan in accordance with Provision D.18.b of the second term permit, which required the Permittees to identify, monitor, and mitigate bacteria sources.

The overall goals of the Pathogen Plan are to identify, monitor and mitigate the controllable sources of bacteria. The 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 (ID) Studies to identify the host (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 effected fecal contamination

The Pathogen Plan will be conducted over three phases until 2018. The Plan addresses six waterbodies, and is implemented in a phased approach that focuses on two waterbodies for each phase (**Table 9-9**).

Table 9-9. Pathogen Plan Implementation Phases.

Monitoring 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

All three phases were in progress during the 2010-2011 reporting year. Each phase includes the following elements, and will be 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 (total coliform, fecal coliform, and *E. coli*) is conducted at strategic locations along 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 (e.g., 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*), which are 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) which can persist for years, and perhaps even regrow in the environment. It should be noted that *Bacteroidales* were shown to be the most reliable human marker in comparison studies³ of microbial source tracking methods that were performed by the Southern California Coastal Waters Research Program (SCCWRP). In addition, USEPA utilized *Bacteroidales* during a recent epidemiological study⁴, and found a positive correlation between *Bacteroidales* concentrations and gastrointestinal illness in swimmers.

Researchers at the University of California, Davis have developed the polymerase chain reaction (PCR) methods⁵ 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-Prevotella* from specific hosts. At this time, methods have been developed to quantify bacteria from the following hosts:

- General warm-blooded animal inputs (called “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 polymerase chain reaction (PCR) amplification⁶. 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 waste⁷. Direct quantification of viruses (instead of bacteria only) provide important

³ 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.

⁴ Wade, Tet al., 2006. Rapidly Measured Indicators of Recreational Water Quality Are Predictive of Swimming-Associated Gastrointestinal Illness. *Environ Health Perspect* 114:24-28.

⁵ 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.

⁶ 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.

⁷ 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.

information about health risks, and allow for prioritization of Program 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 implementing BMPs which focus on specific sources. Targeted BMPs are selected based on the dominant controllable sources of fecal contamination determined from source ID monitoring.

Effectiveness Monitoring

After BMPs have been implemented for a sufficient time period, the effectiveness of control programs is assessed. Assessment includes monitoring fecal indicator bacteria levels to determine if BMPs impacted the impairment of the waterbodies.

9.3.1 Phase I Activities

Monitoring Phase	Waterbody	Start Date	End Date
Phase I	Smith Canal Mormon Slough	July 1, 2004	June 30, 2012

Phase I waterbodies and monitoring locations are shown in **Figure 9-6**. Pathogen Plan components underway during 2010-2011 are depicted below, and discussed in the following sections.

Phase I Component	2004	2005	2006	2007	2008	2009	2010	2011	2012
Characterization Monitoring	■	■					■	■	
Source ID Monitoring		■	■	■	■	■	■	■	
Preliminary BMP Implementation				■	■	■	■	■	■
Effectiveness Monitoring							■	■	■

9.3.1.1 Phase I Characterization Monitoring

Characterization monitoring was completed during 2004-2005, and a detailed analysis of characterization monitoring results for was presented in the 2005-2006 Annual Report. 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, with 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 in compliance with 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 the most important.

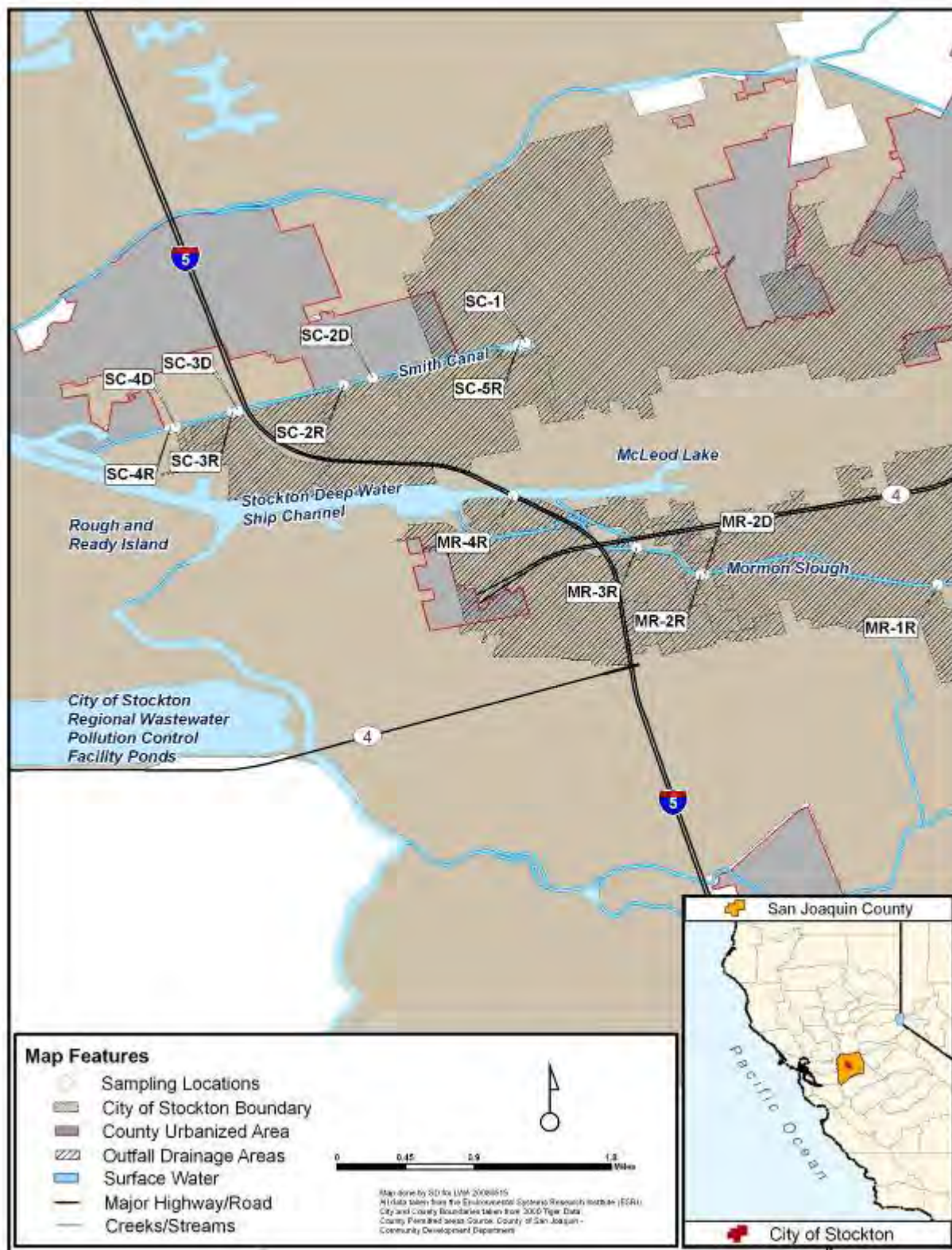


Figure 9-6. Phase I Waterbodies and Monitoring Locations

9.3.1.2 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 on both accessibility and patterns observed during characterization monitoring. The final source ID event was completed on 11/1/2008. Results of the 7 events completed prior to 2008-2009 were reported in the 2007-2008 Annual Report.

Universal *Bacteroidales* were detected in most samples (all except 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 storm events.

9.3.1.3 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

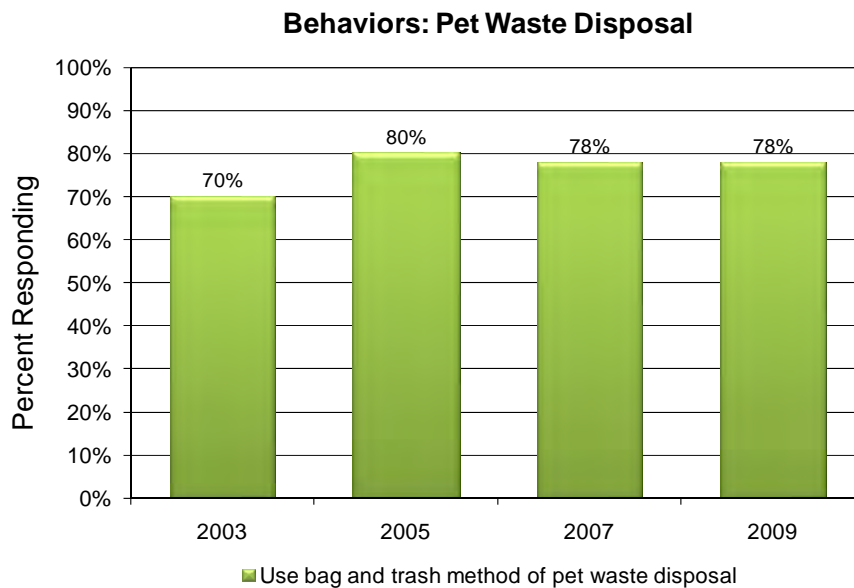
To date, the City has implemented public education and outreach efforts to control pet waste. During 2010-2011, the City provided outreach and literature on the proper disposal of pet waste in the *Stockton Water News*, the City's utility billing insert. An article entitled *Protecting Water Quality* was included in the March 2011 edition of the City's utility billing insert. The article highlighted the importance of properly bagging and disposing of pet waste. The *Stockton Water News* utility billing inserts are distributed to all residents and businesses.

In addition, the City provided information regarding proper disposal of pet waste through the City's Web site. Informational brochures (i.e., Outside Your Home and BMP for Kennels) discuss proper disposal of pet waste.

As described in the 2009-2010 Annual Report, the City previously developed language for and produced new Pet Waste Signs. A total of 44 new signs were installed at 10 existing parks that have stormwater inlets leading directly to waterways in the Smith Canal and Mormon Slough drainage areas. Signs have been installed at Victory Park (9 signs), American Legion Park (5 signs), Louis Park (19 signs), Caldwell (4 signs), Lafayette Square (2 signs), Gleason (3 signs), Columbus Square (2 signs), Liberty Square (2 signs), Union Square (2 signs), and Stribley (5 signs).

Public surveys are used to evaluate the effectiveness of the Permittees' public outreach efforts. The City and County 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. Compared to previous survey data, the following conclusions were drawn from the 2009 public opinion survey:

- The same number of respondents reported properly disposing of their pet waste.



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, which could be potential sources of livestock fecal contamination. One facility, Islamic Meat and Poultry, was previously 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 with manure and facility waste and 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 had been noted at the facility, and no live animals were present at the property. It is possible that Islamic Meat and Poultry contributed to horse/cow fecal contamination during the Phase I Source ID monitoring period. 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' SWMP. To date, the Permittees have preliminarily identified houseboats on Smith Canal as a possible contributor of human fecal pollution. Houseboats located north of the San Joaquin River are regulated by the Central Valley Flood Control Board, and houseboats located on the south levee are the responsibility of the County. Initial permits are issued for houseboats, but no further inspections are conducted after the initial permit issuance.

The Permittees have also identified sanitary sewer overflows as a possible alternative source of human-derived fecal contamination in the Smith Canal and Mormon Slough drainage areas. The City plans to further evaluate these potential sources.

9.3.1.4 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.

9.3.2 Phase II Activities

Monitoring Phase	Waterbody	Start Date	End Date
Phase II	Mosher Slough Five Mile Slough	November 1, 2007	June 30, 2015

Phase II waterbodies and monitoring locations are shown in **Figure 9-7**. Pathogen Plan components underway during 2009-2010 are depicted below, and discussed in the following sections.

Phase II Component	2007	2008	2009	2010	2011	2012	2013	2014
Characterization Monitoring								
Source ID Monitoring								
Preliminary BMP Implementation								
Effectiveness Monitoring								

9.3.2.1 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 5 wet weather events were conducted. Figures depicting the trends in indicator bacteria were included in the 2008-2009 Annual Report. 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. Levels were generally higher in urban discharge relative to receiving water, except for urban discharge site MS-1D, which had the lowest levels 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 storm 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, indicating 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 levels were highest in urban discharge samples further upstream (FM-2D and FM-1D).

9.3.2.2 Phase II Source Identification Monitoring

Sites were selected for Source ID monitoring based on trends in characterization monitoring data. Sites were targeted which had consistent high levels of indicator bacteria.

Phase II source identification monitoring began in February 2009 and was completed in June 2010, with a total of 5 storm events and 3 dry weather events. A summary of completed source identification monitoring events was submitted to the Regional Water Board in December 2010.

Universal *Bacteroidales* were detected in nearly every sample, as is typical of studies in other watersheds, with no apparent trends between wet weather and dry weather events. Human *Bacteroidales* were detected more frequently during dry weather events compared to wet weather events – with human markers present during two of the three dry weather events at all locations except the upstream Mosher Slough location (MS-14RU), with particularly high levels detected at FM-2D and MS-14D during one dry weather event. Cow/horse *Bacteroidales* were rarely detected, with the only detection showing a relatively low concentration of gene copies in Five-Mile Slough receiving water (FM-2R). Dog *Bacteroidales* were the most frequently detected of the source-specific markers, with a presence at all locations except for the upstream Mosher Slough locations (MS-14RU). They were not detected during all events, however – they were present at two of the five wet weather events and one of the three dry weather events.

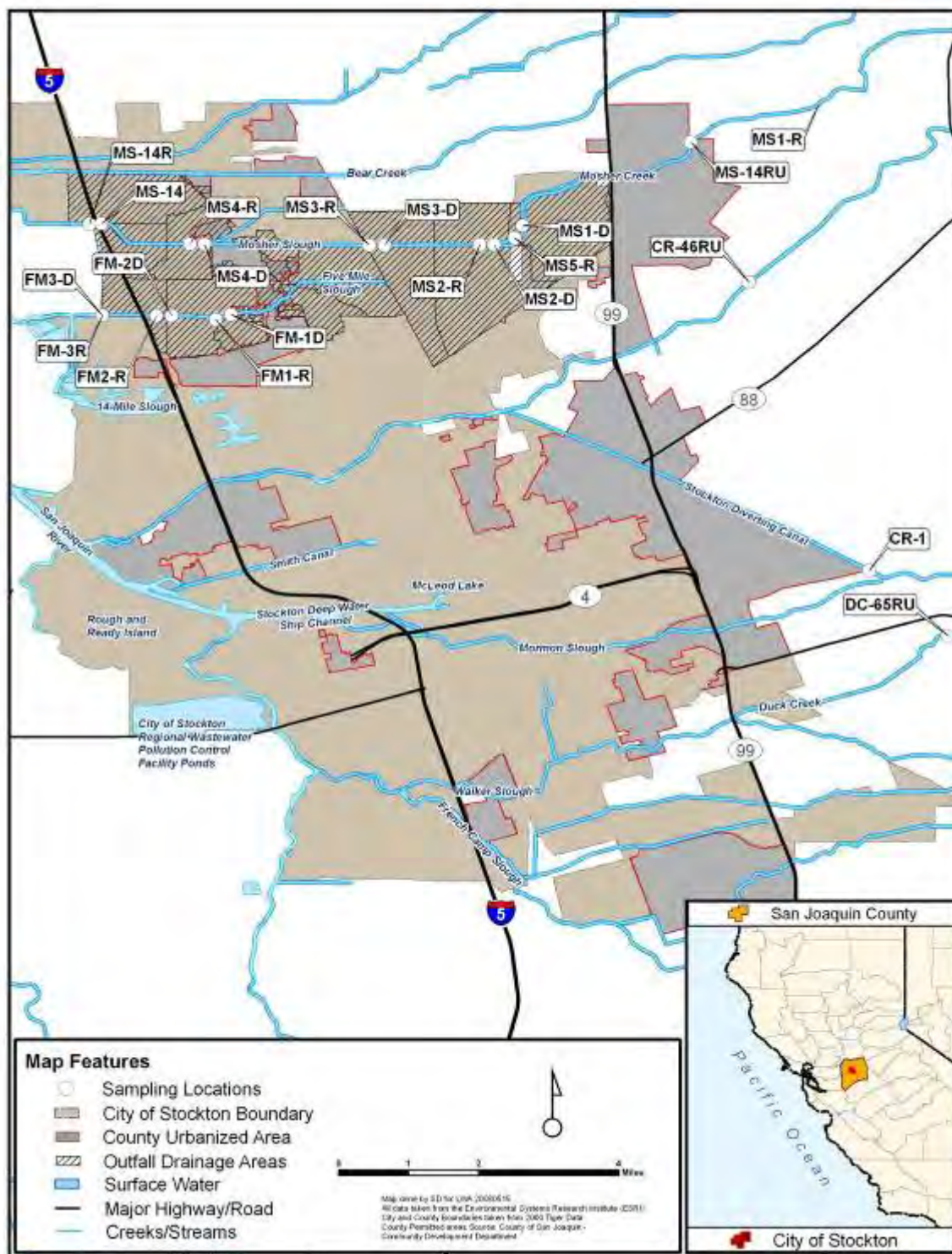


Figure 9-7. Phase II Monitoring Locations

9.3.2.3 Phase II 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 through targeted outreach.

Pet Waste Control

Citywide efforts focused on pet waste source control through public outreach and education, including billing inserts, outreach brochures, and newspaper articles, were described in Section 9.3.1.3. The City's 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 sanitary sewer overflows, which are a potential source of human-derived fecal contamination in Stockton waterways, as described in Section 4.3 of the Annual Report. Additionally, the Permittees' illicit discharge program (described in Section 2.3-2.4 of the Annual Report) 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 City will continue to track and respond to sanitary sewer overflows and illicit connections as a potential source of human fecal input to Phase II waterways.

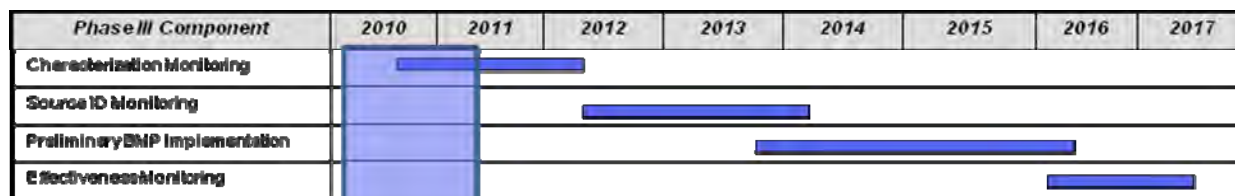
9.3.2.4 Phase II Effectiveness Monitoring

Effectiveness monitoring for Phase II waterbodies will be initiated during the next Permit term.

9.3.3 Phase III Activities

Monitoring Phase	Waterbody	Start Date	End Date
Phase III	Lower Calaveras River Walker Slough	July 1, 2010	June 30, 2018

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 9-8**. Pathogen Plan components underway for Phase III during 2010-2011 are depicted below.



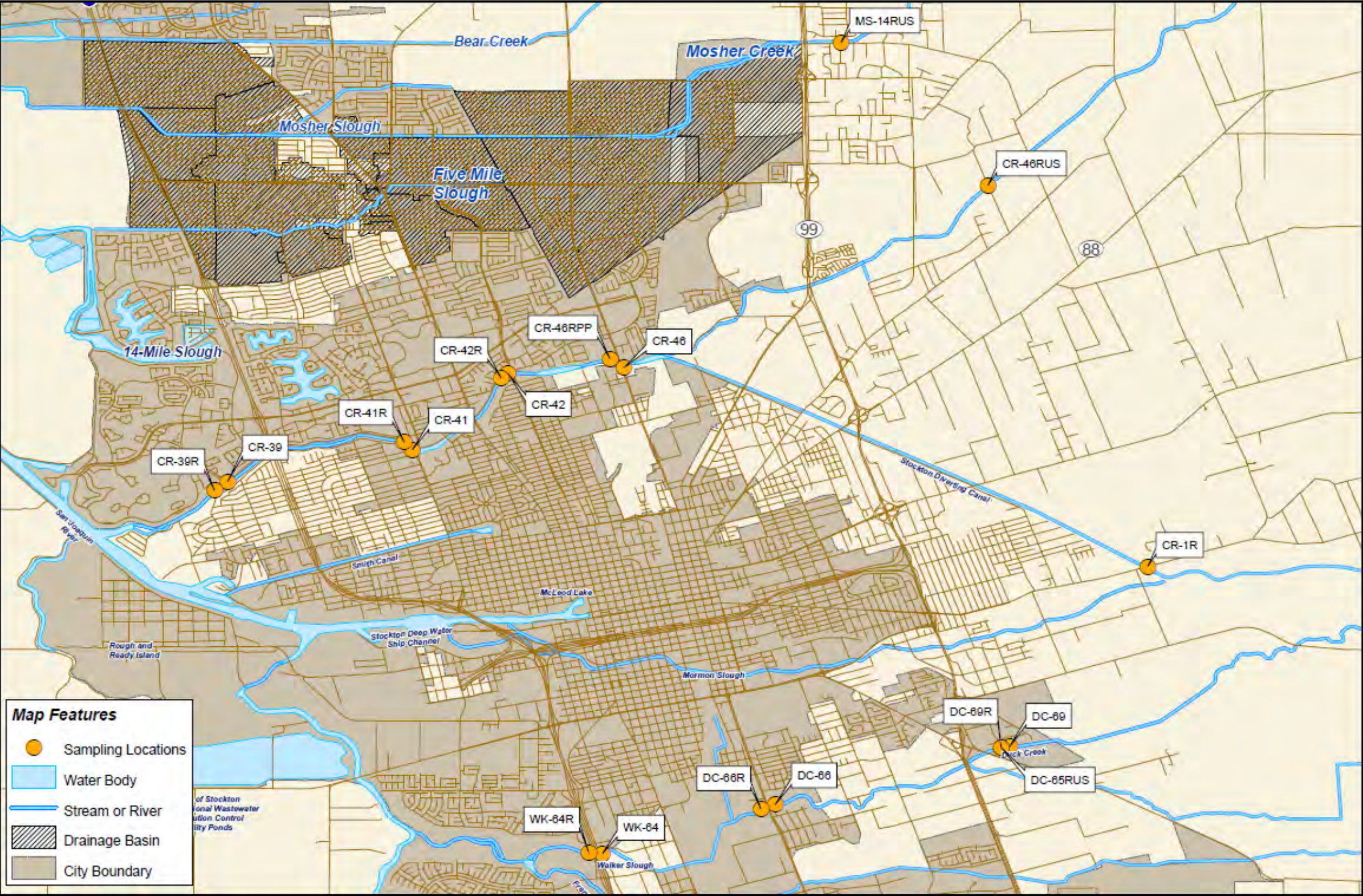


Figure 9-8. Pathogen Plan Phase III Characterization Monitoring Locations

9.3.3.1 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. Monitoring locations are shown in **Figure 9-8**. Receiving water sites are denoted with an “R” and discharge sites are denoted with a “D.” 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. In total, 7 dry weather and 2 wet weather events were conducted during 2010-2011. Data is summarized in **Table 9-10**.

When compared to single sample WQOs (400 MPN/100 mL for fecal coliform and 235 MPN/100 mL for *E. coli*) the frequency of exceedances was 42% overall.

- For the Calaveras River, 28 of 72 samples (39%) were above single sample WQOs.
- For Duck Creek, 27 of 54 samples (50%) were above single sample WQOs.
- For upstream locations, 7 of 20 samples (35%) were above single sample WQOs.

Sites where 50% or more samples exceeded single sample WQOs include:

- CR-46 (78%)
- CR-42 (78%)
- CR-41 (78%)
- DC-66 (67%)
- DC-66R (67%)
- WK-64 (67%)
- MS-14RU (100%)
- DC-65RU (50%)

Wet Weather

Two storm events were sampled, from which 21 of 30 total samples (70%) were above single sample WQOs during wet weather.

- For the Calaveras River, 11 of 16 wet weather samples (69%) were above single sample WQOs.
- For Duck Creek, 9 of 12 wet weather samples (75%) were above single sample WQOs.
- For upstream locations, 1 of 2 wet weather samples (50%) were above single sample WQOs. There was insufficient flow in the upstream locations during storm events to sample all sites.

Dry Weather

Seven dry weather events were sampled. In total, 41 of 116 dry weather samples (35%) were above single sample WQOs.

- For the Calaveras River, 17 of 56 dry weather samples (30%) were above single sample WQOs.
- For Duck Creek, 18 of 42 dry weather samples (43%) were above single sample WQOs.
- For upstream locations, 6 of 18 dry weather samples (33%) were above single sample WQOs.

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 -- 64% of dry weather and 84% of wet weather Phase I samples exceeded single sample WQOs, compared to 35% of dry weather and 70% of wet weather Phase III samples that exceeded single sample WQOs. In other words, the water quality regarding indicator bacteria contamination is better in the lower Calaveras River and Duck Creek than in the Phase I waterbodies, Mosher Slough and Smith Canal.

When compared to Phase II characterization monitoring (presented in the 2008-2009 Annual Report), Phase III waterbodies had a similar frequency of exceedances of single sample WQOs -- 43% of dry weather and 65% of wet weather Phase II samples exceeded single sample WQOs. There appears to be a consistent pattern of a greater frequency of exceedances during wet weather events than dry weather events in all waterbodies, from Phase I, II, and III.

Table 9-10. Characterization Monitoring for the lower Calaveras River, Duck Creek, and Upstream locations (Phase III) – Dry Weather (DW) Events and Wet Weather (WW) Events

Water Body	Site Name	Dry Weather Events							Wet Weather Events	
		DW01 1/10/11	DW02 1/24/11	DW03 2/7/11	DW04 4/6/11	DW05 5/4/11	DW06 5/25/11	DW07 6/16/11	WW01 11/19/10	WW02 3/2/11
Lower Calaveras River	CR-46	X	X	✓	X	X	X	✓	X	X
	CR-46R	✓	✓	✓	✓	✓	✓	✓	X	✓
	CR-42	✓	X	✓	X	X	X	X	X	X
	CR-42R	✓	✓	✓	✓	✓	✓	✓	X	✓
	CR-39	✓	✓	✓	✓	✓	✓	✓	X	✓
	CR-39R	✓	✓	✓	✓	✓	✓	✓	X	X
	CR-41	X	X	X	✓	X	X	X	X	✓
	CR-41R	✓	✓	X	✓	✓	✓	✓	X	✓
Duck Creek	DC-69	✓	✓	✓	✓	✓	✓	X	X	X
	DC-69R	✓	✓	✓	✓	X	X	X	X	✓
	DC-66	✓	✓	X	✓	X	X	X	X	X
	DC-66R	X	✓	✓	✓	X	X	X	X	X
	WK-64	X	✓	X	X	X	✓	X	X	✓
	WK-64R	✓	✓	✓	✓	✓	✓	X	X	✓
Upstream	MS-14RU	--	--	--	--	X	X	X	--	--
	CR-1	✓	✓	✓	✓	✓	✓	✓	--	✓
	CR-46RU	--	--	--	--	✓	--	✓	--	--
	DC-65RU	✓	--	--	✓	✓	X	X	--	X

Notes:

✓ = Sample collected, and both *E. coli* and fecal coliform were below single sample maximum WQOs of 235 MPN/100 ml and 400 MPN/100 ml, respectively.

X = Sample collected, and either *E. coli* or fecal coliform were above single sample maximum WQOs of 235 MPN/100 ml and 400 MPN/100 ml, respectively.

-- = No sample collected due to dry channel or discontinuous flow.

To highlight the spatial and temporal patterns of fecal indicator bacteria concentrations in the Smith Canal and Mormon Slough watersheds, indicator data collected during 2010-2011 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 9-10 and 9-11**, respectively. Similarly, the data from Duck Creek are shown in **Figure 9-12 and 9-13**. Data from the upstream locations are shown in **Figure 9-14 and 9-15**. 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, and all Pathogen Plan characterization monitoring data are appended in **Appendix I-2**.

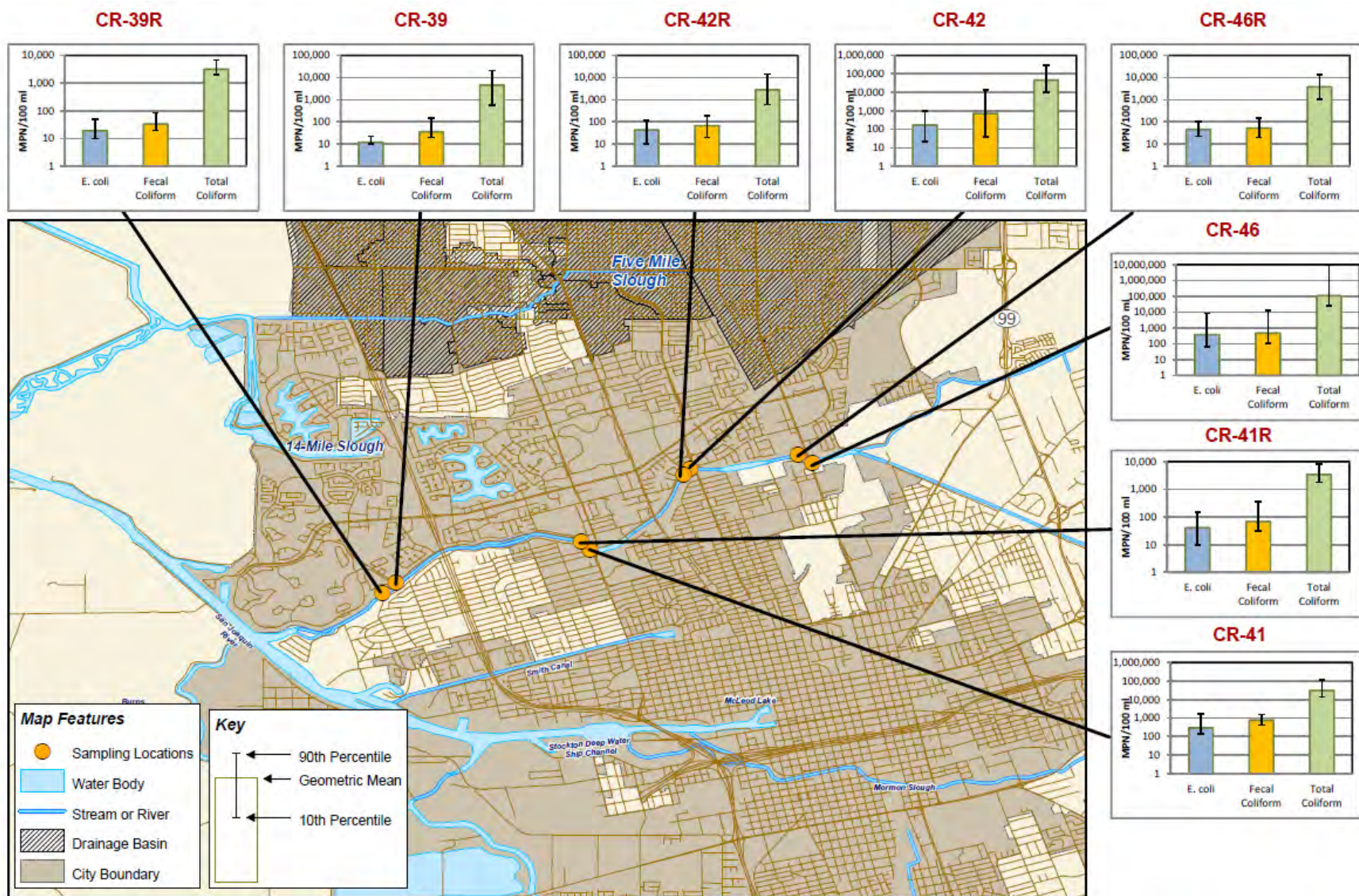


Figure 9-10. 2010-2011 Dry Weather Characterization Monitoring Results for the Lower Calaveras River (n=7).

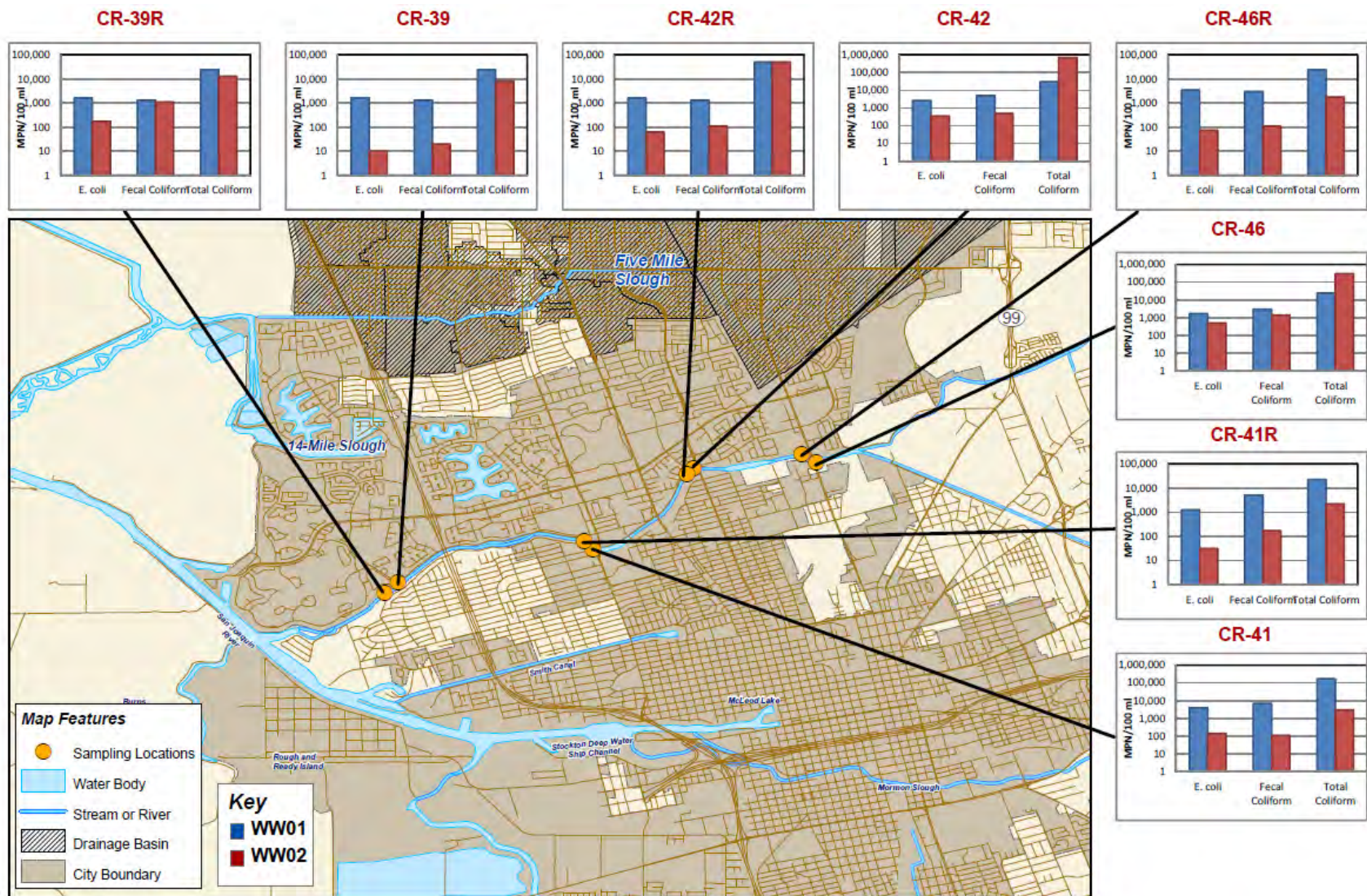


Figure 9-11. 2010-2011 Storm Event Characterization Monitoring Results for the Lower Calaveras River (n=2).

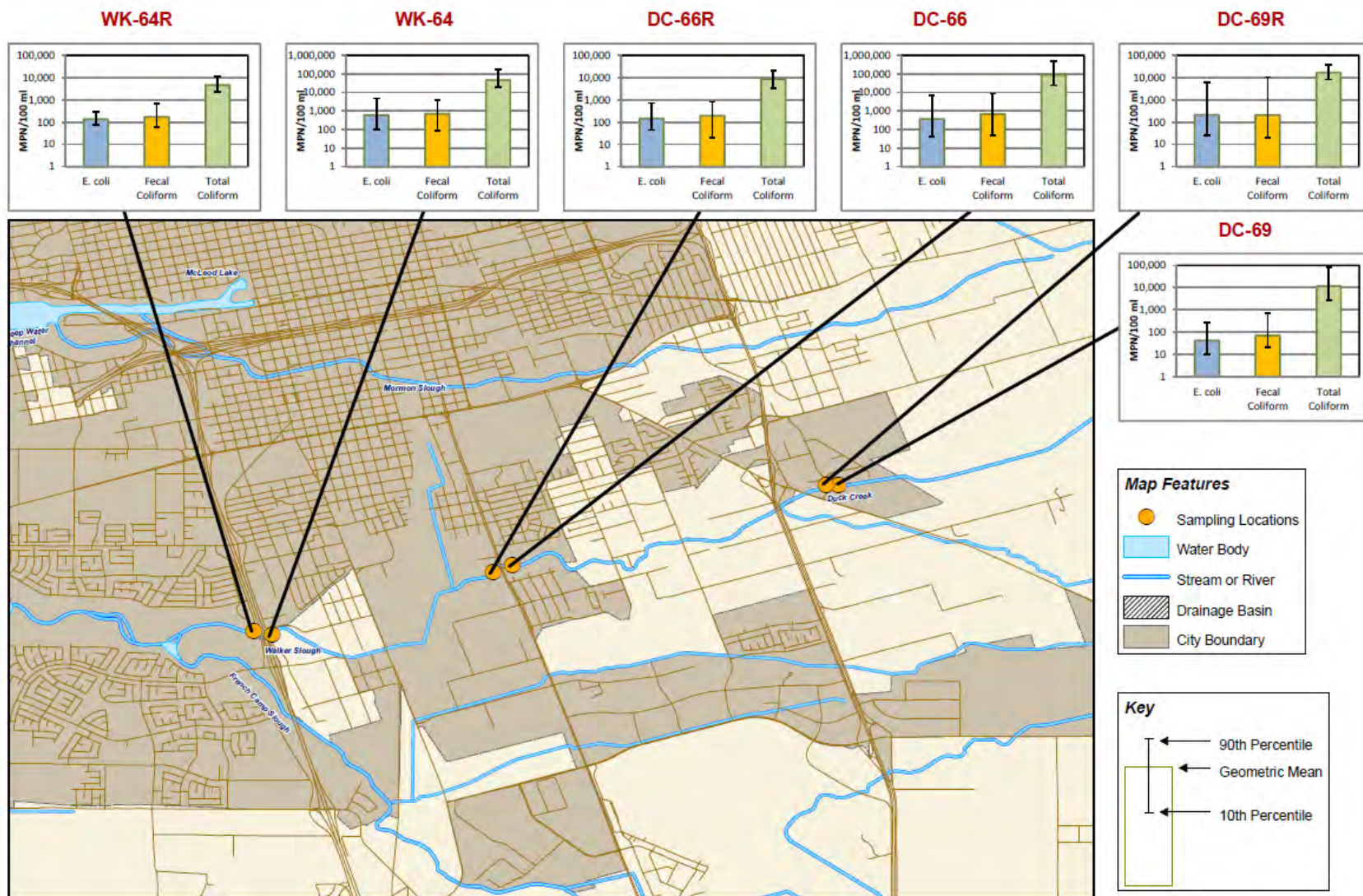


Figure 9-12. 2010-2011 Dry Weather Characterization Monitoring Results for Walker Slough/Duck Creek (n=7).

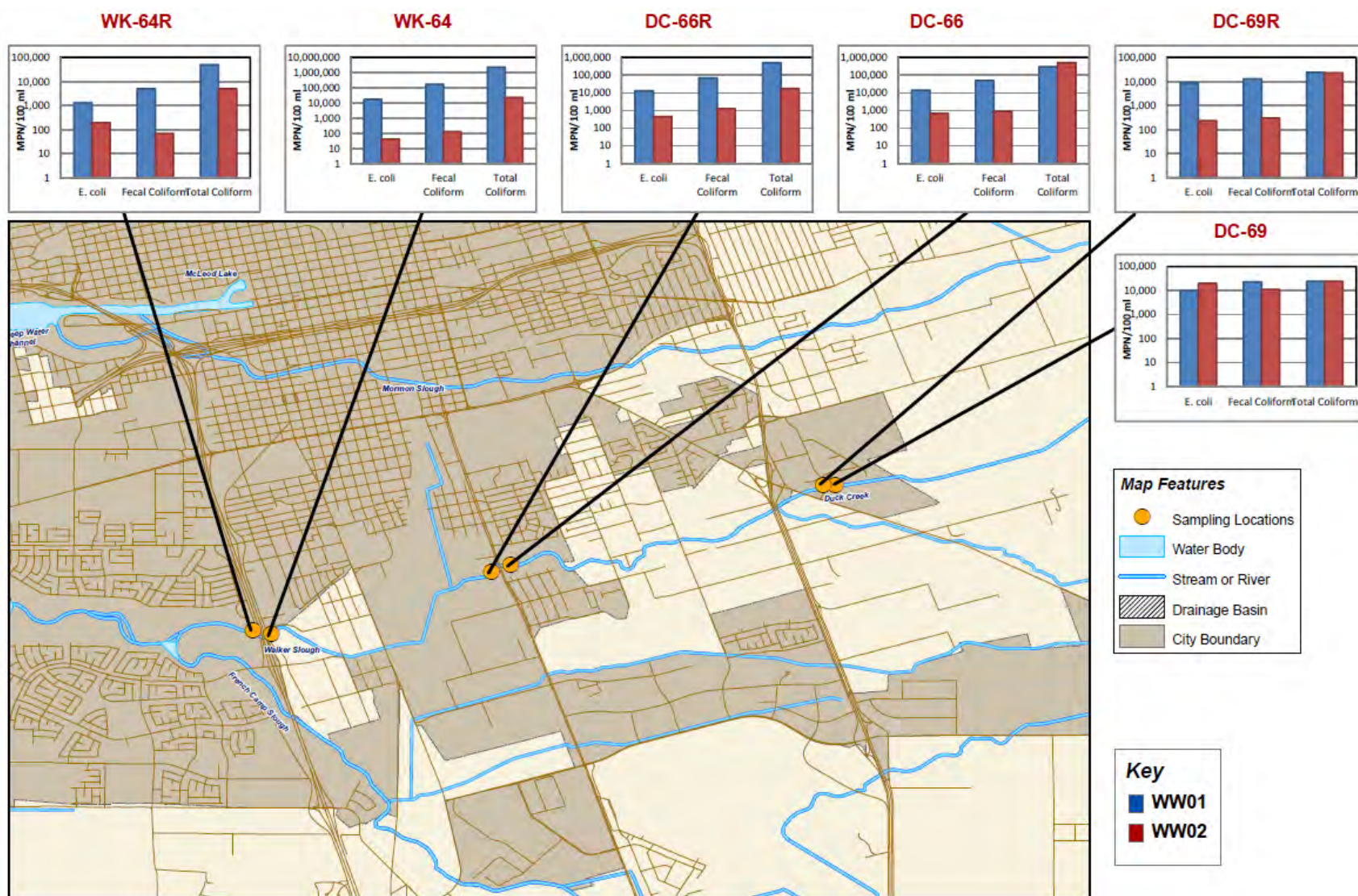


Figure 9-13. 2010-2011 Storm Event Characterization Monitoring Results for Walker Slough/Duck Creek (n=2).

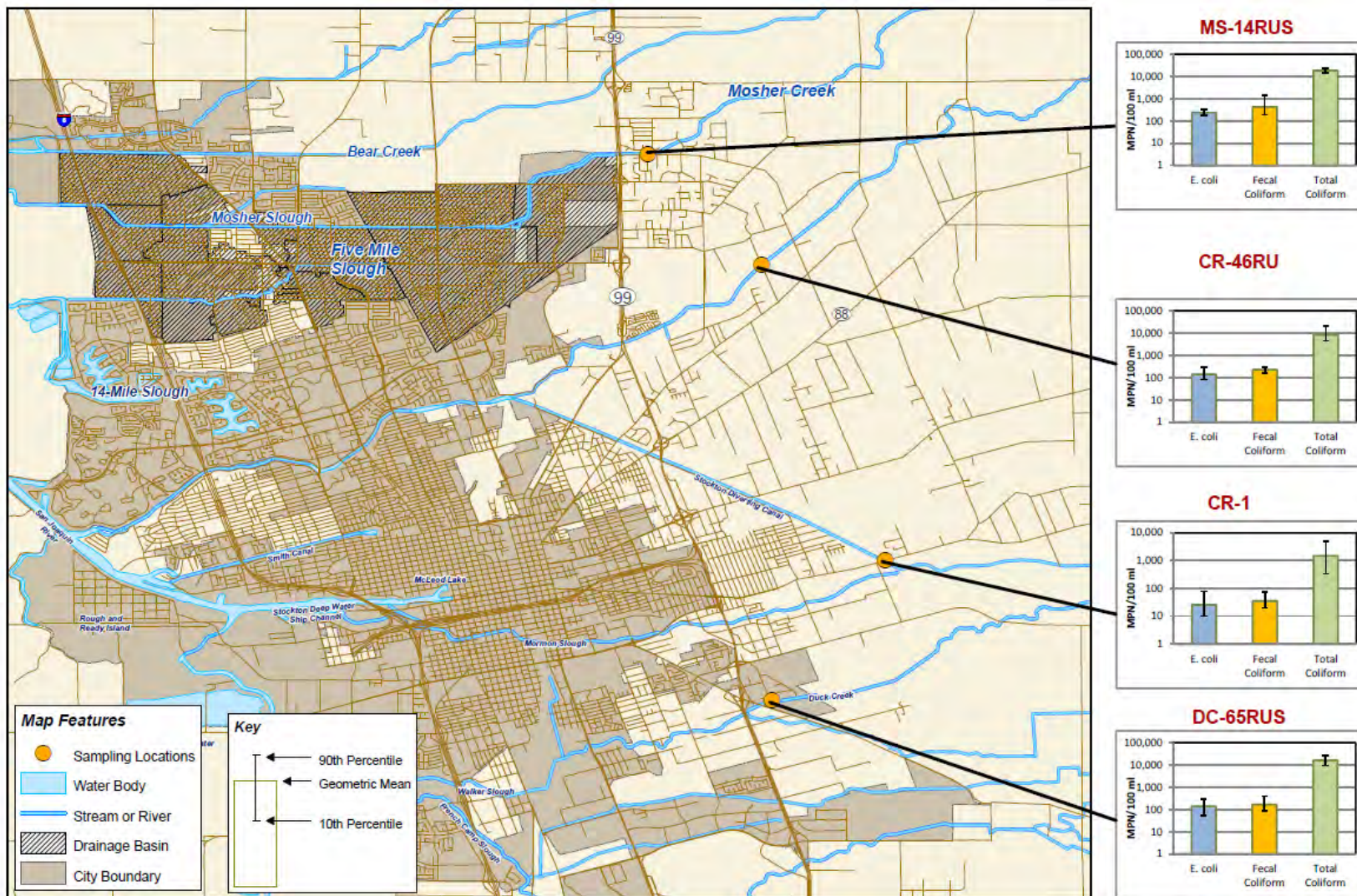


Figure 9-14. 2010-2011 Dry Weather Characterization Monitoring Results for Upstream Locations (n=7).

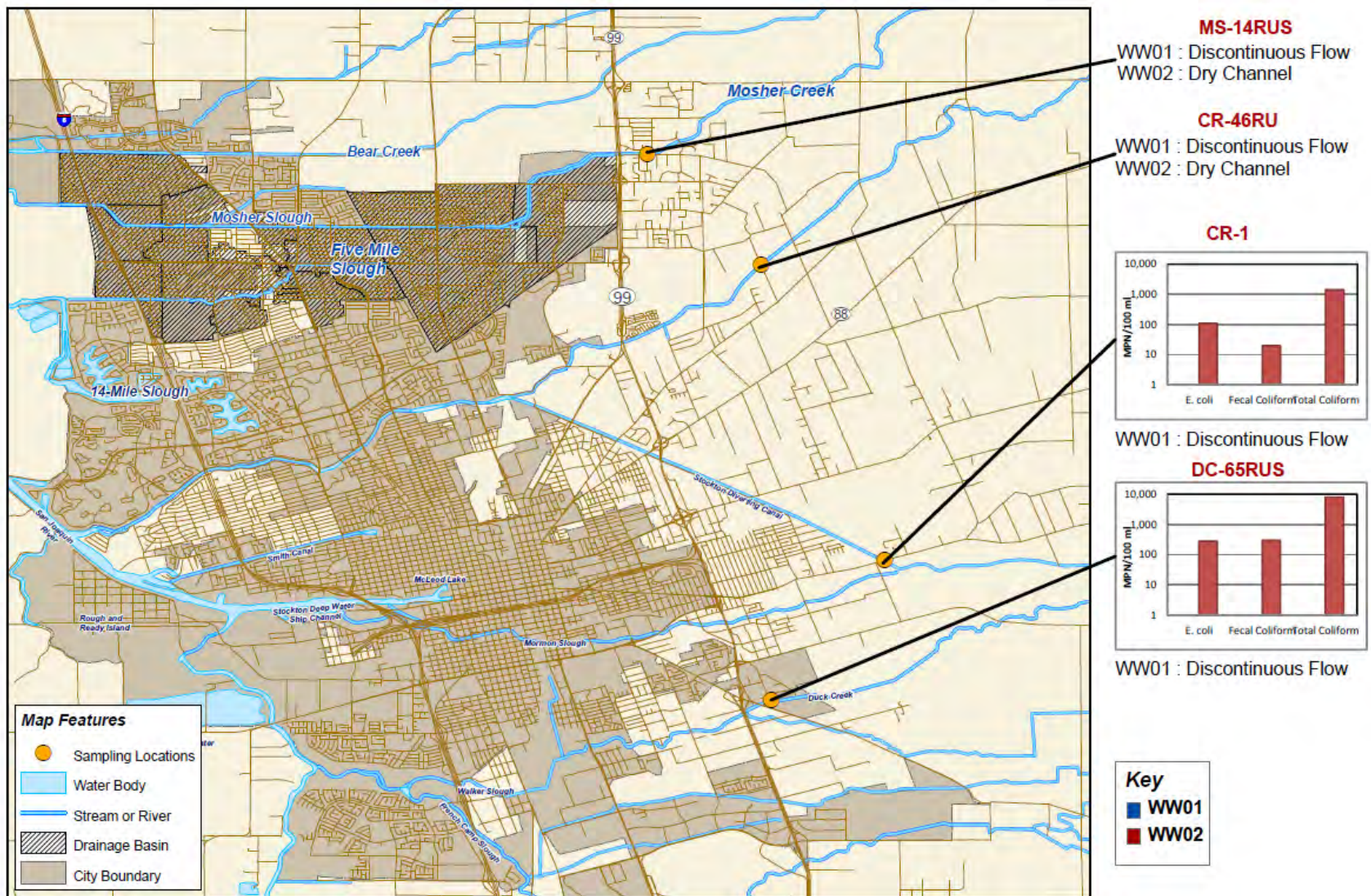


Figure 9-15. 2010-2011 Storm Event Characterization Monitoring Results for Upstream Locations (n=2).

9.3.4 2011-2012 Pathogen Plan Activities

The complete schedule for Pathogen Plan activities is shown in **Figure 9-16**, with the activities to be conducted during 2011-2012 highlighted.

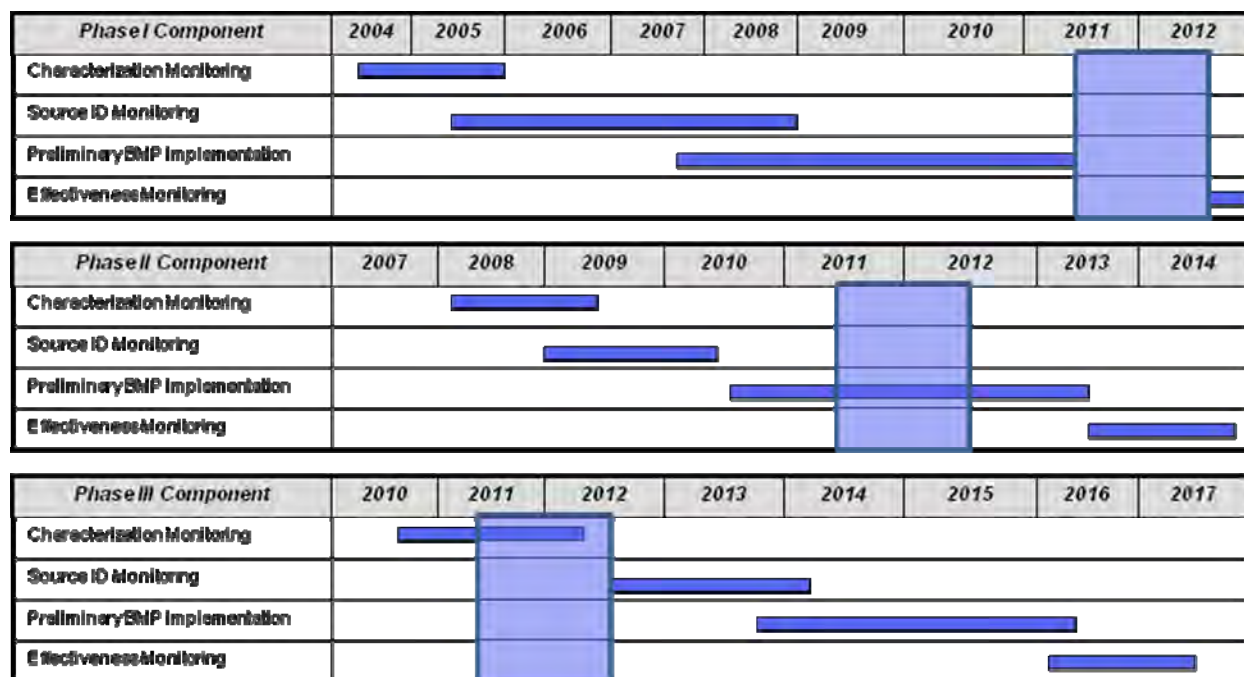


Figure 9-16. Pathogen Plan Schedule. 2011-2012 Activities are shown in the blue highlighted boxes.

9.3.5 Pathogen Plan Program Modifications

Every April, the City submits an annual work plan for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Water Quality Based Programs. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary.

The program modifications that were identified during 2010-2011 include the following:

- **Phase III Characterization Monitoring:** Reduce the Phase III characterization monitoring dry weather monitoring from 24 events to 12 events. To date 7 dry weather monitoring events have been completed. A total of 12 dry weather events will provide sufficient data for the purpose of characterization monitoring. 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.

9.4 MERCURY PLAN

The Sacramento-San Joaquin Delta Estuary (the Delta) is on the Clean Water Act Section 303(d) List of Impaired Water Bodies because of elevated levels of methylmercury in fish. To address mercury impairment in the Delta, the Permittees developed a Mercury Pollution Prevention Plan (Mercury Plan) that included a mercury monitoring program (Methylmercury Monitoring Plan). The Plans identified the Permittees' strategy to reduce methylmercury exposure to human and wildlife in the Delta and to prevent the creation or maintenance of toxic hot spots. In 2008, the Permittees developed and submitted the Mercury Plan and monitoring program according to Provision 28.d of the Permittees' Municipal Stormwater NPDES Permit (Order No. R5-2007-0173).

The focus of the Mercury Plan is to reduce mercury in urban runoff. The Plan identifies possible sources of mercury to urban runoff and describes public outreach and education strategies to mitigate the controllable sources of mercury pollution. It addresses the following goals:

- Public outreach to promote proper use and disposal of products containing mercury, including coordination with household hazardous waste facilities and commercial and industrial outreach
- Assessment and reduction of municipal use of mercury-containing products
- Support of sediment and erosion control efforts
- Characterization of total mercury and methylmercury in Stockton waterbodies and stormwater discharges

9.4.1 Mercury Plan Components

The Mercury Plan approach is shown in **Figure 9-17**, and includes the components described below.

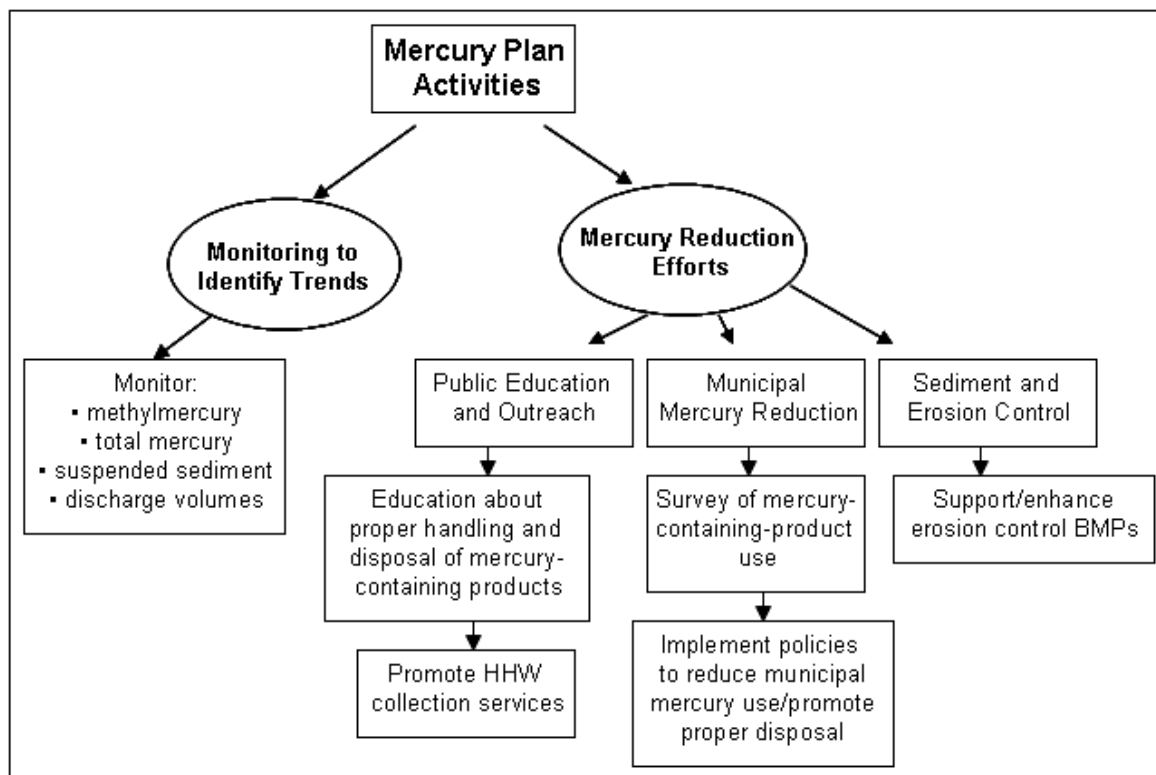


Figure 9-17. The Mercury Plan Approach

9.4.1.1 Public Outreach

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. A major component is to inform the public about common products that contain mercury and safe disposal options using various media. General information regarding mercury in the environment is available on the City's stormwater web site.^[1]

The Permittees jointly conduct an annual mixed media campaign, consisting of radio and government access cable channel public service announcements. During 2009-2010, mercury outreach was provided through an insert in the *Stockton Water News* utility billing newsletter in December 2009 focusing on mercury awareness. This mailer reached more than 46,000 utility customers.

Finally, the City promotes the County's hazardous waste collection program on its Web site, through the distribution of Household Hazardous Waste Facility brochures, and in the City's utility bill newsletter. During 2010-2011, the Household Hazardous Waste Program, a joint effort of the City and County, collected mercury-containing products, as described in Section 3 of the Annual Report.

9.4.1.2 Commercial and Industrial Outreach

The City of Stockton contracts inspections of commercial and industrial with the purpose of helping local businesses become better aware of what can be done to reduce or eliminate stormwater pollutants. The City Stormwater Program provided information on mercury and mercury disposal to businesses during 2009-2010 as part of the Commercial and Industrial Business Program Inspections. The form for the industrial business inspections was modified to specifically inquire about and review the mercury management plan of each of the businesses inspected. There were no industrial and commercial inspections planned for 2010-2011. The City will continue its outreach to businesses as needed and when it resumes inspections in 2011-2012.

9.4.1.3 Municipal Operations

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 includes 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 Universal Waste Rule (UWR).

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 Universal Waste Rule. 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

^[1] <http://www.stocktongov.com/mud/>

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.

The Permittees also continued to implement a Storm Drainage System Maintenance Control Measure, which prioritizes catch basins for cleaning based on the required level of maintenance, labels all with a storm drain message, and includes special event requirements to prevent debris accumulation in catch basins and storm drains. This control measure is described in Section 4 of the Annual Report.

9.4.1.4 Erosion Prevention BMPs

Sediment-associated elemental mercury from historic mining activity is a prevalent mercury source within the Central Valley. Erosion 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 City implements 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 inspection to ensure proper BMP implementation and specific practices which minimize sediment runoff from construction sites, and minimize the potential for erosion in the construction of new development. Efforts conducted during 2010-2011 are described in Section 6 of the Annual Report.

9.4.1.5 Mercury Characterization Monitoring

The Permit requires monitoring to characterize the concentrations and loads of methylmercury entering the Delta from Stockton urban runoff. Characterization studies will focus on total and methylmercury concentrations in receiving waters and discharges (including detention basins). The objective of the Mercury Plan and the Methylmercury Monitoring Plan at this stage is to conduct baseline monitoring to determine the methylmercury and total mercury concentrations and loads discharged to the Delta by the SUA.

The specific monitoring activities are outlined below:

- A combination of discharge outfalls, major upstream tributaries of the SUA and or downstream locations will be monitored for total mercury, methylmercury, and suspended sediment;
- Three storm events and two dry weather events will be monitored each year for three years, including a range of storm intensities; and
- The instantaneous discharges will be estimated at the sampled locations during the time of sampling, and used to estimate the annual discharge volumes from the Stockton area within each watershed.

Baseline mercury monitoring commenced in 2008. Monitoring locations are shown in **Figure 9-18**, and in **Table 9-11** below.

Table 9-11. Mercury Plan Monitoring Locations

Waterbody	Monitoring Location	Monitoring Sites	
		Discharge Site ID	Receiving Water Site ID
Smith Canal	Legion Park pump station at Yosemite Lake	SC-1	SC-5R
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	

During 2010-2011, five monitoring events were completed. The schedule of completed events is shown in **Table 9-12**. During each event, samples were collected for analysis of total mercury, methylmercury, and suspended sediment concentration.

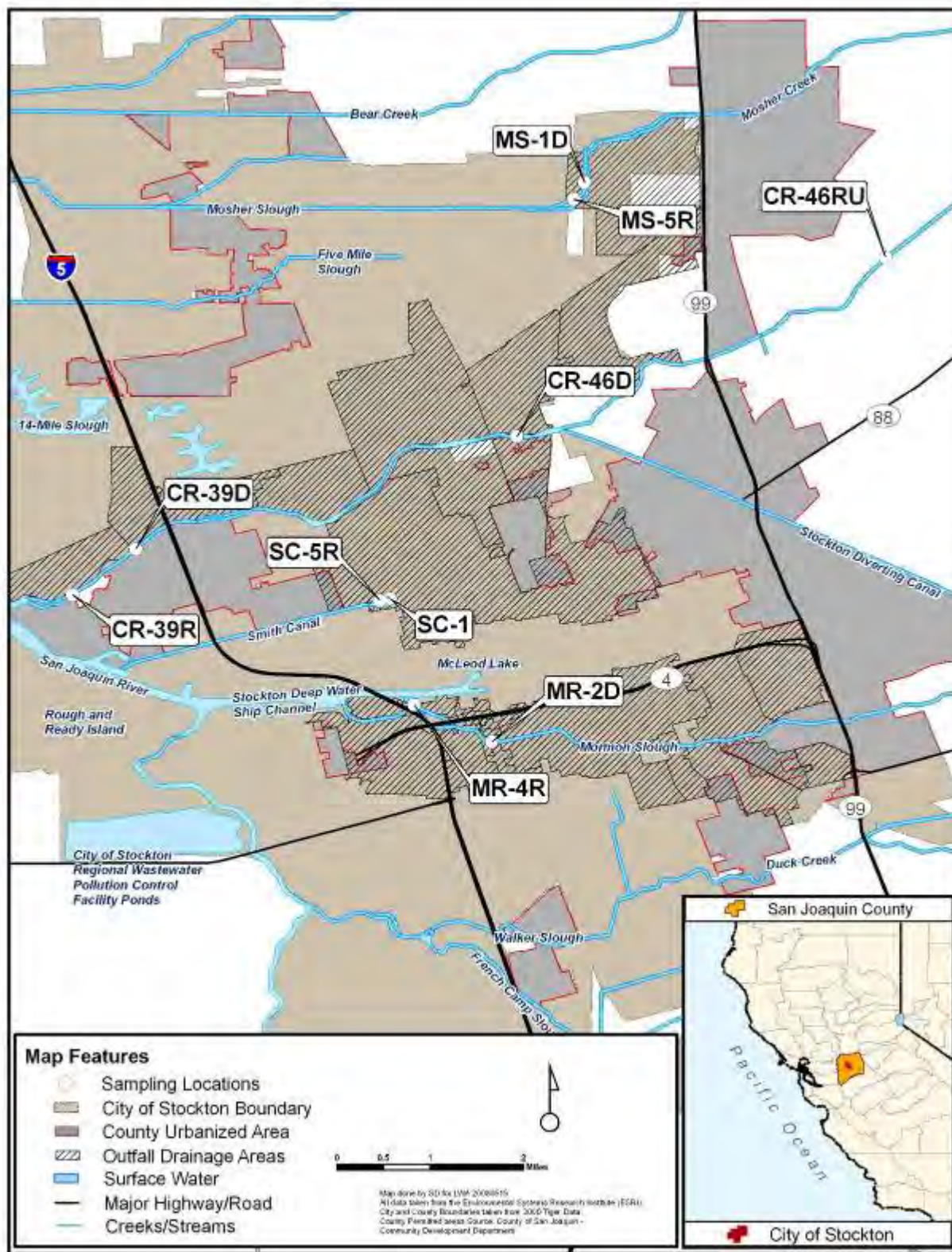


Figure 9-18. Mercury Plan Monitoring Locations

Table 9-12. Schedule of completed monitoring events for the Mercury Plan during 2010-2011.

Water-body	Site Type and Name	2010-2011 Monitoring Year				
		Dry Weather #1 (8/16/10)	Storm Event #1 (11/19/10)	Storm Event #2 (12/8/10)	Dry Weather #2 (1/10/11)	Storm Event #3 (3/2/11)
Smith Canal	Discharge: SC-1	√	√	√	√	√
	Receiving Water: SC-5R	√	√	√	√	√
Mosher Slough	Detention Basin Effluent: MS-1D	√	√	√	√	√
	Receiving Water: MS-5R	√	--- ^b	√	--- ^b	√
Calaveras River	Upstream location: CR-46RU	√	--- ^b	--- ^a	--- ^b	√
	Discharge: CR-46D	√	√	√	√	√
	Discharge: CR-39D	√	√	√	√	√
	Receiving water: CR-39R	√	√	√	√	√
Mormon Slough	Discharge: MR-2D	√	√	√	----	√
	Receiving water: MR-4R	√	√	√	√	√

Notes:

---^a = Not sampled due to dry channel

---^b = Not sampled due to discontinuous flow

2010-2011 Mercury Monitoring Results

Total mercury, methylmercury, and SSC were monitored during the sampling events described in **Table 9-12**. Results are given in **Tables 9-13, 9-14, and 9-15**, for total mercury, methylmercury, and SSC, respectively. There are no applicable water quality objectives for mercury or methylmercury in the monitored waterbodies, so data is discussed qualitatively in the sections below. Complete 2010-2011 monitoring data are included in **Appendix I-3**.

Table 9-13. Total Mercury concentrations (µg/L) observed during 2010-2011

Waterbody	Site Type and Name	Dry Weather #1 (8/16/10)	Storm Event #1 (11/19/10)	Storm Event #2 (12/8/10)	Dry Weather #2 (1/10/11)	Storm Event #3 (3/2/11)
Smith Canal	Discharge: SC-1	0.00281	0.00789	0.0274	0.00427	0.00197
	Receiving Water: SC-5R	0.00364	0.00283	0.00594	0.00424	0.00471
Mosher Slough	Detention Basin Effluent: MS-1D	0.00766	0.00366	0.00247	0.00301	0.00243
	Receiving Water: MS-5R	0.00300	--- ^b	0.00513	--- ^b	0.00438
Calaveras River	Upstream location: CR-46RU	0.0524	--- ^b	--- ^a	--- ^b	0.00915
	Discharge: CR-46D	0.00149	0.00742	0.0148	0.0108	0.00645
	Discharge: CR-39D	0.00289	0.00742	0.00278	0.00192	0.00284
	Receiving water: CR-39R	0.00142	0.00183	0.00174	0.00375	0.0194
Mormon Slough	Discharge: MR-2D	0.248	0.00397	0.0281	----	0.0149
	Receiving water: MR-4R	0.00383	0.00155	0.00224	0.00369	0.00282

Notes:

---^a = Not sampled due to dry channel

---^b = Not sampled due to discontinuous flow

Table 9-14. Methylmercury concentrations (ng/L) observed during 2010-2011

Waterbody	Site Type and Name	Dry Weather #1 (8/16/10)	Storm Event #1 (11/19/10)	Storm Event #2 (12/8/10)	Dry Weather #2 (1/10/11)	Storm Event #3 (3/2/11)
Smith Canal	Discharge: SC-1	0.077	0.250	0.136	0.090	0.051
	Receiving Water: SC-5R	0.034	0.031	0.045	0.033	0.044
Mosher Slough	Detention Basin Effluent: MS-1D	1.38	0.128	0.060	0.108	0.057
	Receiving Water: MS-5R	0.132	--- ^b	0.097	--- ^b	0.245
Calaveras River	Upstream location: CR-46RU	0.507	--- ^b	--- ^a	--- ^b	0.682
	Discharge: CR-46D	0.051	0.182	0.093	0.060	0.081
	Discharge: CR-39D	1.36	0.585	0.111	0.084	0.049
	Receiving water: CR-39R	0.061	0.046	0.063	0.058	0.195
Mormon Slough	Discharge: MR-2D	3.22	0.104	0.142	----	0.061
	Receiving water: MR-4R	0.036	0.030	0.041	0.041	0.051

Notes:

---^a = Not sampled due to dry channel

---^b = Not sampled due to discontinuous flow

Table 9-15. Suspended sediment concentration (mg/L) observed during 2010-2011 Mercury Plan monitoring

Waterbody	Site Type and Name	Dry Weather #1 (8/16/10)	Storm Event #1 (11/19/10)	Storm Event #2 (12/8/10)	Dry Weather #2 (1/10/11)	Storm Event #3 (3/2/11)
Smith Canal	Discharge: SC-1	<10	59	32	59	<10
	Receiving Water: SC-5R	32	<10	18	44	31
Mosher Slough	Detention Basin Effluent: MS-1D	120	34	13	<10	<10
	Receiving Water: MS-5R	13	--- ^b	78	--- ^b	<10
Calaveras River	Upstream location: CR-46RU	60	--- ^b	--- ^a	--- ^b	66
	Discharge: CR-46D	13	12	100	76	<10
	Discharge: CR-39D	20	32	<10	10	<10
	Receiving water: CR-39R	14	17	<10	<10	29
Mormon Slough	Discharge: MR-2D	400	<10	43	----	28
	Receiving water: MR-4R	15	<10	<10	31	<10

Notes:

---^a = Not sampled due to dry channel

---^b = Not sampled due to discontinuous flow

To display the spatial and temporal variation of the total mercury, methylmercury, and SSC data collected during the Mercury Plan, a geographic information systems (GIS) tool was utilized, as shown in **Figure 9-19**. A comprehensive analysis of mercury monitoring results will be presented in the Baseline Characterization Report in December 2011, which will include statistical analyses and mercury load estimates. A qualitative analysis of the data is presented below.

Total Mercury

There are no applicable WQOs for mercury in Stockton waterways; however, total mercury concentrations were relatively low, and were consistently below the California Toxics Rule (CTR) criterion of 0.05 µg/L for total recoverable mercury for freshwater sources of drinking water⁸. The highest 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 (8/16/10), which were higher than the CTR criterion. There were no trends apparent between wet weather vs. dry weather event total mercury concentrations. Concentrations of total mercury were not significantly different between receiving water and urban discharge sampling locations.

Methylmercury

Methylmercury was detected in very low concentrations at all locations during each sampling event. Levels were highest in the Mosher Slough detention basin effluent (MS-1D) and Mormon Slough discharge location (MR-2D) during the first dry weather event. Generally, levels did not vary substantially among urban discharge and receiving water locations, or between the upstream location and locations with the urban area.

Suspended Sediment Concentration

Suspended sediment concentrations appeared to show similar trends to total mercury and methylmercury data; however, due to the limited dataset, trends were not statistically significant. 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 were generally less than 100 mg/L, except at MR-2D and MS-1D during the first dry weather event, and at site CR-46D during the second storm event. In contrast to previous monitoring data from 2008-2010, when most locations appeared to have elevated SSC during storm events compared to dry weather, there was no trend apparent during 2010-2011 for SSC concentrations for wet vs. dry weather events.

⁸ The CTR does not specify duration or frequency, but the Regional Water Board has previously employed a 30-day averaging period with an allowable exceedance frequency of once every three years. Mercury in urban runoff can be compared to CTR standards, but there may be too little urban runoff and receiving water concentration data to evaluate compliance with the CTR.

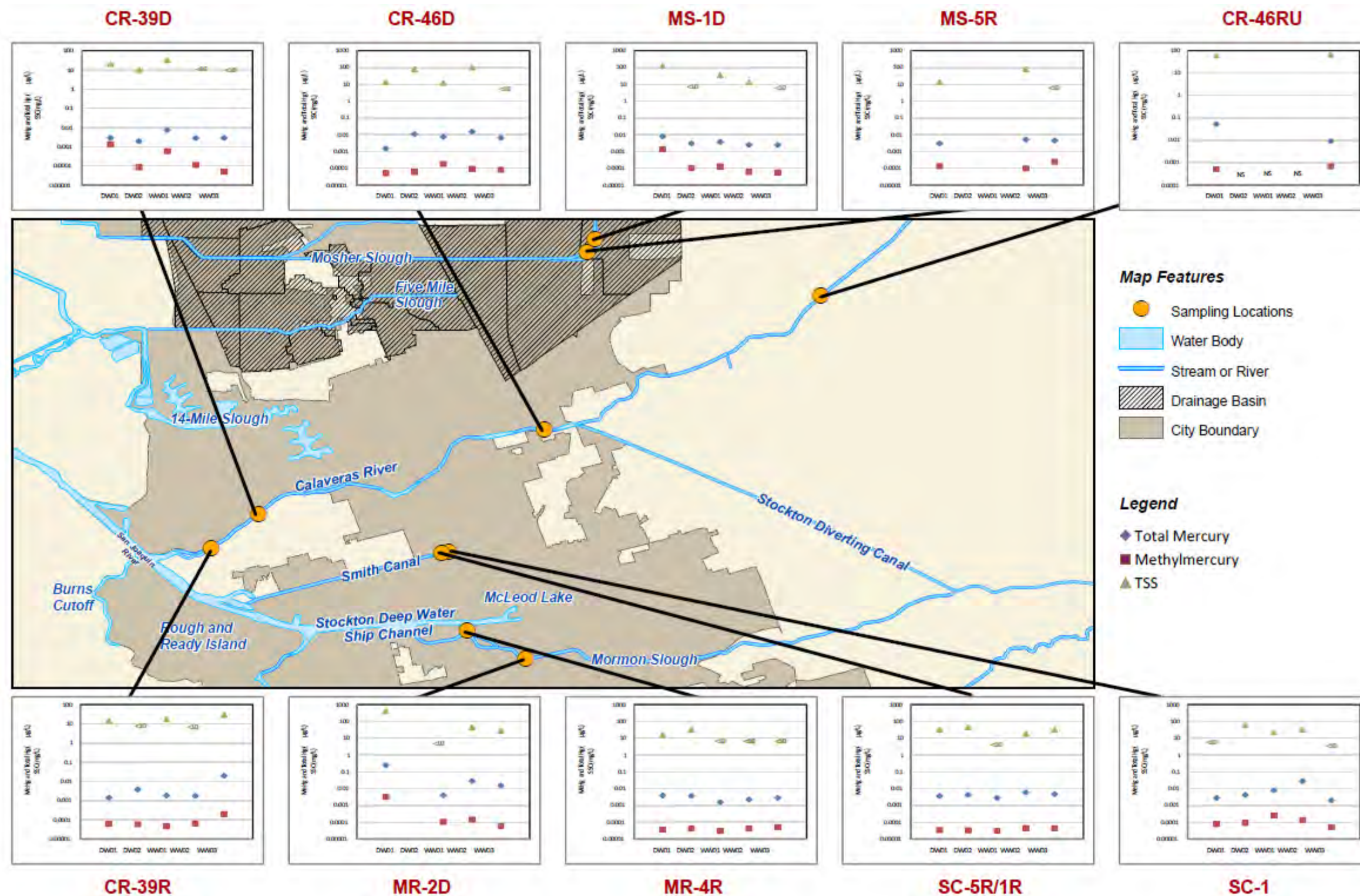


Figure 9-19. Concentrations of total mercury (Total Hg), methylmercury (MeHg), and suspended sediment concentration (SSC) observed during 2010-2011 Mercury Plan monitoring.
DW01 = 8/16/10 Dry Weather Event; DW02 = 1/10/11 Dry Weather Event; WW01 = 11/19/10 Storm Event; WW02 = 12/8/10 Storm Event; WW03 = 3/2/11 Storm Event

9.4.2 2011-2012 Mercury Plan Activities

Mercury Plan activities for the 2011-2012 reporting year will include the following:

- **Public Outreach:** Continue to coordinate with Household Hazardous Waste Program to promote proper disposal of mercury-containing products.
- **Commercial and Industrial Outreach:** Distribute outreach material during commercial and industrial inspections.
- **Municipal Operations:** Provide outreach to municipal departments on Universal Waste Rule guidelines for safe handling and disposal of mercury-containing products.
- **Characterization Monitoring:** Characterization monitoring is complete. The Permittees will develop annual load estimates based on characterization monitoring results and estimated flows, and develop the Baseline Mercury Monitoring report (to be submitted in December 2011).

9.4.3 Mercury Plan Program Modifications

Every April, the City submits an annual work plan for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Water Quality Based Programs. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary.

There were no program modifications identified for the Mercury Plan during 2010-2011.

9.5 LOW DISSOLVED OXYGEN PLAN

Section 4 of the 13267 Letter and Permit Provision D(28)(b)(iii) required the City and County to develop and implement a low dissolved oxygen (DO) monitoring and assessment work plan (Low DO Work Plan⁹). The purpose of the Low DO Work Plan is to assess the impacts from urban runoff on receiving water quality within the SUA. The City and County conducted low DO monitoring activities for the 2010-2011 fiscal year in general conformance with the Low DO Work Plan, dated April 3, 2009.

The following summarizes the Low DO Work Plan monitoring program efforts through June 30, 2011. Data for 2010-2011 Low DO Plan monitoring efforts are included in **Appendix I-7**.

9.5.1 2010-2011 Low DO Work Plan

The Low DO Work Plan provided for a two-year sampling and continuous monitoring program (one year for Smith Canal) for the six SUA waterways on the 303(d) list for dissolved oxygen impairment. One receiving water and one urban discharge location was identified for Smith Canal and Mormon Slough. Two receiving water and two urban discharge locations were initially identified each for the Calaveras River, Stockton Channel, Five Mile Slough, and Mosher Slough; however, it was necessary to modify the implementation schedule proposed in Section 8 of the Low DO Work Plan due to issues regarding site access, equipment/personnel security, and hydrologic considerations. Modifications to the *in-situ* monitoring program are in keeping with the intent of the 13267 Letter and Permit Provisions.

During the 2010-2011, water quality *in-situ* data recorders were deployed and monthly grab samples were collected in five of the six SUA waterways as shown in **Figure 9-20**. *In-situ* data recorders were deployed at one downstream receiving water location in Mormon Slough (MM-4R) and Five Mile Slough (5M-25R), and at two receiving water locations in the Stockton Channel (DW-1R, upstream; DW-2R, downstream) and Calaveras River (CR-42R, upstream; CR-39R, downstream). *In-situ* water quality monitoring at the Smith Canal Yosemite Lake (SC-5R) receiving water location was concluded in June 2010 and the equipment removed in July 2010.

Monthly grab samples were collected at each active receiving water and corresponding urban discharge monitoring location, conditional upon sufficient flow and absence of tidal impact, for oxygen-demanding substances and nutrient analyses. Collection of *in-situ* data and grab samples were not necessarily concurrent at MS-14RUS as flow may have been sufficient for sample collection but insufficient to effectively support deployment of an *in-situ* data recorder.

During 2010-2011, sediment samples were collected at the Mormon Slough, Calaveras River, Five Mile Slough, and Mosher Slough receiving water locations for five-day biological oxygen demand (BOD₅), chemical oxygen demand (COD), sediment oxygen demand (SOD), and total organic carbon (TOC).

The following sections present selected data collected during the 2010-2011 Low DO Work Plan monitoring program. A full analysis of the data will be completed for the final report due for delivery to the Regional Water Board in December 2012.

⁹ City of Stockton and County of San Joaquin *Low Dissolved Oxygen Monitoring and Assessment Work Plan*, dated April 3, 2009

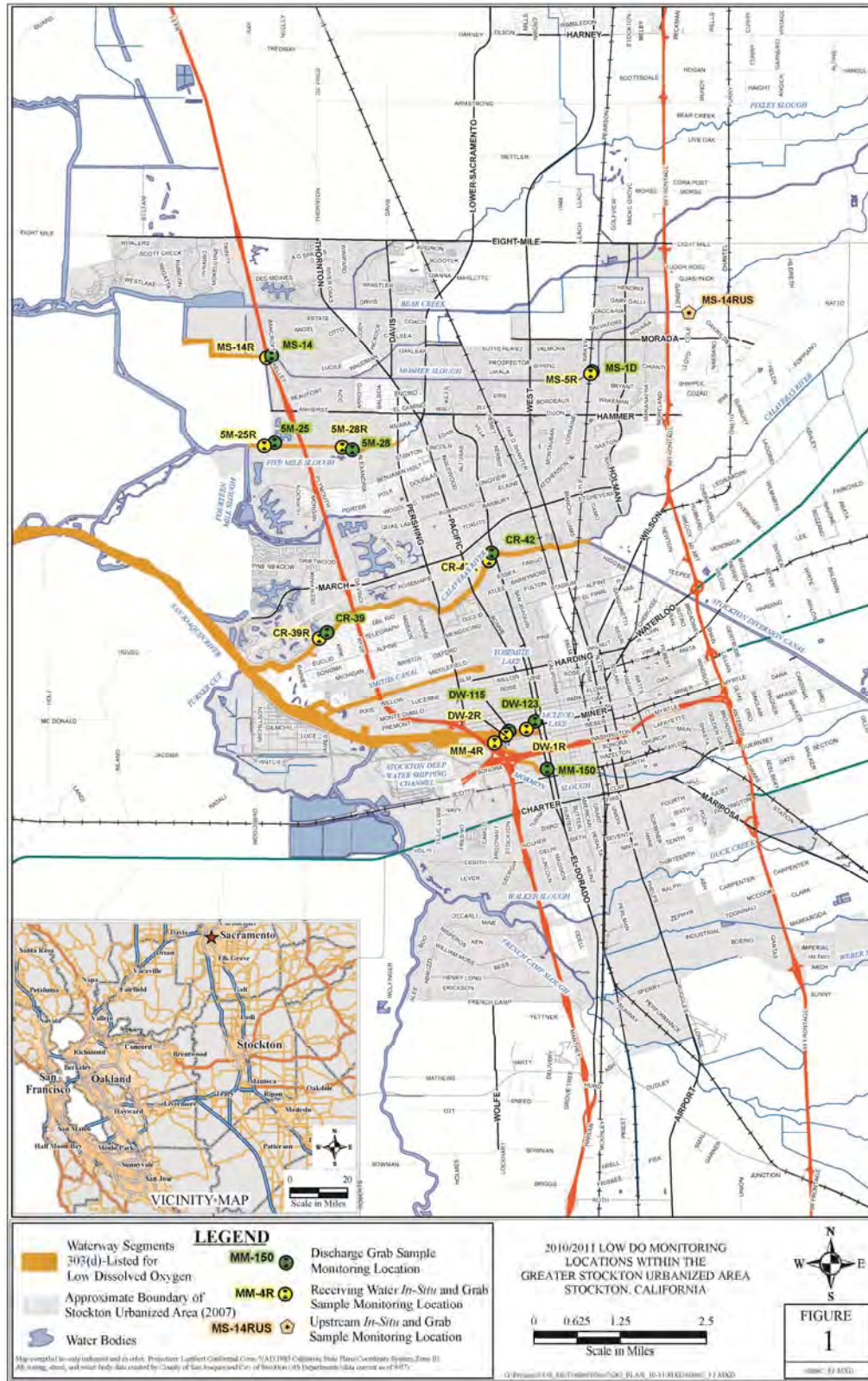


Figure 9-20. Low DO Plan 2010-2011 Monitoring Locations

9.5.2 Monitoring Challenges and Modifications

Overall, the urbanized and shallow nature of Stockton's waterways is a concern regarding deployment of *in-situ* data recorders; this has been particularly true for Mosher Slough and upstream Five Mile Slough. The *Low DO Work Plan* monitoring program on the Calaveras River was hampered by unusually high volume flows in the river during the wet season.

Installation equipment has twice been vandalized at Mosher Slough, and field personnel have been verbally threatened with physical harm on more than one occasion by a local property owner. Relocation of the *in-situ* monitoring locations was not feasible due to property boundaries and the physical nature of Mosher Slough. The upstream location for Five Mile Slough had the same concerns for equipment security as Mosher Slough; moving the proposed upstream location east was limited by available water and moving the proposed location any farther west would intrude upon the downstream monitoring location. Consequently, the following modifications¹⁰ to the Mosher and Five Mile Slough Low DO Work Plan monitoring program were implemented: (1) collection of weekly field parameters in concert with monthly laboratory sampling at upstream and downstream discharge and receiving water monitoring locations on Mosher Slough and at an upstream Five Mile Slough monitoring location; and, (2) limited *in-situ* data recorder deployment during "high flow" (wet/irrigation season) periods with increased maintenance checks in Mosher Slough upstream of the SUA.

During the 2010-2011 wet season, the Low DO Work Plan monitoring program was negatively impacted by unusually high volume flows in the Calaveras River¹¹. In January 2011, field crews were unable to locate the *in-situ* monitoring equipment installed at the upstream Calaveras River monitoring site. In March 2011, the dock housing the downstream Calaveras River monitoring equipment was severely damaged which, in turn, resulted in damage to the *in-situ* data recorder. Both incidents appear to have been the result of impact by large debris carried along by extremely high volume river flows. The monitoring program in the Calaveras River was suspended pending data recorder repair and re-installation of field equipment (anticipated in August 2011).

9.5.3 Field Monitoring

During 2010-2011, *in-situ* data recorders were deployed and grab sampling commenced at the receiving water and urban discharge monitoring locations shown in **Table 9-16**. Collection of weekly field parameters at the designated Five Mile and Mosher Slough monitoring stations commenced in March 2010 and November 2010, respectively. Weekly field parameters were collected at two receiving water (MS-14R, downstream; MS-5R, upstream) and two discharge (MS-14, downstream; MS-1D, upstream) monitoring locations on Mosher Slough and one upstream receiving water (5M-28R) and discharge (5M-28) monitoring location in Five Mile Slough. During 2010-2011, intermittent *in-situ* water quality monitoring was conducted in Mosher Slough upstream of the SUA (MS-14RUS) during periods of sufficient flow.

¹⁰ Informal Response to City of Stockton's MS4 Request to Modify the Low Dissolved Oxygen Work Plan, provided in an email correspondence from the Regional Water Quality Control Board, TMDL Group, dated May 25, 2010.

¹¹ Peak daily average flow released from New Hogan Reservoir into the Calaveras River on March 23, 2011 was recorded at approximately 6,926 cubic feet per second (cfs) (County of San Joaquin, personal communication, August 8, 2011).

Table 9-16. 2010-2011 In-Situ and Grab Sample Monitoring Locations

Waterbody	Monitoring Location (nearest urban/ geographic feature)	(Site ID)	Field Activity	
			Grab Sample Collection Start Date	In-Situ Recorder Installation Date
Stockton Channel	Stockton Marina Dock D	DW-2R	7/06/2009	6/24/2009
	Harrison Street ^a	DW-115	NA ^b	NA
	Stockton Marina Dock H	DW-1R	7/06/2009	6/24/2009
	McLeod Lake ^a	DW-123	NA ^b	NA
Mormon Slough	Weber Avenue Bridge	MM-4R	9/09/2009	9/02/2009
	Commerce Street P.S.	MM-150	10/06/2009	NA
Five Mile Slough	Fourteen-Mile Slough	5M-25R	3/12/2010	3/05/2010
	Lighthouse Drive P.S.	5M-25	3/12/2010	NA
	Swenson Park NE Corner	5M-28R	3/12/2010	NA ^c
	Alexandria Place P.S.	5M-28	3/12/2010	NA ^c
Calaveras River	Stockton Yacht Club	CR-39R	10/22/2009	9/14/2009
	Brookside Pump Station	CR-39	10/22/2009	NA
	El Dorado Street Bridge	CR-42R	1/08/2010	3/11/2010
	Bianchi P.S.	CR-42	1/08/2010	NA
Mosher Slough	Mariner's Bridge	MS-14R	11/8/2010	NA ^c
	Kelley Drive P.S.	MS-14	11/8/2010	NA ^c
	La Morada Detention Basin	MS-5R	11/8/2010	NA ^c
	La Morada Detention Basin P.S.	MS-1D	11/8/2010	NA ^c
	Cole Bridge (Upstream of SUA)	MS-14RUS	8/12/2010 ^d	8/18/2010 ^d

Notes: NA = Not Applicable P.S. = Pump Station Wet Well SUA = Stockton Urbanized Area,

^a = Stormwater System Gravity Outfall

^b = Grab samples not collected due to tidal impact, dry conditions, and/or insufficient flow.

^c = Weekly field parameters collected at this location.

^d = Intermittent *in-situ* monitoring and grab sample collection due to discontinuous, seasonal flow.

In-situ water quality data were recorded on continuous 15-minute intervals for the following field parameters: date/time; temperature, depth, DO, pH, oxidation-reduction potential (ORP), turbidity, electrical conductivity (EC), salinity, total dissolved solids (TDS), and resistivity. In addition, vertical DO profiling was conducted at those *in-situ* monitoring locations where the water column averages greater than four feet (Stockton Channel, Calaveras River, Mormon Slough and Five Mile Slough [5M-25R]).

Monthly¹² grab samples were collected from the selected pump station wet wells and receiving waters monitoring locations and analyzed for oxygen demanding substances including: biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), total suspended solids (TSS), total ammonia-nitrogen (N), nitrate, nitrate as N, nitrite, nitrite as N, orthophosphate, total phosphorous, and volatile suspended solids (VSS).

During 2010-2011, sediment samples were collected at Mormon Slough, the Calaveras River, Five Mile Slough, and Mosher Slough receiving water locations for BOD, COD, SOD, and TOC. Sediment sample locations and dates are provided in **Table 9-17**. Sediment sampling occurs once following a wet season storm event and once during the dry season (anticipated May through August).

Table 9-17. 2009/2010 Low DO Work Plan Sediment Monitoring Locations and Sample Dates

Waterbody	Monitoring Location (nearest urban/ geographic feature)	Site ID	Season	
			Wet	Dry
Mormon Slough	Weber Avenue Bridge	MM-4R	10/23/2009	-
			-	8/24/2010
			1/14/2011	- ^a
Calaveras River	Stockton Yacht Club	CR-39R	1/13/2011	- ^a
	El Dorado Street Bridge	CR-42R	1/21/2011	- ^a
Five Mile Slough	Fourteen-Mile Slough	5M-25R	1/12/2011	8/24/2010
	Swenson Park NE Corner	5M-28R	1/12/2011	8/24/2010
Mosher Slough	Cole Bridge (Upstream of SUA)	MS-14RUS	-	8/30/2010
	Mariner's Bridge	MS-14R	1/11/2011	- ^a
	La Morada Detention Basin	MS-5R	1/11/2011	- ^a

Notes:

- = No sediment samples collected

-^a = Dry season sediment sampling is scheduled for August/September 2011.

Potential oxygen demand from sediment was evaluated by testing samples for TOC and SOD. In addition, sediment sample extracts were submitted for BOD and COD analyses in order to evaluate the latent potential oxygen demand of interstitial pore water. The method for BOD in soils is a modified method of SM5210B described as SM5210B (M) in which pore water is extracted from the soil using deionized (DI) water and then an aliquot of the extract is analyzed as a water sample (EPA 405.1). The method for COD in soils is described as SM5220D (M) in which pore water is extracted from the soil using DI water and then an aliquot of the extract is analyzed as a water sample.

9.5.4 Results and Discussion

Results for 2010-2011 Low DO Work Plan monitoring program efforts are summarized in the following sections. Sediment sample analytical results are provided in **Table 9-18**.

¹² Grab samples were not collected and analyzed in February and March 2011 pending award of City of Stockton and County of San Joaquin storm water monitoring contract.

Table 9-18. 2010-2011 Low DO Work Plan Sediment Sample Analytical Results

Waterbody	Site ID	Date	BOD (mg/kg)	COD (mg/kg)	TOC (mg/kg)	SOD (g/m ² /day)
Mormon Slough	MM-4R	8/24/2010	3,500	6,400	8,300	1.3
		8/24/2010 ^{FD}	-	-	7,300	1.0
		1/14/2011	110	4,200	4,700	9.6
Calaveras River	CR-39R	1/13/2011	500	19,000	7,400	3.9
	CR-42R	1/21/2011	420	9,300	6,300	8.3
Five Mile Slough	5M-25R	8/24/2010	25,000	38,000	13,000	3.2
		8/24/2010 ^{FD}	-	-	11,000	2.9
		1/12/2011	360	18,000	7,800	6.9
	5M-28R	8/24/2010	13,000	23,000	27,000	2.8
		1/12/2011	560	33,000	28,000	8.6
Mosher Slough	MS-14RUS	8/30/2010	1,400	1,500	7,300	1.7
		8/30/2010 ^{FD}	-	-	4,500	1.7
	MS-14R	1/11/2011	90	12,000	16,000	16
	MS-5R	1/11/2011	57	6,100	6,700	6.4
		1/11/2011 ^{FD}	65	6,600	7,000	7.4

Notes:

^{FD} = Field Duplicate

BOD₅ = Biochemical Oxygen Demand

COD = Chemical Oxygen Demand

TOC = Total Organic Carbon

SOD = Sediment Oxygen Demand

- = No sediment samples collected

Units:

mg/kg – milligram per kilogram – parts per million (ppm)

g/m²/day – grams per square meter per day

Grab samples were collected at the urban discharge and receiving water sites during dry weather¹³ and between two and four days following a qualifying storm event¹⁴. Laboratory analytical results for oxygen demanding substances and nutrient concentrations in urban discharge and receiving water samples are provided in Appendix I-7.

The average monthly in-situ and weekly field DO concentrations are summarized in **Table 9-19** on the following page. The Basin Plan¹⁵ contains a numeric water quality objective (WQO) which requires that DO levels in SJR waterways be maintained above 6.0 milligrams per liter (mg/L) between September 1

¹³ Dry weather monitoring events are preceded by at least seven (7) dry days (defined typically as 0.10 inches of rainfall or less).

¹⁴ Timing of storm event sampling is based on data presented in the *Smith Canal Drainage Area Analysis and Dissolved Oxygen Work Plan Final Report*, dated October 2, 2006. A qualifying storm event is defined as a storm with a 70% probability of at least 0.25 inches of precipitation forecasted a minimum of 72 hours prior to the event and preceded by a continuous three day period with no measurable precipitation (defined as less than 0.10 inch of precipitation during the previous 72 hours).

¹⁵ Water Quality Control Plan (Basin Plan - CRWQCB-CVR-1998)

and November 30 and above 5.0 mg/L at all other times; this requirement is reiterated in the Permit (Provision C.1.a).

Table 9-19. 2010-2011 Monthly Average DO Concentrations (mg/L)

Site code	7/2010	8/2010	9/2010	10/2010	11/2010	12/2010	1/2011	2/2011	3/2011	4/2011	5/2011	6/2011
DW-2R	7.02	6.01	6.89	6.85	7.21	8.23	8.47	9.36	-	9.97	10.90	-
DW-1R	7.56	6.91	6.96	6.33	6.60	7.63	7.93	9.14	8.84	8.25	9.54	8.99
MM-4R	5.94	5.92	5.93	5.52	6.38	6.92	7.82	8.97	8.26	7.68	7.75	8.02
5M-25R	7.49	5.20	5.79	4.93	7.42	6.29	8.16	8.92	8.60	8.37	6.98	5.10
5M-28R ^a	6.78	4.60	5.89	2.62	5.43	3.60	6.21	9.41	7.61	4.50	6.49	6.41
CR-39R	8.07	6.68	8.04	5.37	5.65	8.59	10.81	10.03	10.62	-	-	-
CR-42R	8.53	8.73	8.17	7.66	8.54	6.06	-	-	-	-	-	-
MS-14R ^{a,b}	- ^a	- ^a	- ^a	6.46	4.84	4.84	7.70	11.43	6.43	8.23	7.21	6.11
MS-5R ^{a,b}	- ^a	- ^a	- ^a	Dry	4.79	8.97	-	10.20	9.06	8.99	7.73	6.68
MS-14RUS ^b	- ^a	5.57	8.89	5.82	6.73	6.88	Dry	Dry	Dry	7.42	8.18	6.41
MS-14RUS ^c	- ^a	3.78	0.86	8.54	8.00	9.48	- ^a	- ^a	- ^a	9.55	9.62	-
Basin Plan WQO for DO	5.0 mg/L		6.0 mg/L			5.0 mg/L						

Notes: mg/L = milligrams per liter = parts per million (ppm); **Bold** = average concentrations below the Basin Plan WQO for DO

- = *In-situ* data recorder out of service

^a = Low DO Work Plan monitoring program inactive

^b = Weekly field parameter (dependent on presence of active flow)

^c = *In-situ* parameter (dependent on presence of sufficient flow to support *in-situ* monitoring)

Vertical DO profiles were generated at the Stockton Channel, Calaveras River, Five Mile and Mormon Slough *in-situ* monitoring locations (**Figures 9-21 through 9-24**). In general, an overall decline in DO concentration was observed with depth; this decreasing trend appears most pronounced during the warm summer months. Recorded depths reflect seasonal as well as tidal variation within the SUA, which ranges from 0 feet mean sea level (msl) to approximately four feet above msl. With the exception of Mormon Slough at MM-4R, DO concentrations reported during the vertical depth measurements generally were above Basin Plan WQOs.

In 2006, the City installed a bubbler system in the Stockton Channel. Eight (8) laterals are interspersed along the waterway's reach from McLeod Lake to the Interstate (I)-5 overpass that diffuse air into the water column. The system was designed to prevent thermal stratification and inhibit blue-green algae growth in the waterway. The bubbler system operated¹⁶ continuously from May 2010 through November 3, 2010 and from April 1, 2011 through June 30, 2011.

¹⁶ Standard bubbler operation schedule is April 1 through November 1.

Stockton Channel (DW-1R and DW-2R) Vertical Dissolved Oxygen (DO) Profiles (Permit Year 2010 - 2011)

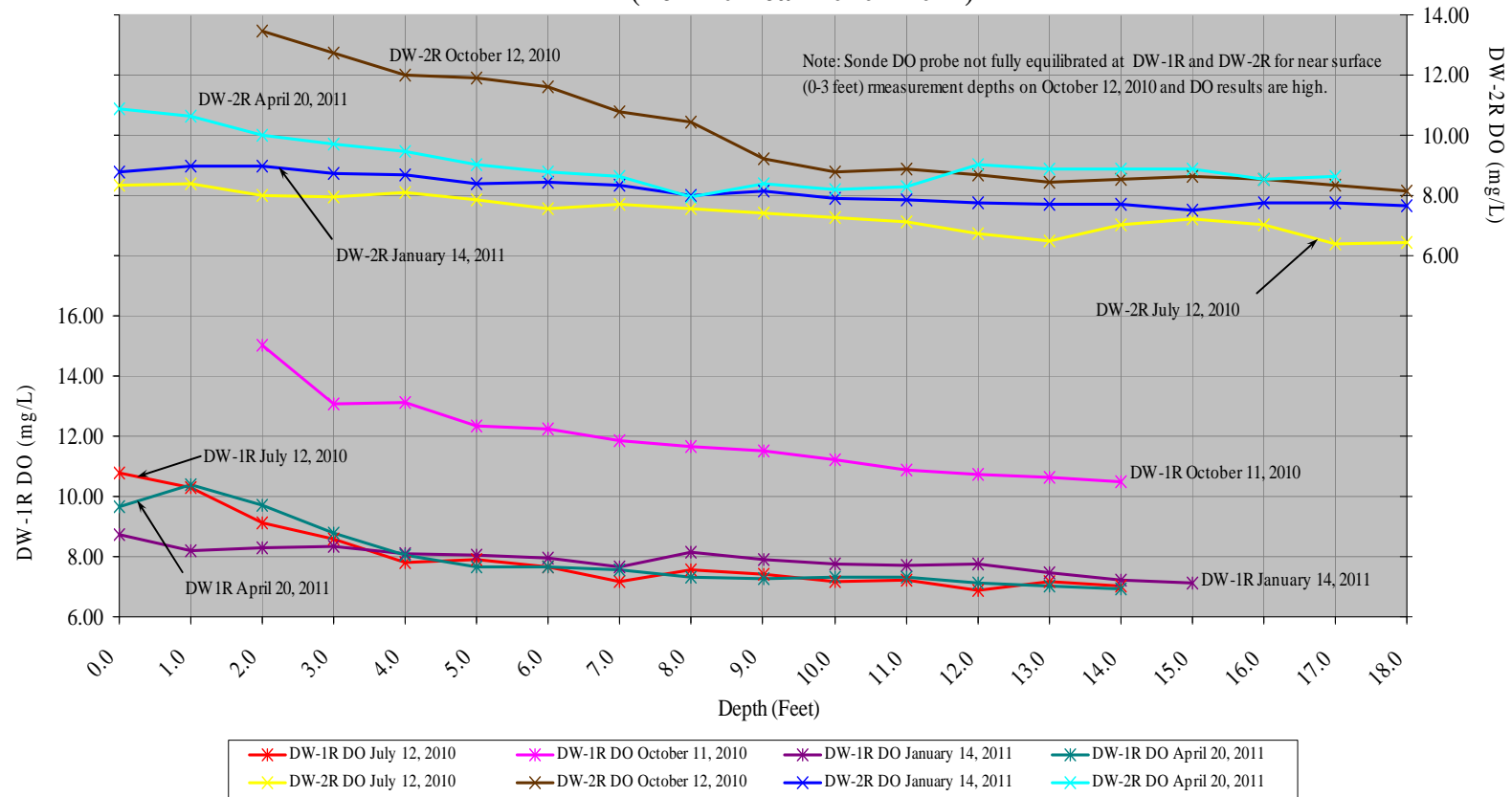


Figure 9-21. Stockton Channel (DW-1R and DW-2R) Vertical DO Profiles (2010-2011)

**Calaveras River (CR-39R and CR-42R)
Vertical Dissolved Oxygen (DO) Profiles
(Permit Year 2010 - 2011)**

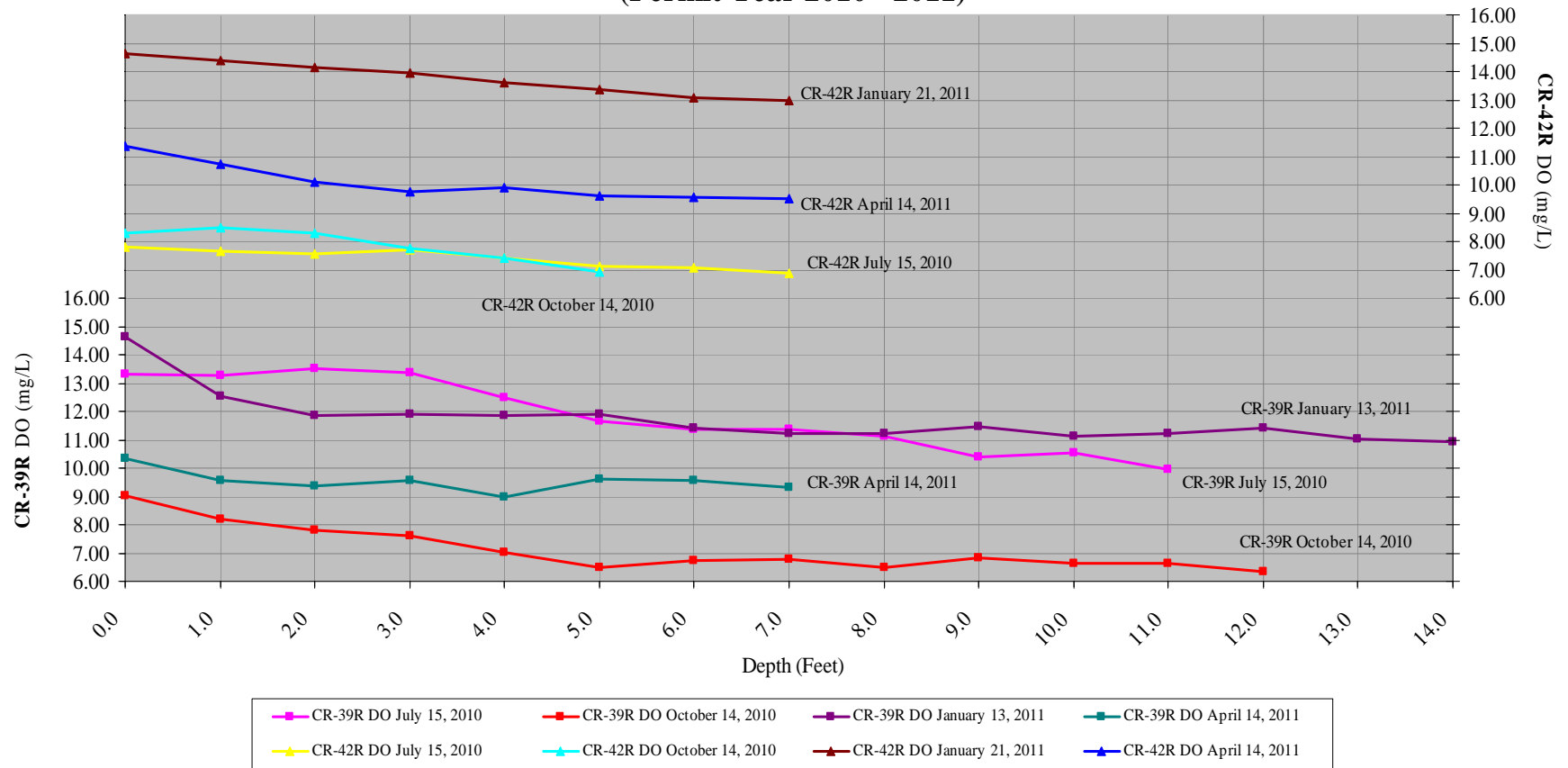


Figure 9-22. Calaveras River (CR-39R and CR-42R) Vertical DO Profiles (2010-2011)

Five-Mile Slough (5M-25R) Vertical Dissolved Oxygen (DO) Profile (Permit Year 2010 - 2011)

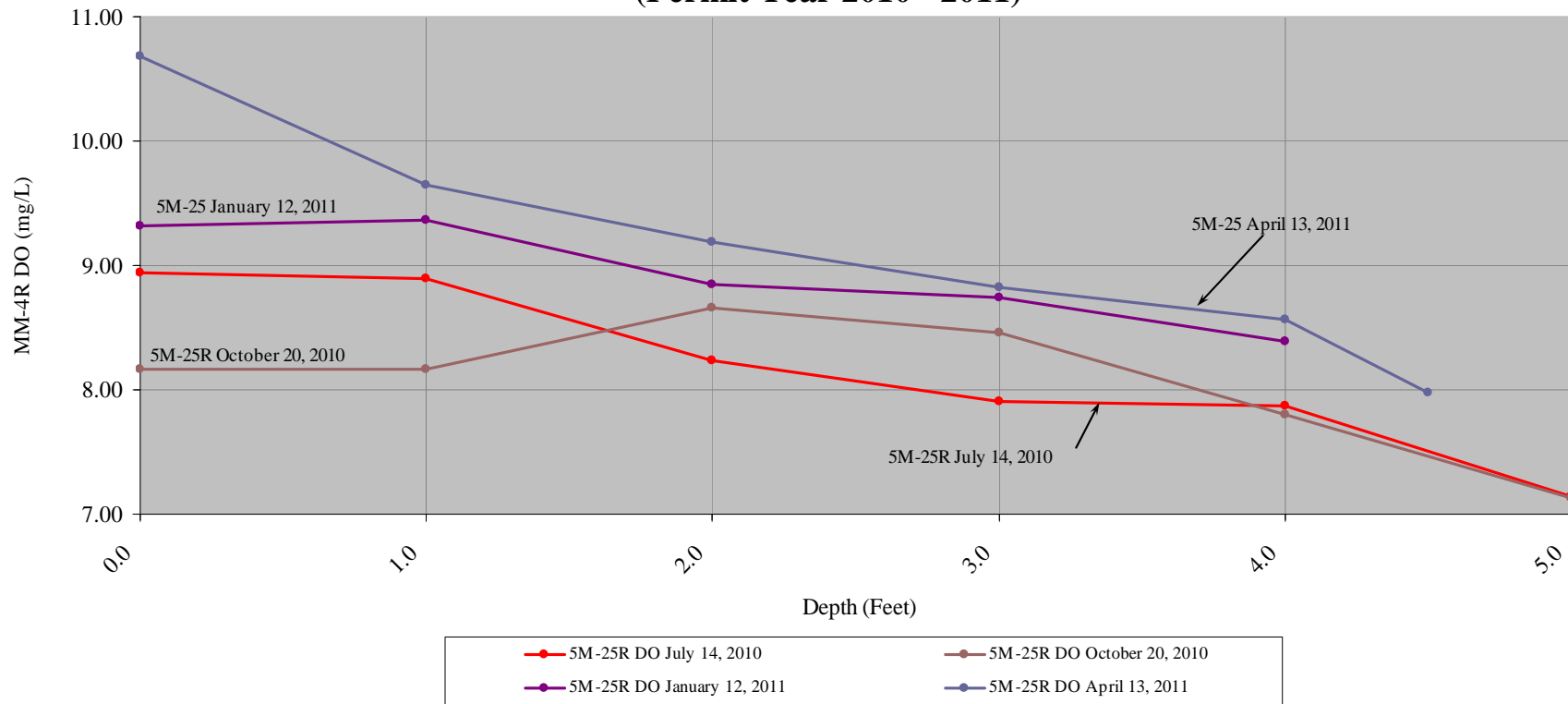


Figure 9-23. Five Mile Slough (5M-25R) Vertical DO Profiles (2010-2011)

**Mormon Slough (MM-4R)
Vertical Dissolved Oxygen (DO) Profile
(Permit Year 2010 - 2011)**

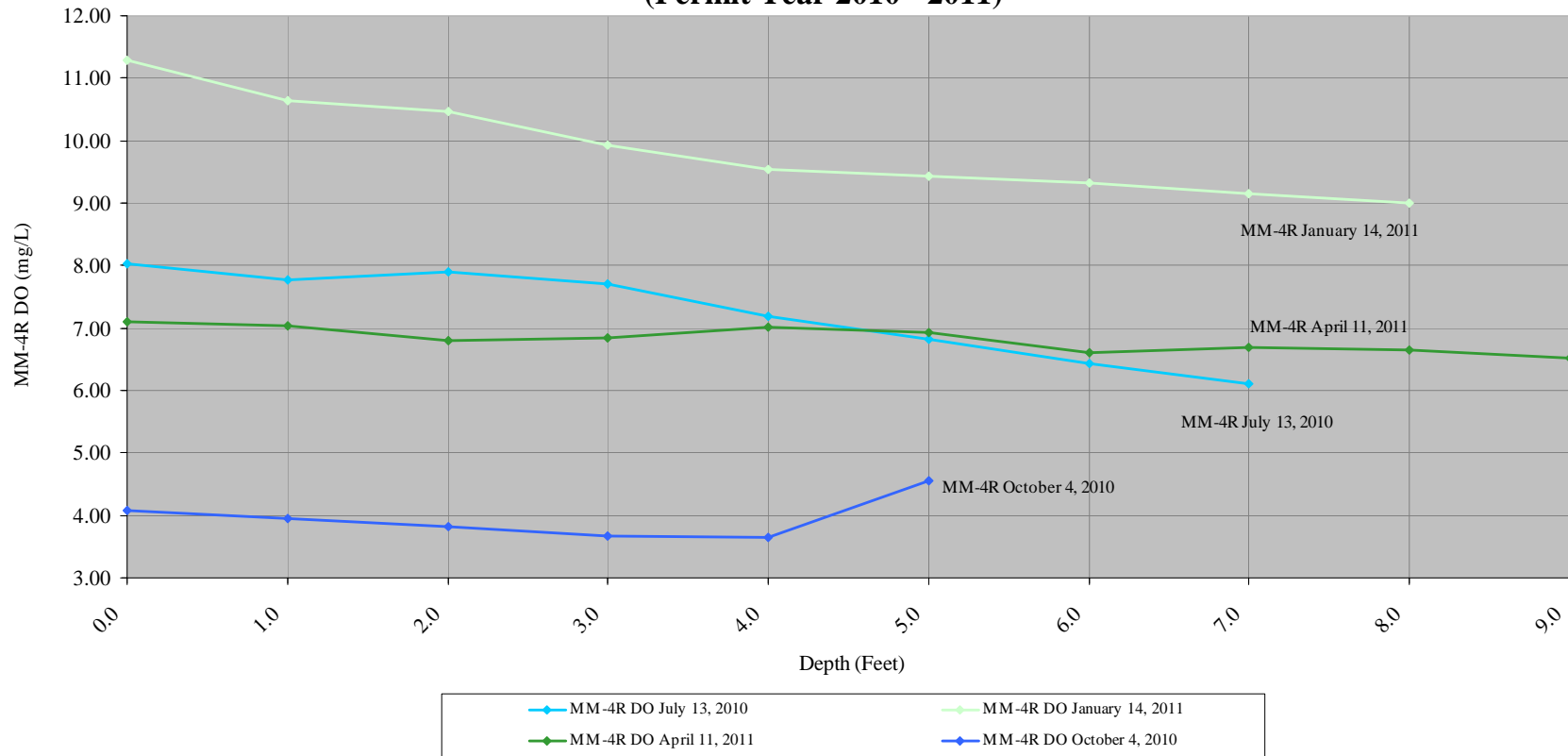


Figure 9-24. Mormon Slough (MM-4R) Vertical DO Profiles (2010-2011)

9.5.5 Stockton Channel (DW Samples)

In general, DO levels recorded in the Stockton Channel at the DW-1R and DW-2R locations remained above the Basin Plan WQOs during the 2010-2011 FY (**Figure 9-25**). Intermittent DO sags below the WQO were noted at the DW-2R location in August 2010 and at the DW-1R location immediately following the early season storm events on October 17 and 23, and November 20, 2010. Although a decrease in the DO concentration was noted at the DW-2R location following the early season storms; DO levels below the WQO were sporadic and of limited duration.

In general, the periods of high turbidity observed in the Stockton Channel appear to be associated with summer and holiday (Memorial Day, Fourth of July, and Labor Day) recreational activities, coincident with operation of the bubbler system (**Figure 9-26**). The turbidity spike observed in late February/early March appears to be related to resumption of intensive storm activity and increased storm water runoff. Although spikes in turbidity concentration appeared to precede DO sags, DO levels generally remained above the WQO during these periods of high turbidity. Episodes of relatively high turbidity levels observed during the wet season did not coincide with decreased DO concentrations below the WQO.

Deep Water Channel In-Situ Dissolved Oxygen and Precipitation (July 2010 - June 2011)

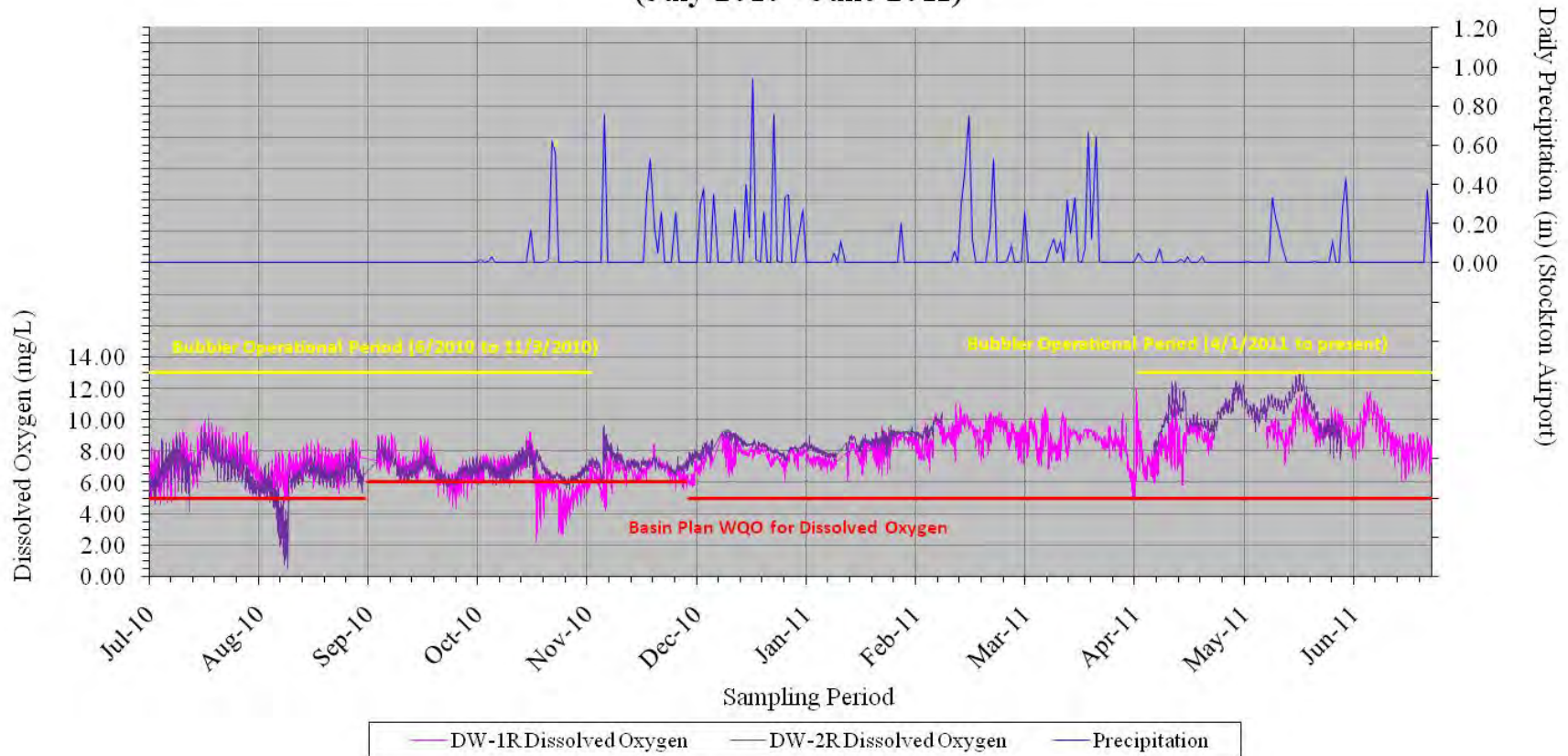


Figure 9-25. Deep Water Channel *In-Situ* Dissolved Oxygen and Precipitation (2010-2011)

Deep Water Channel In-Situ Turbidity and Precipitation (July 2010 - June 2011)

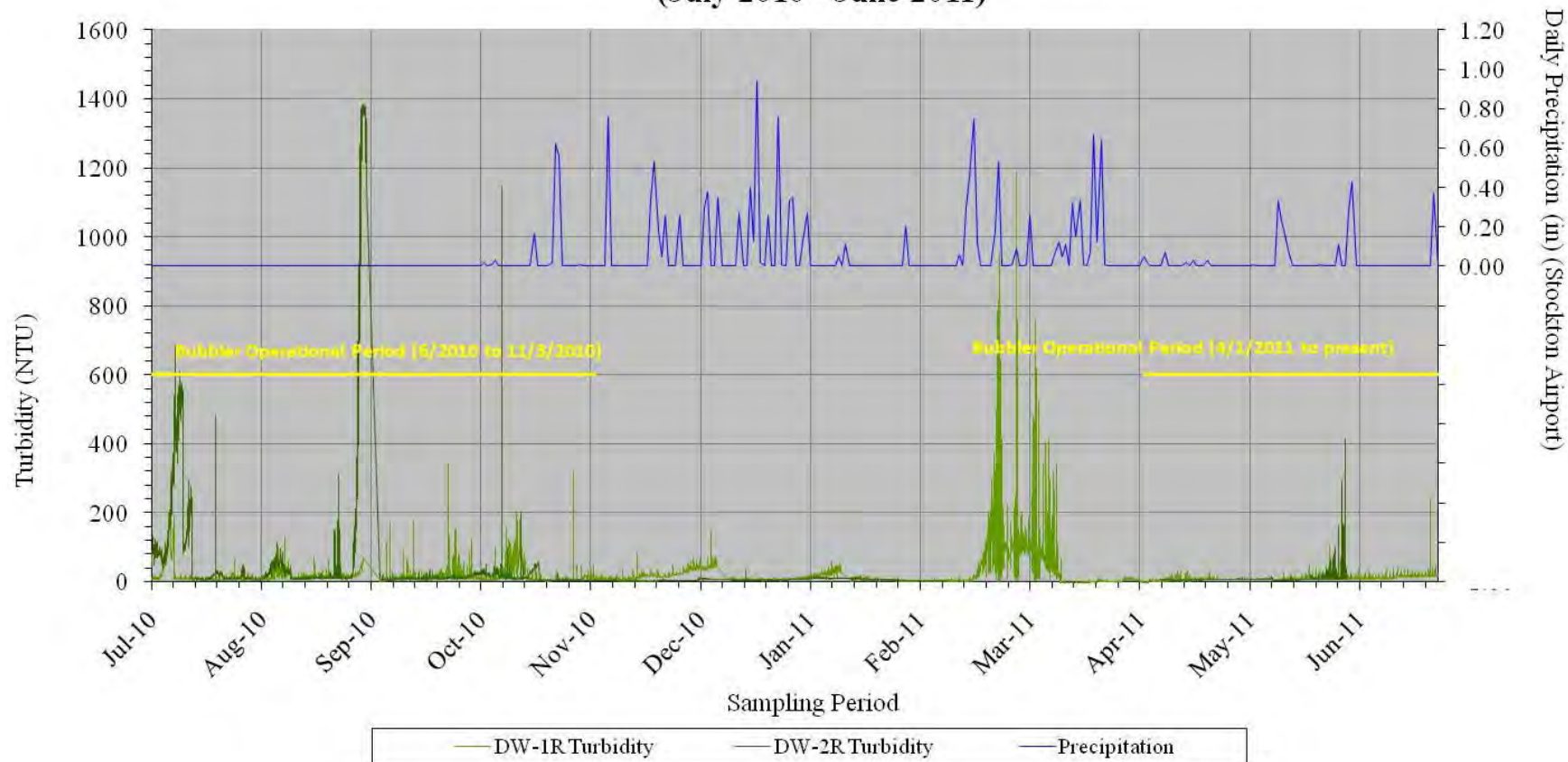


Figure 9-26. Deep Water Channel *In-Situ* Turbidity and Precipitation (2010-2011)

9.5.6 Mormon Slough (MM samples)

In-situ DO levels recorded in Mormon Slough at the MM-4R monitoring location demonstrated periods of low DO predominantly during the warm summer months and through the early wet season (July through November) (**Figure 9-27**). However, with the exception of September and October 2010, monthly average DO levels recorded at the MM-4R monitoring location remained above the Basin Plan WQOs during the 2010-2011 FY.

In general, the periods of high turbidity observed in Mormon Slough appear to be associated with summer and possibly algal growth or agricultural activities (**Figure 9-28**). Although spikes in turbidity concentration appeared to precede DO sags, DO levels generally remained above the WQO during these periods. Episodes of relatively high turbidity levels observed during the wet season did not coincide with decrease DO concentrations below the WQO.

Mormon Slough (MM-4R)
***In-Situ* Dissolved Oxygen and Precipitation**
(July 2010 - June 2011)

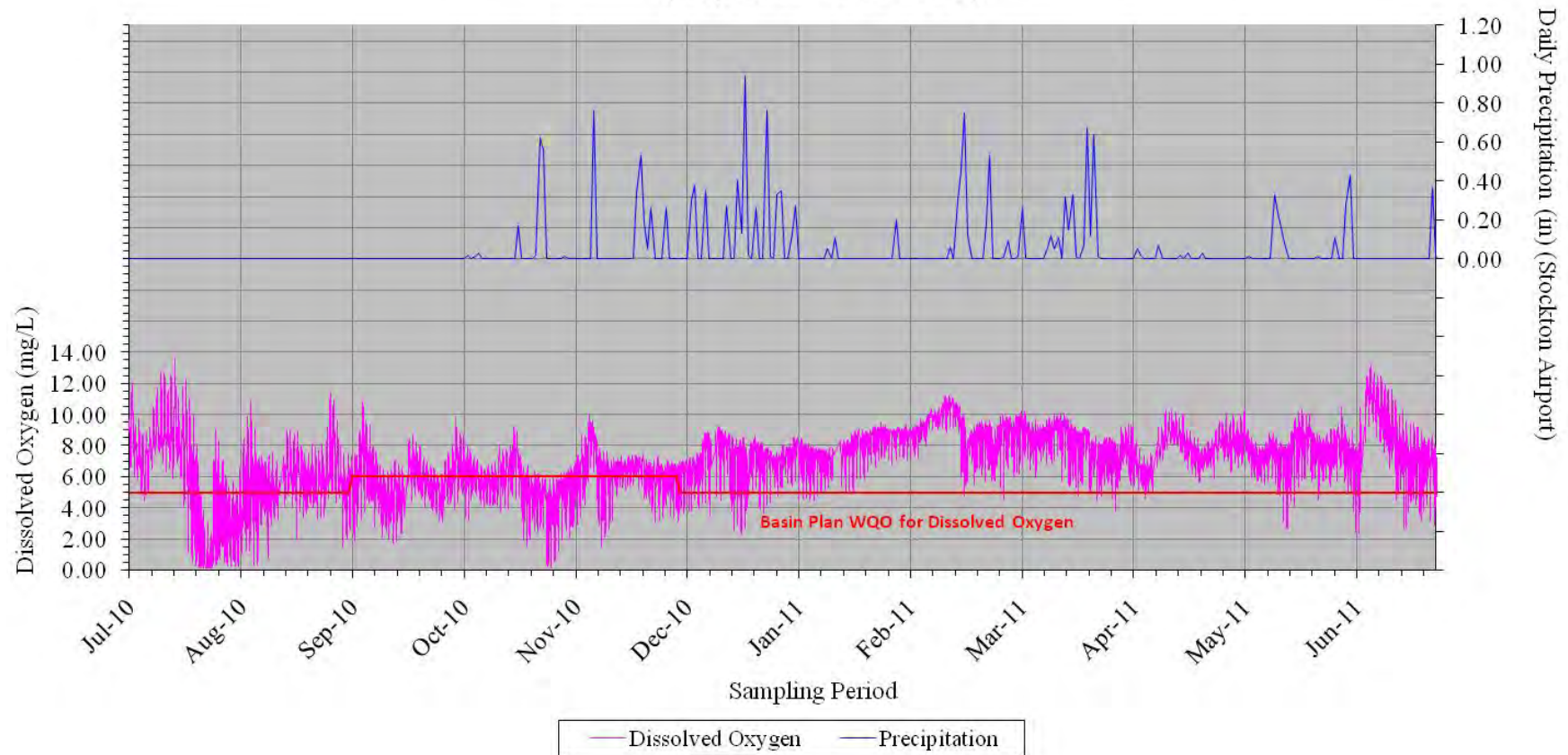


Figure 9-27. Mormon Slough *In-Situ* Dissolved Oxygen and Precipitation (2010-2011)

Mormon Slough (MM-4R)
***In-Situ* Turbidity and Precipitation**
(July 2010 - June 2011)

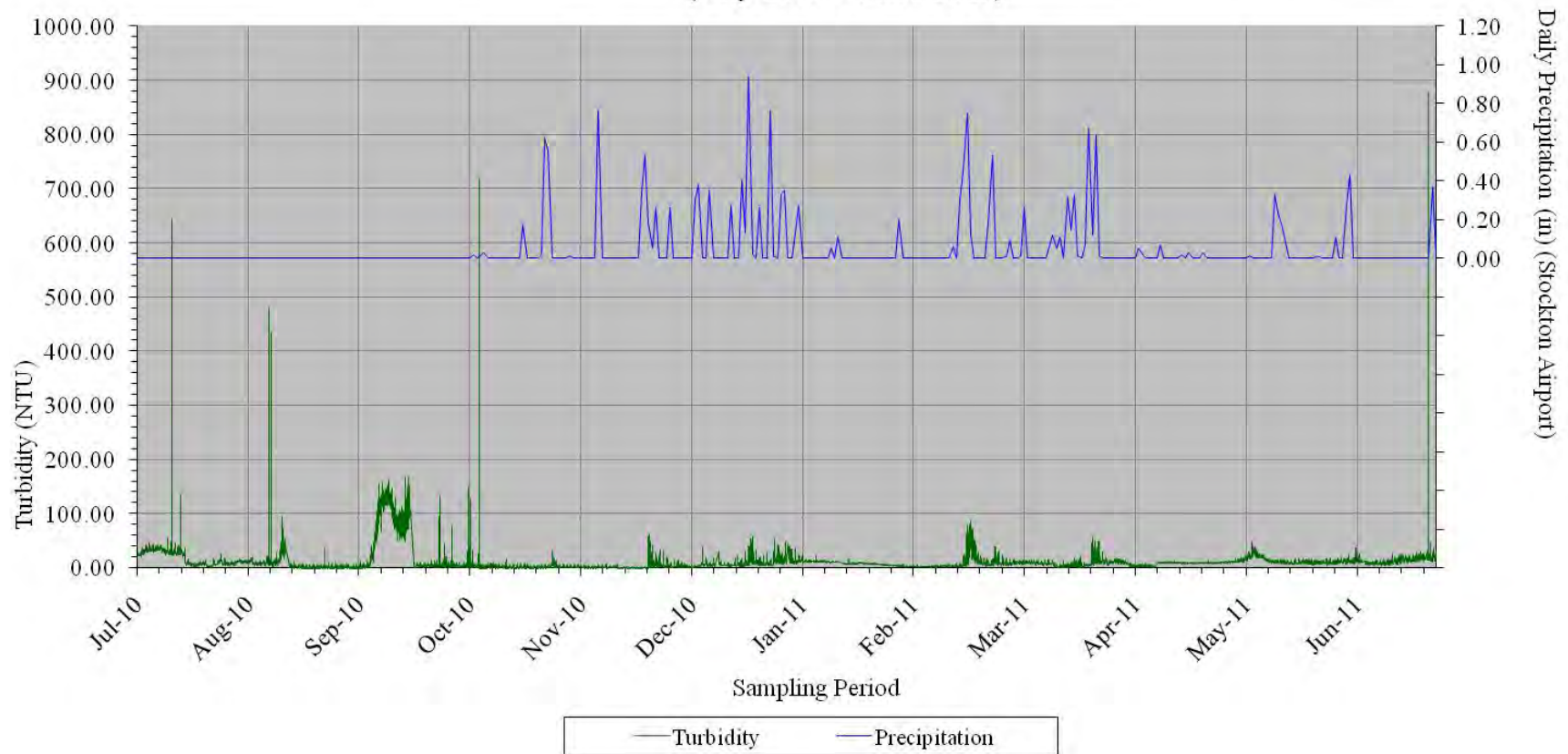


Figure 9-28. Mormon Slough *In-Situ* Turbidity and Precipitation (2010-2011)

9.5.7 Five Mile Slough (5M samples)

Water quality field data was collected at the 5M-25R downstream monitoring location using a continuous *in-situ* data recorder versus periodic *in-situ* grab samples at the 5M-28R upstream monitoring location (**Figure 9-29**, on the following page). Water depth at the 5M-25R location averaged approximately five feet; depth at the 5M-28R location averaged between one and two feet. Accordingly, DO concentrations at 5M-25R were generally higher than that recorded at 5M-28R. With the exception of September and October 2010, monthly average DO levels recorded in Five Mile Slough at the 5M-25R monitoring location remained above the WQO. DO sags below the WQO occurred predominantly during the warm summer months and through the early wet season (July through November). DO concentrations at the 5M-28R location were consistently below the WQO from August 2010 through January 2011 and in April/May 2011.

Periods of greatest excursion below the DO WQO in Five Mile Slough correlate with higher and more variable summer turbidity and pH (**Figures 9-30 and 9-31**). In general, the periods of high turbidity occur in summer, and are possibly caused by agricultural activities or algal growth induced by warm water temperatures. Higher variability of pH during summer was observed and is consistent with either cause. With the exception of the “first flush” early wet season period, higher turbidity levels reported during the wet season generally did not appear to contribute to low DO levels, as concentrations tended to remain above the WQO during these periods. Higher turbidity observed during the wet season at 5M-25R did not coincide with decreased DO concentrations below the WQO. In contrast, high turbidity in winter at upstream sample at 5M-28R does appear to be associated with low DO concentrations below the WQO.

Five Mile Slough
***In-Situ* / Periodic Dissolved Oxygen and Precipitation**
(July 2010 - June 2011)

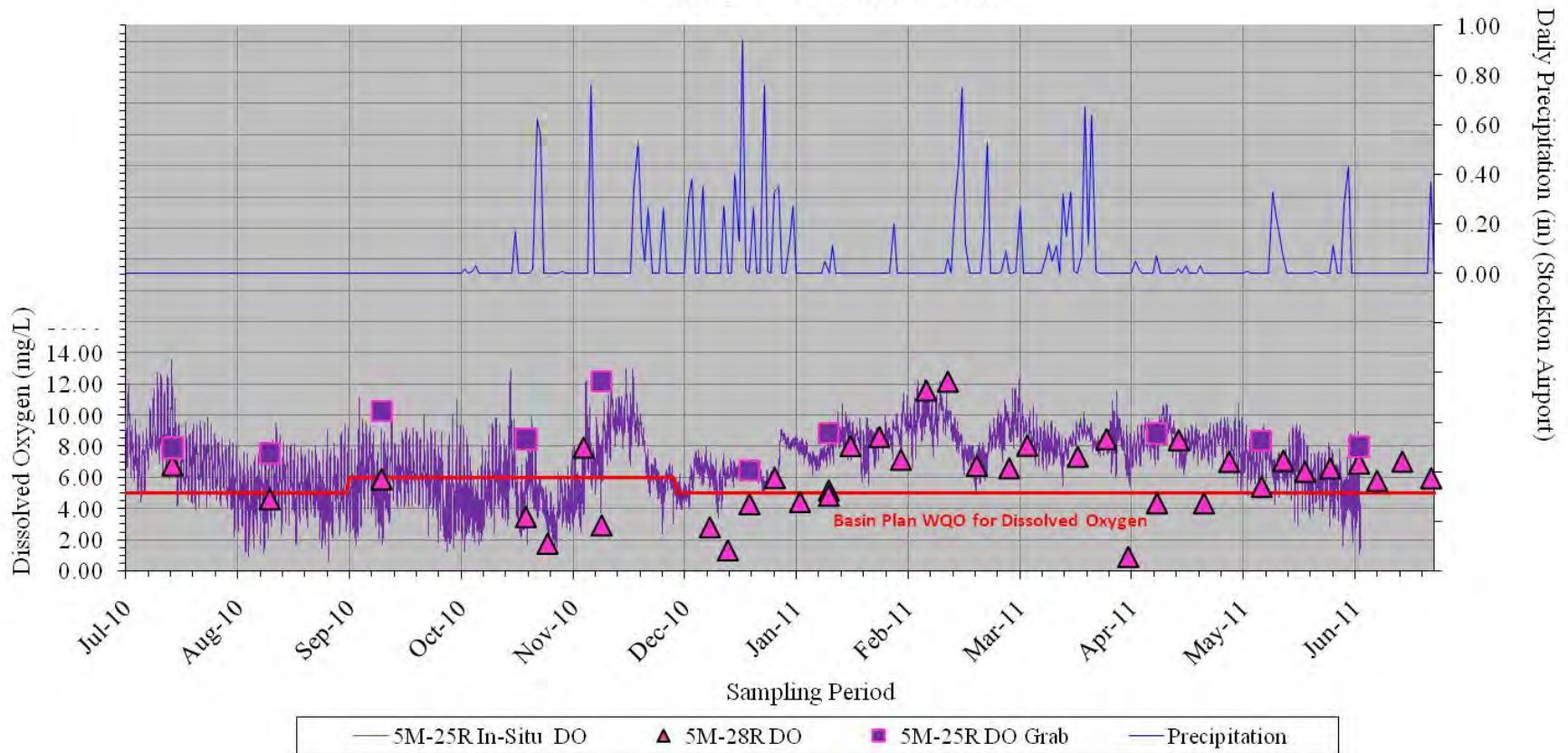


Figure 9-29. Five Mile Slough *In-Situ* / Periodic Dissolved Oxygen and Precipitation (2010-2011)

Five Mile Slough
***In-Situ* / Periodic Dissolved Oxygen and Turbidity**
(July 2010 - June 2011)

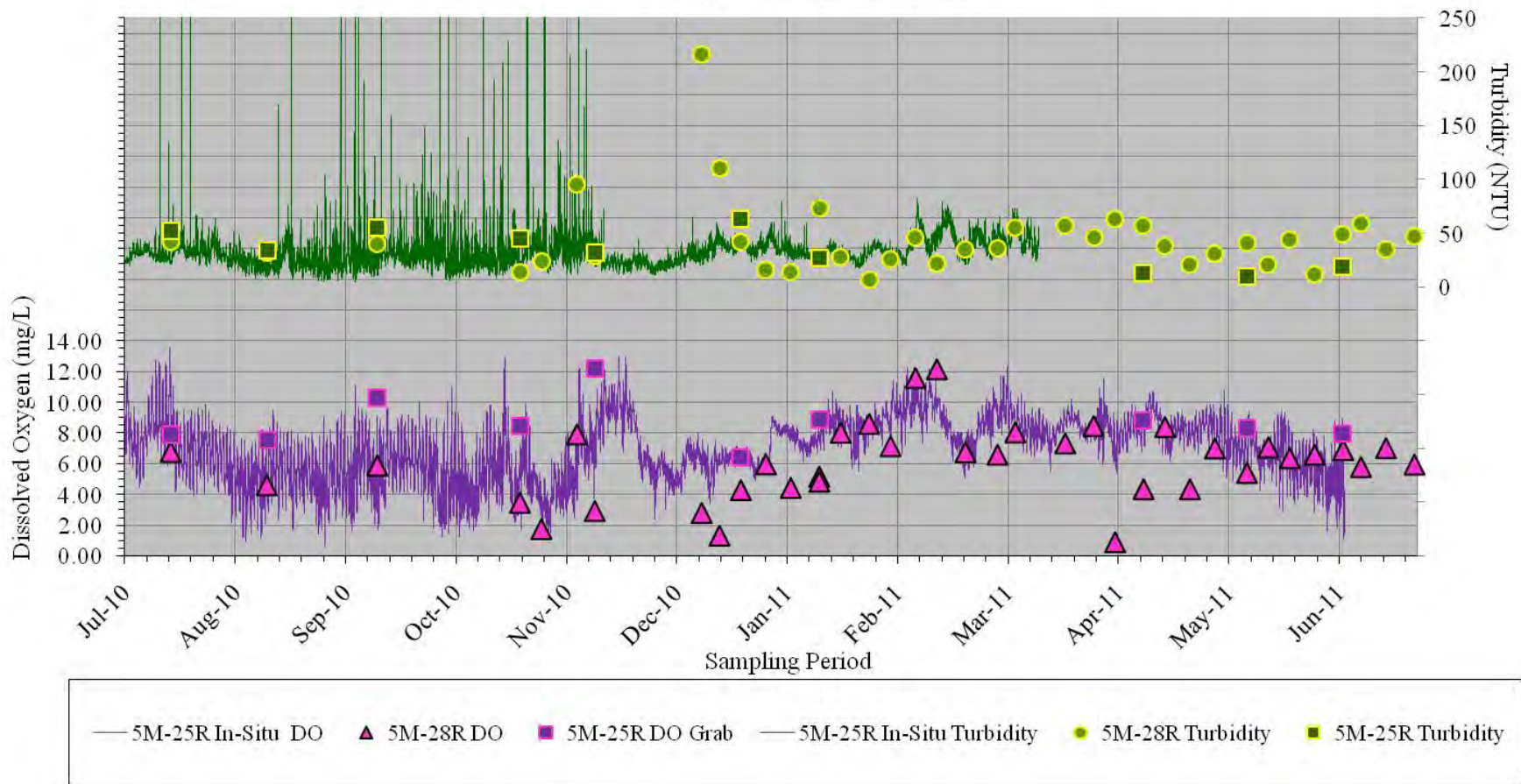


Figure 9-30. Five Mile Slough *In-Situ* / Periodic Dissolved Oxygen and Turbidity (2010-2011)

**Five Mile Slough
In-Situ / Periodic pH and Precipitation
(July 2010 - June 2011)**

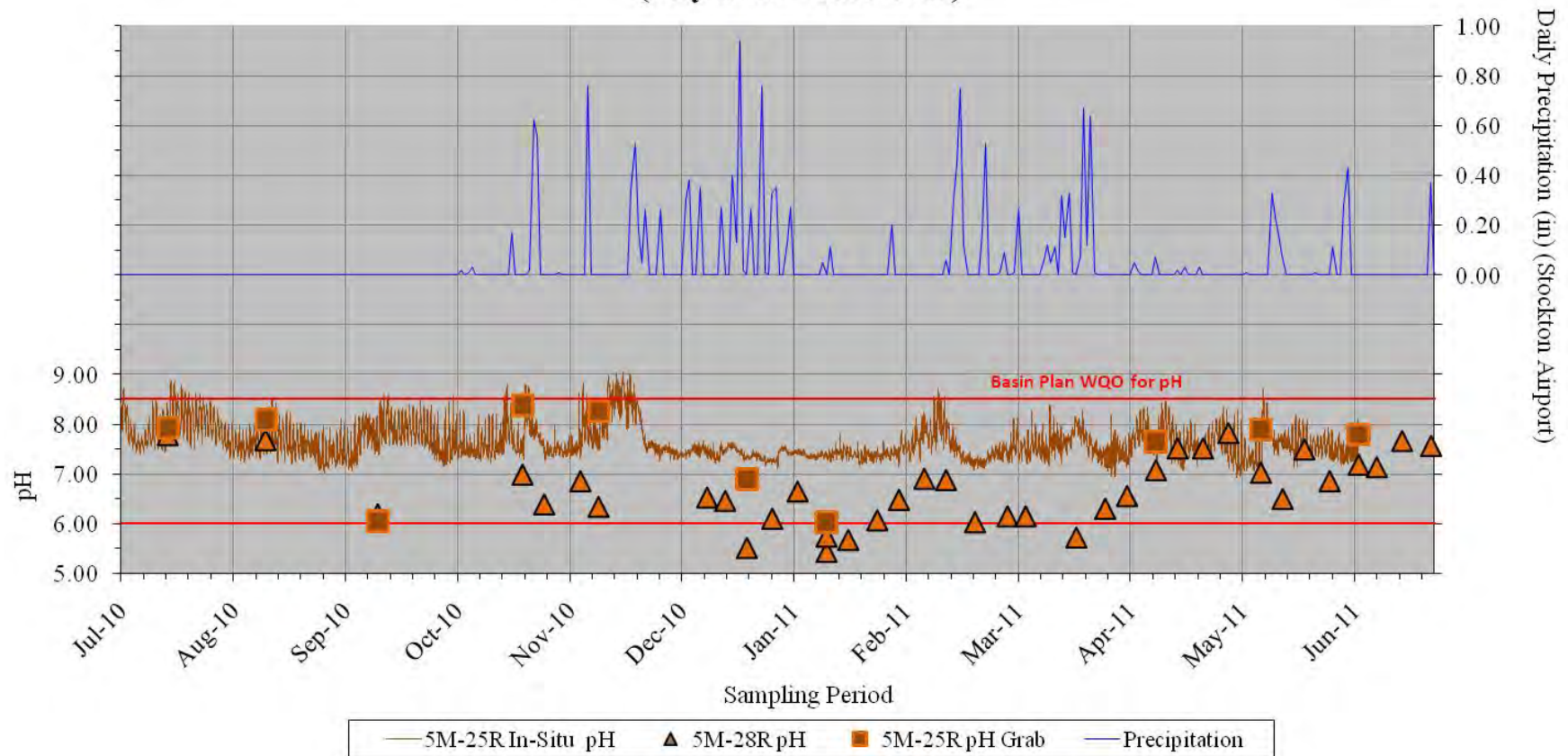


Figure 9-31. Five Mile Slough *In-Situ* / Periodic pH and Precipitation (2010-2011)

9.5.8 Calaveras River (CR samples)

Due to equipment damage and loss, in-situ water quality data for the Calaveras River is discontinuous. In general, DO levels recorded in the Calaveras River remained above WQOs (**Figure 9-32**). Three prominent DO sags below the WQO occur in the upstream sampling data at CR-42R following rainfall events in late October, mid-November and throughout December. Delayed DO sags below the WQO were noted at the downstream CR-39R monitoring location following the early wet season October through December 2010 storm events. This is consistent with mobilization of bottom sediments and increased suspended organic matter transported to the lower stream reach. During the dry season; DO levels below the WQO were rare, sporadic and of limited duration.

In general, the periods of high turbidity observed in the Calaveras River coincide with three different factors: algae growth; periods of high recreational activity; and, storm water inputs. Although DO levels appeared to be depressed during these intervals, DO concentrations generally remained above the WQO (**Figure 9-33**). Episodes of relatively high turbidity levels observed during the wet season did not coincide with decreased DO concentrations below the WQO.

**Calaveras River
In-Situ Dissolved Oxygen and Precipitation
(July 2010 - April 2011)**

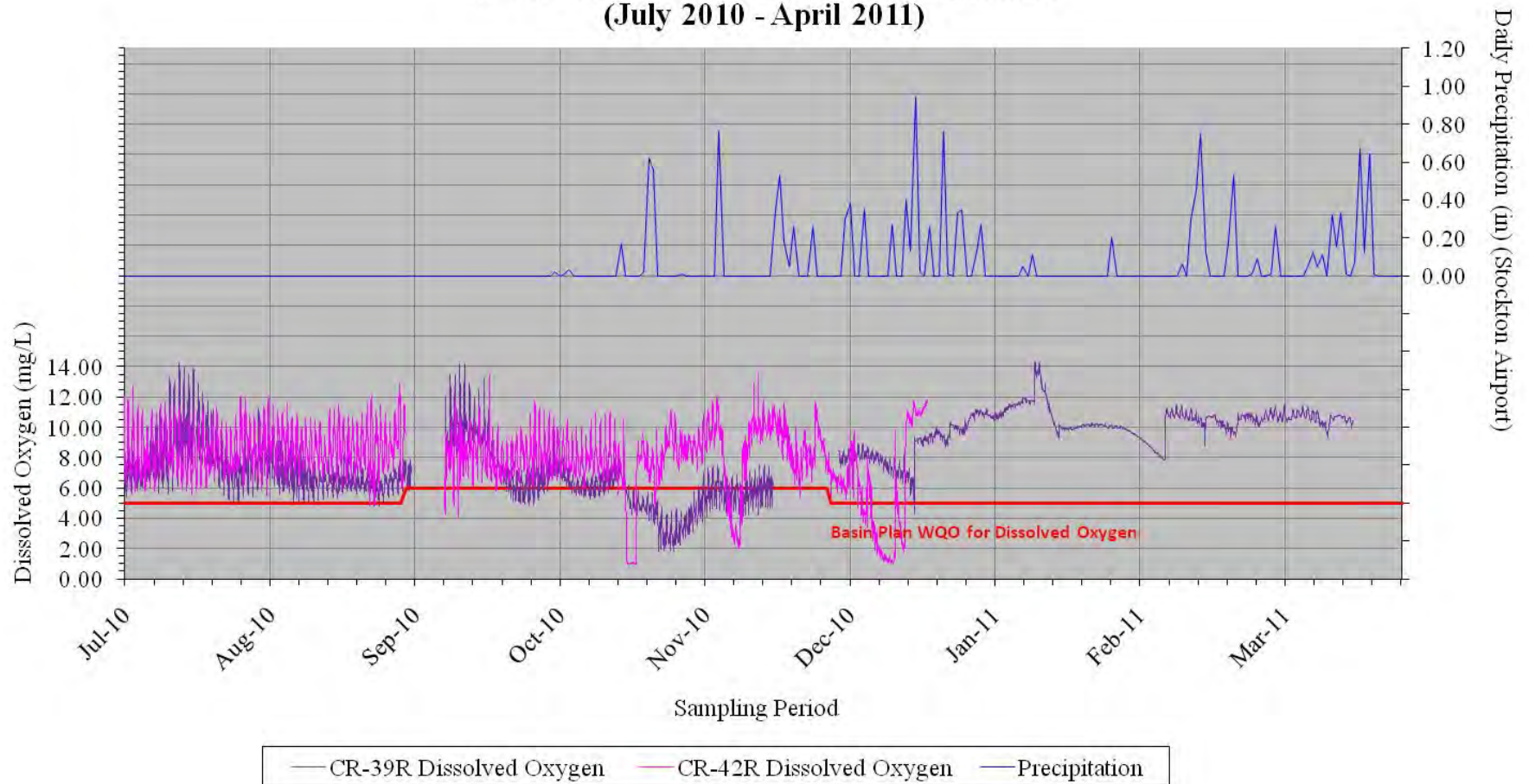


Figure 9-32. Calaveras River *In-Situ* Dissolved Oxygen and Precipitation (2010-2011)

Calaveras River
***In-Situ* Dissolved Oxygen and Turbidity**
(July 2010 - April 2011)

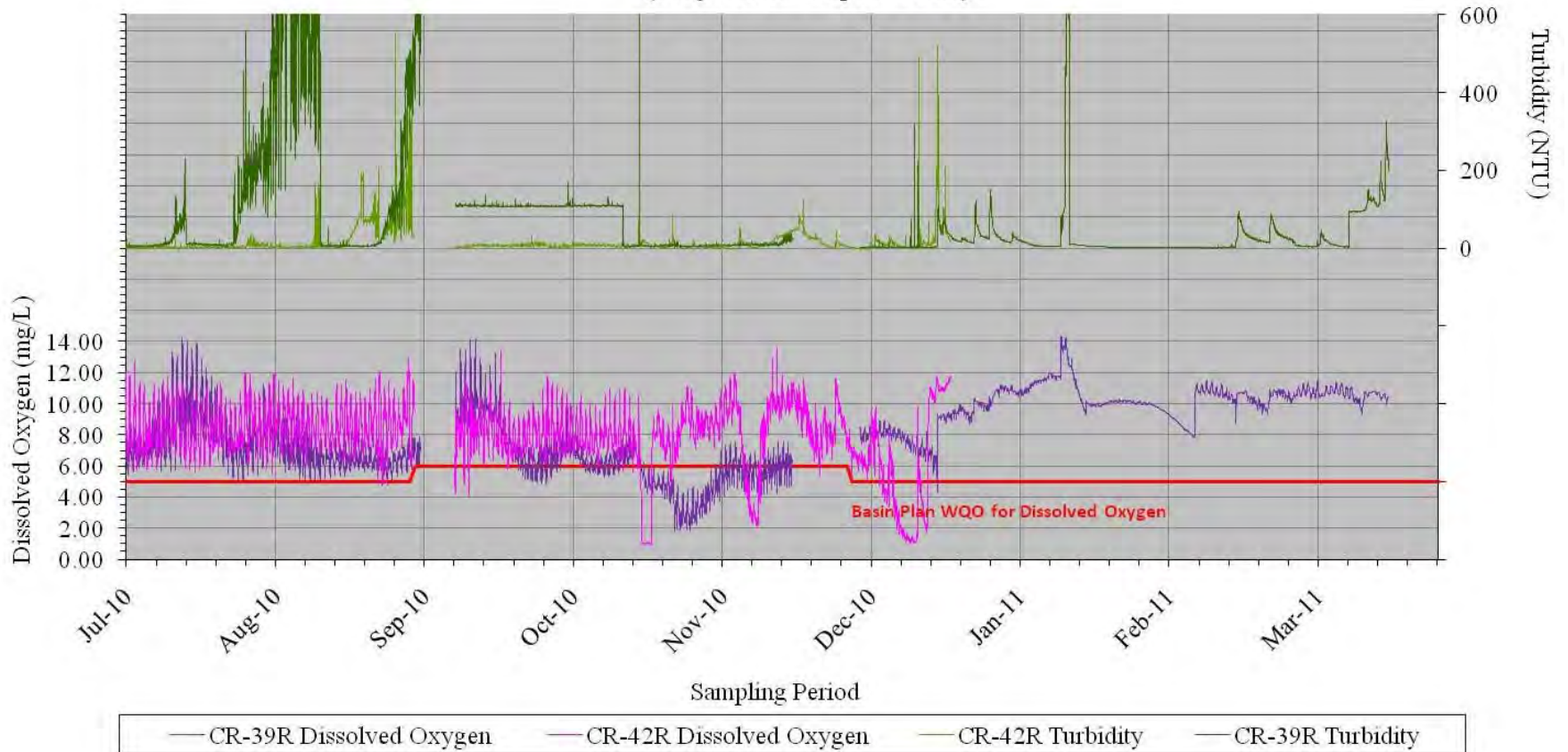


Figure 9-33. Calaveras River *In-Situ* Dissolved Oxygen and Turbidity (2010-2011)

9.5.9 Mosher Slough (MS samples)

Water quality field data were collected using periodic *in-situ* grab samples at the MS-14R and MS-5R monitoring locations combined with intermittent continuous *in-situ* data recorded from the MS-14RUS, upstream SUA monitoring location (**Figure 9-34**). Water depth averages approximately three feet (with tidal contribution) at the MS-14R downstream monitoring locations; available flow at the MS-5R and MS-14RUS sites is highly dependent upon agricultural irrigation contributions.

In general, DO concentrations decreased downstream from MS-14RUS (upstream SUA) to MS-14R. Despite periodic DO sags during low flow intervals, monthly average DO levels recorded the MS-5R and MS-14RUS monitoring location remained above the WQO (**Figure 9-35**). Concentrations of DO at MS-14RUS in August through October 2010 (which were below the WQO) were associated with high turbidity. Concentrations of DO at the MS-14R location were consistently below the WQO during the early wet season period from November 2010 through January 2011. Higher turbidity observed during the early wet season at MS-5R did not appear to coincide with low DO concentrations.

Mosher Slough
In-Situ / Periodic Dissolved Oxygen and Precipitation
(July 2010 - June 2011)

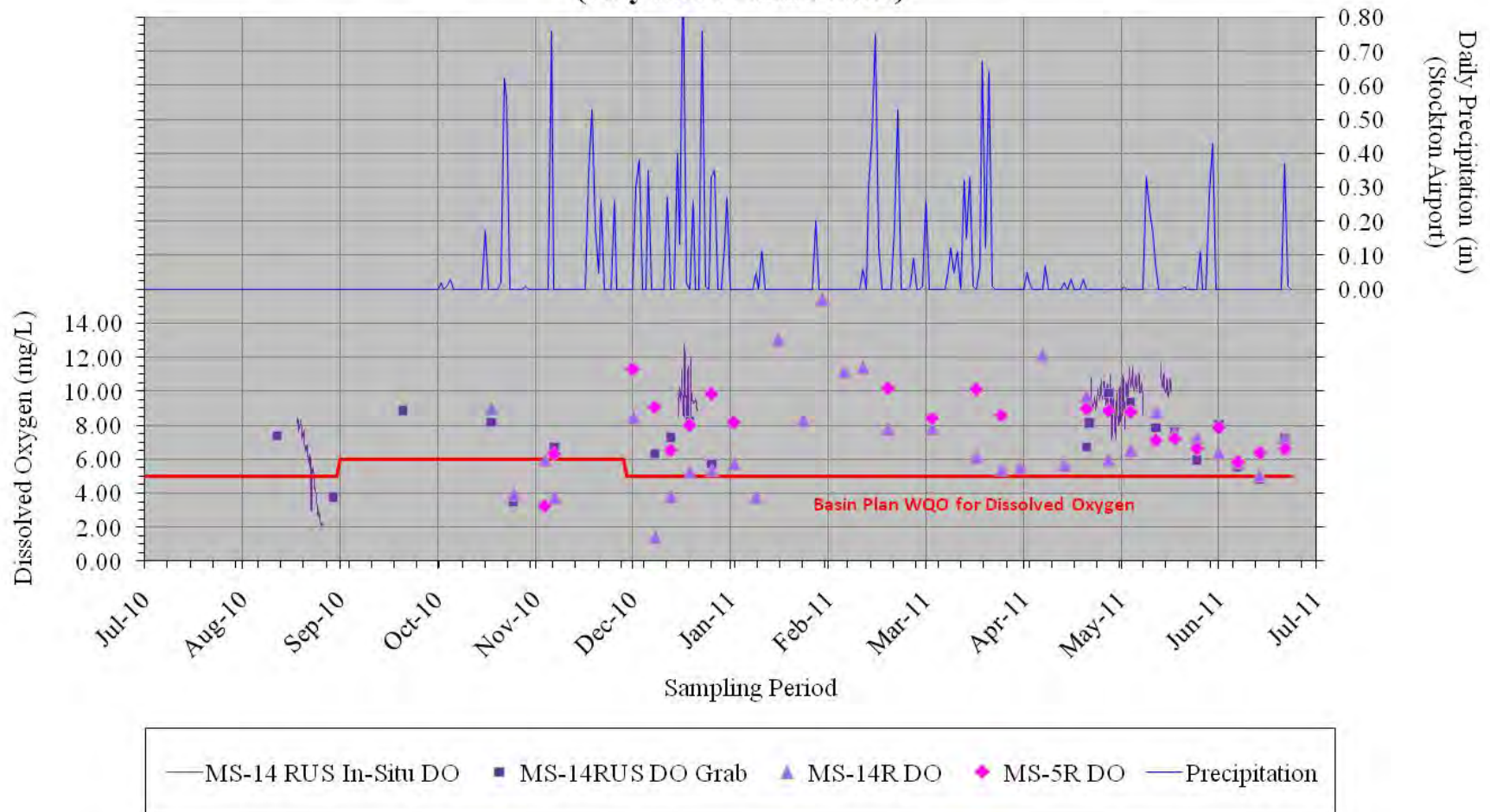


Figure 9-34. Mosher Slough *In-Situ / Periodic* Dissolved Oxygen and Precipitation (2010-2011)

Mosher Slough
***In-Situ* / Periodic Dissolved Oxygen and Turbidity**
(July 2010 - June 2011)

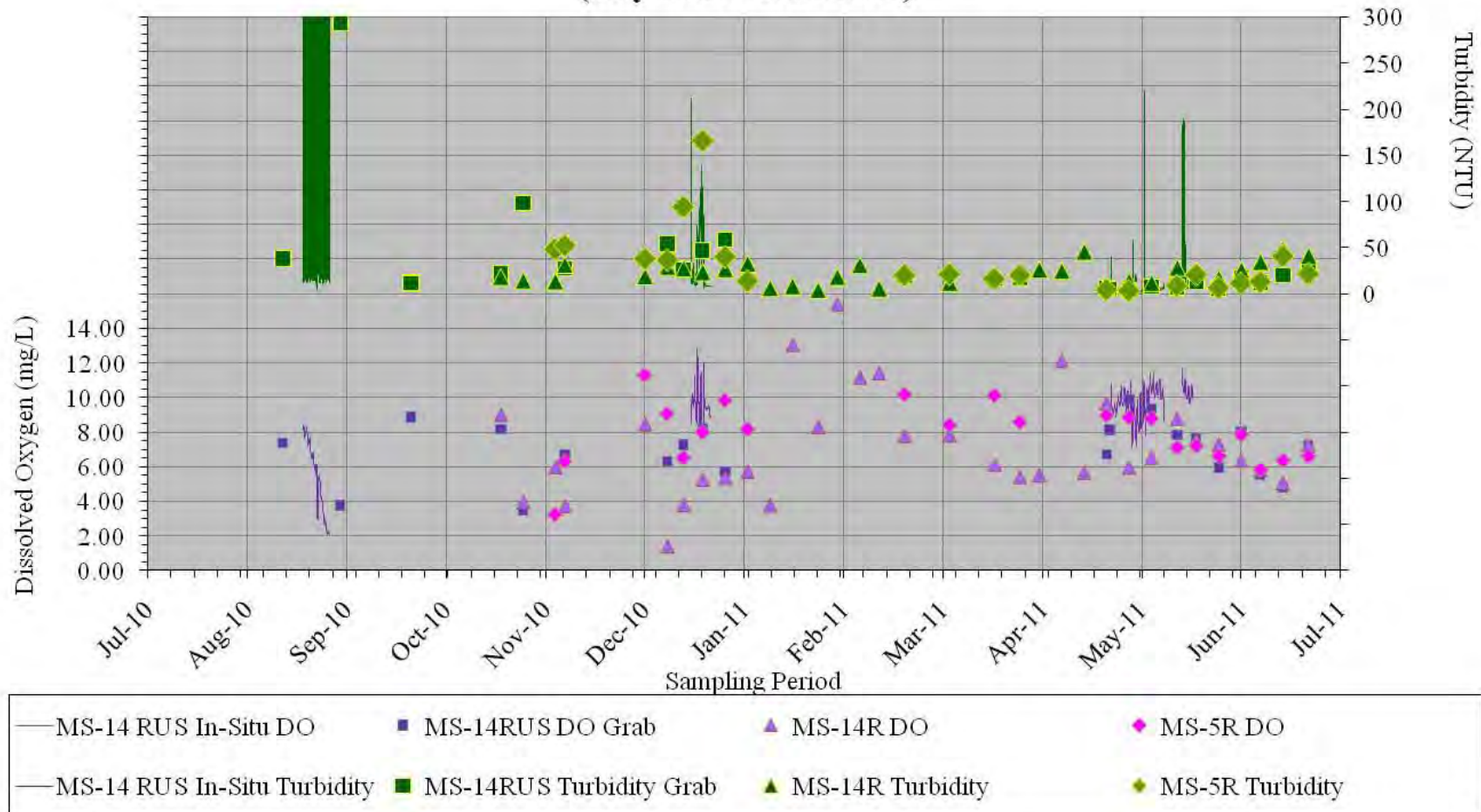


Figure 9-35. Mosher Slough *In-Situ* / Periodic Dissolved Oxygen and Turbidity (2010-2011)

9.5.10 Discussion of Results - 2010-2011 Sediment Samples

Review of the sediment sample analytical results collected during the 2010-2011 Low DO Work Plan monitoring program indicate a substrate consisting of highly reduced anoxic sediments with the potential for a very high oxygen demand in the pore water.

The sediment results in **Table 9-18** allow some general conclusions. At sites where samples from both seasons are available (i.e. Mormon Slough and Five Mile Slough), the parameters BOD, COD and TOC decreased from summer to winter, except at the upstream Five Mile Slough sample, where COD and TOC increased from winter to summer. It appears that there is a general tendency for oxygen consuming potential in sediments to be lower during the rainy season, but that winter additions of constituents can occur locally. This is consistent with mobilization of light organic material that accumulated during low flows in the summer dry season (windblown debris, decayed algae, etc.). At the 5M-28R location, where an increase was observed, water depth is quite shallow and could be an area of local deposition even in winter. Winter paired samples from upstream and downstream in the Calaveras River and Mosher Slough suggest BOD, COD and TOC all increase in downstream directions, again consistent with downstream transport of organic matter during higher flows. Summertime upstream and downstream samples from Five Mile Slough show that BOD and COD of interstitial fluids increased with transport downstream, but TOC decreased. This observation is consistent with breakdown of organic matter in sediment during warm summer months of relatively lower flow. This process would also account for generally lower DO and higher turbidity that was also reflected in the *in-situ* data.

SOD results reflect the rates of oxygen demand. The significance of SOD rates is unclear. These have increased from summer to winter at locations where samples are available from both seasons (i.e. Mormon Slough and Five Mile Slough). During winter sampling SOD decreased downstream at the Calaveras River and Five Mile Slough, but increased downstream flow at Mosher Slough. During summer sampling SOD increased downstream at Five Mile Slough. No other summer upstream-downstream paired sampling is available. However, in general, SOD results increased at those locations where winter flow increases were most pronounced.

9.5.11 Discussion of Results - Dissolved Oxygen in the Water Column

Vertical DO profiling conducted at the Stockton Channel, Calaveras River, Five Mile and Mormon Slough *in-situ* monitoring locations indicate that DO concentrations followed a general decreasing trend with depth which appeared most pronounced during the warm summer months. With the exception of Mormon Slough at MM-4R during October 2010, DO concentrations reported during the vertical depth measurements generally were above Basin Plan WQOs.

A review of the precipitation amounts and recorded DO levels in the receiving waters indicate a period of marked oxygen depletion following the early season storm events (October 17 and 23, 2010; 0.17 and 0.62 inches, respectively). In general, average monthly DO concentrations below the WQO were limited to the very shallow waterways during the warm summer months.

The monitoring data does not reflect a simple relationship between rainfall amounts and turbidity levels with respect to DO concentrations. Although resuspension of biologically-active (reduced) lake sediments by early season storm events are a likely source¹⁷ of oxygen sags within Stockton's shallow "closed system" waterways (Smith Canal, Five Mile Slough); hydrologic conditions and recreational activities are likely the source of high turbidity episodes recorded during the warm summer period. DO sags are preceded by spikes in turbidity; this relationship is most pronounced during the early wet season,

¹⁷ *Smith Canal Drainage Area Analysis and Dissolved Oxygen Work Plan Final Report*, dated October 2, 2006

particularly following the “first flush” rain event. Later in the wet season, DO levels generally remained above the WQO regardless.

9.5.12 Dissolved Oxygen Related to Chemical Monitoring Results

The following section discusses the relationships between temperature, biological processes and chemical interaction with urban discharges observed at Five Mile Slough (**Figures 9-36 through 9-48**). Although Mosher Slough, Mormon Slough, the Calaveras River, and the Stockton Channel each have unique aspects related to their source water, adjoining land uses, and discharge impacts, the following interactions described for Five Mile Slough are at play in these waterways as well. Thus, a detailed discussion is provided below for Five Mile Slough monitoring results, which can also be applicable to the other monitored waterbodies. The cause of DO depletion within each waterway appears to be a complex mix of numerous processes. Effective DO impact mitigation within each waterway depends on evaluating the maximum benefit from the least effort. Analyses at each of the other waterways using the full data set will be performed in the final report.

Temperature and Biological Effects

Dissolved oxygen is affected by temperature, biological activity and chemical equilibria. The chart of DO and temperature (**Figure 9-36**) shows an apparent inverse relationship. In general, periods of highest temperature tend to be periods of lower DO. This follows from the fact that oxygen is less soluble in warm water than cold. However, on closer inspection of the data, it can be seen that other factors affect the DO values day to day and season to season.

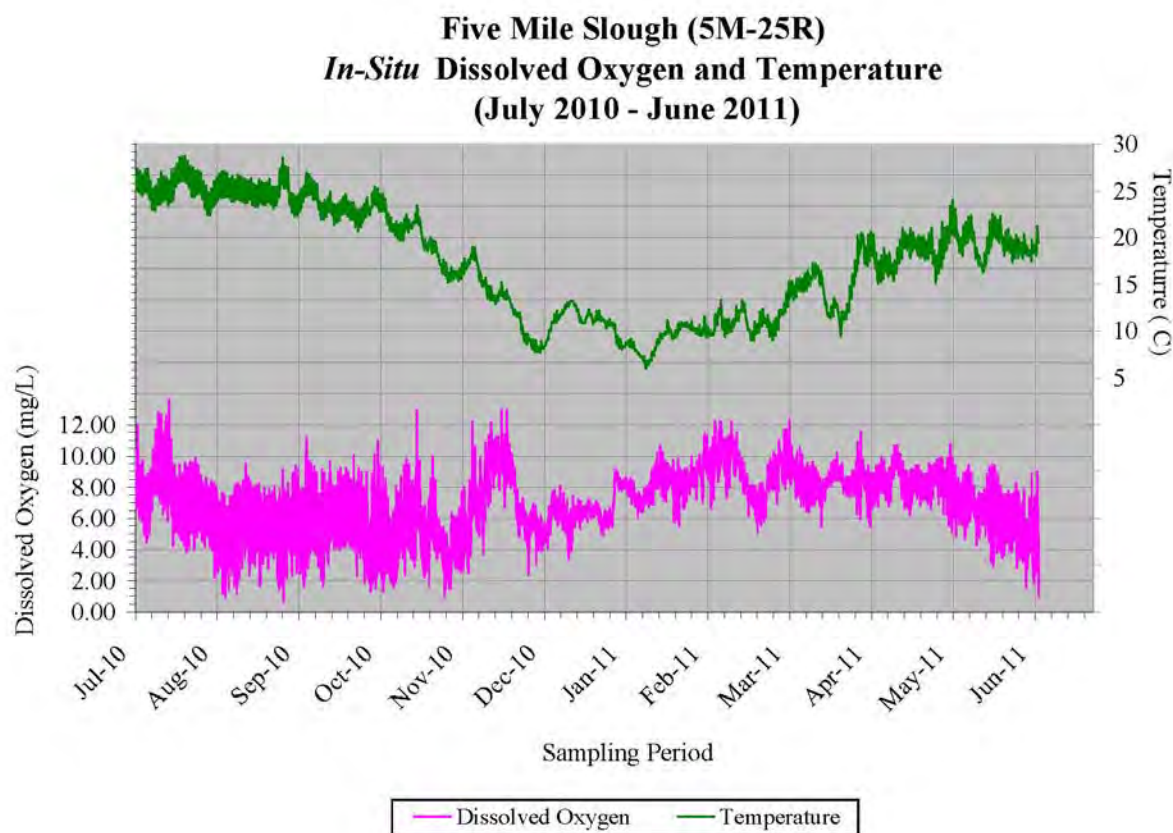


Figure 9-36. Five Mile Slough *In-Situ* Dissolved Oxygen and Temperature (2010-2011)

Detailed *in-situ* DO and temperature data (**Figure 9-37**) reveal that most excursions below the DO WQO at Five Mile Slough occurred during the summer and fall days (July to November in 2010 and starting in late May 2011 through June in 2011). Selected summer data are plotted on **Figure 9-38**. The blue data are moving 24-hour averages of DO values, and show that most data excursions below the WQO are short lived, lasting less than a day until August 2010. The first significant excursion below the WQO occurred from August 2 through 7, August 9, and again August 25 through 28. While the last episode occurred during a spike in water temperature, the others did not, so temperature is not the sole factor affecting episodes of low DO.

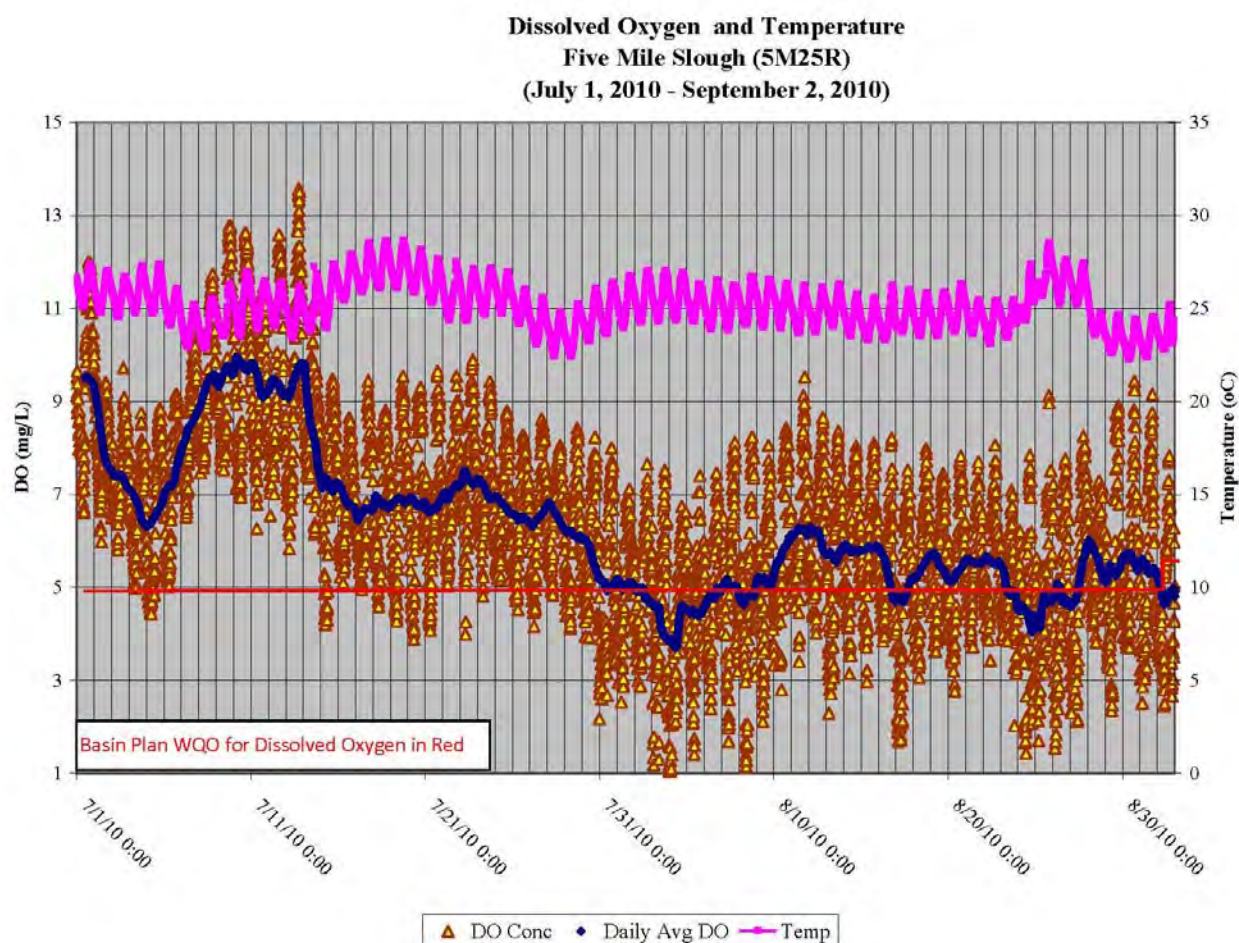


Figure 9-37. Dissolved Oxygen and Temperature Five Mile Slough (5M-25R) (2010-2011)

In summertime, daily temperature fluctuations of about 3°C and daily DO fluctuations of approximately 4 mg/L are common. DO and temperature are at maximum levels in early afternoon and at minimum levels at night (**Figure 9-38**). This correlation is opposite of the oxygen solubility. Therefore, oxygen must be added to the water during hot summer days, most likely from photosynthesizing algae. Low DO at night indicates the oxygen added during the day is depleted by bacterial activity despite the cooler temperature. The pH data shows wide daily summer swings, further evidence for active biological processes. These swings are caused by nightly re-equilibration of water to atmospheric CO₂. The data reveal a strong interplay between oxygenating and photosynthesizing biological activity, especially during warm summer months.

**Dissolved Oxygen and Temperature
Five Mile Slough (5M25R)
August 30, 2010 - September 2, 2010**

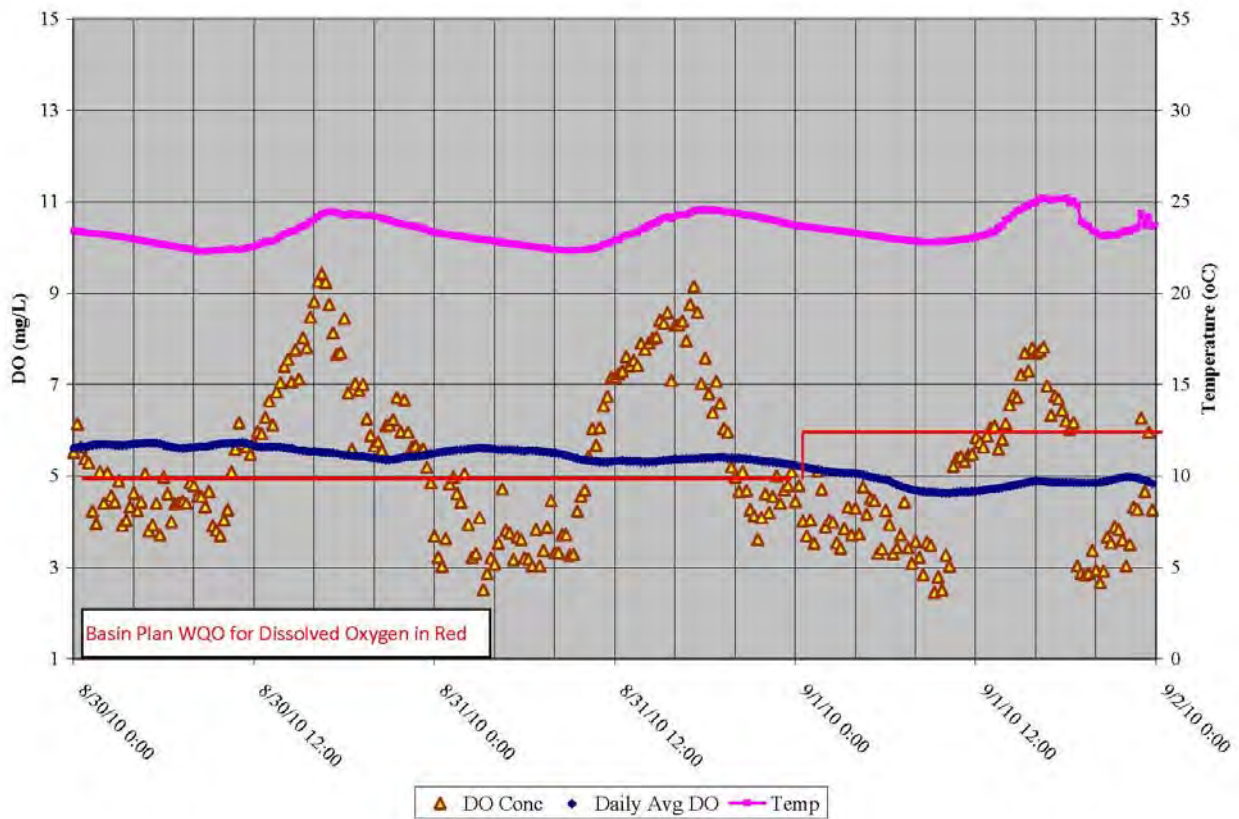


Figure 9-38. Dissolved Oxygen and Temperature Five Mile Slough (5M-25R)

In winter, daily temperature and DO swings are much more subdued than summer, typically about half as great, as shown on **Figures 9-39** and **Figure 9-40**. The winter DO values and daily averages are typically well above the WQO, except when correlated with storm events. This reflects, in part, the seasonally lower temperatures with smaller partial pressure of oxygen; however, even in winter the effects of biological processes described above influence diurnal DO values. **Figures 9-39** and **9-40** show a daily correlation between DO and temperature maxima.

**Dissolved Oxygen and Temperature
Five Mile Slough (5M25R)
(January 23, 2010 - March 4, 2011)**

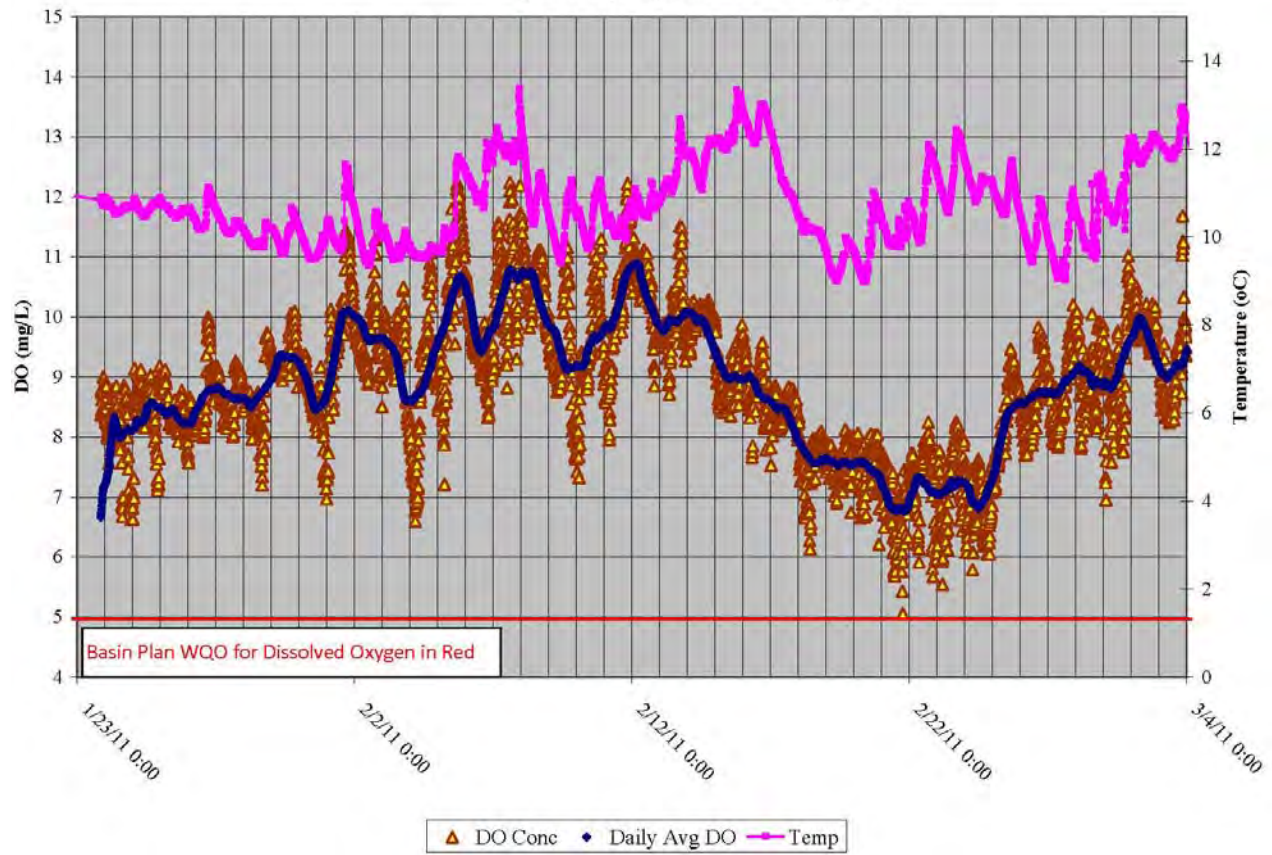


Figure 9-39. Dissolved Oxygen and Temperature Five Mile Slough (5M-25R)

**Dissolved Oxygen and Temperature
Five Mile Slough (5M25R)
February 4, 2010 - February 8, 2010**

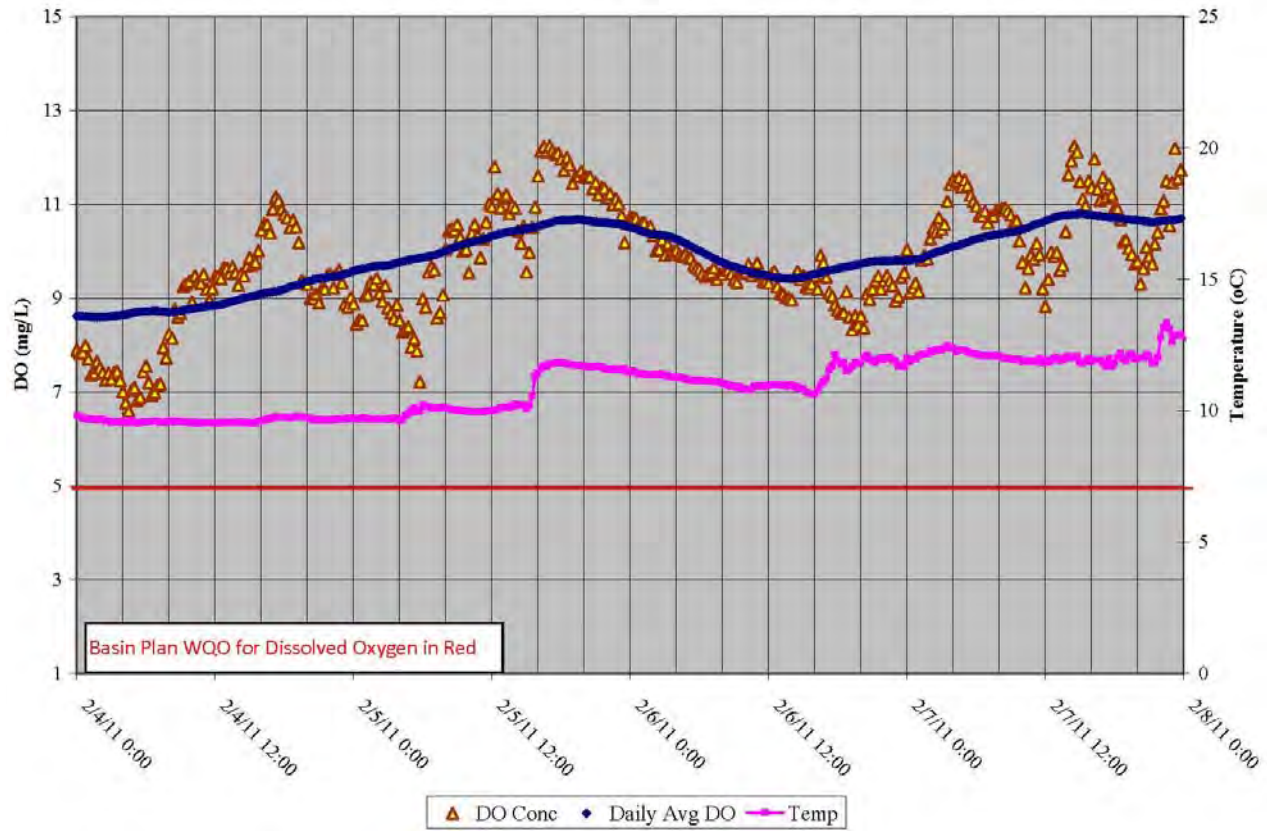


Figure 9-40. Dissolved Oxygen and Temperature Five Mile Slough (5M-25R)

Chemical Effects - Oxygen Demanding Substances

Grab samples provide snapshots in time of the water quality in discharge and receiving water. Concentrations of Oxygen Demanding Substances (ODS) in samples from the upstream receiving water (5M-28R) exhibit baseline average values of COD below 30 mg/L with occasional spikes in TSS during the rainy season. BOD is much lower, typically less than 5 mg/L. Downstream receiving waters at 5M-25R had similar water quality and patterns. In the latter rainy season from February through April, COD and BOD values drop below detection limits at both locations due to flushing and dilution of constituents contributing to ODS. Charts showing ODS concentrations in samples collected from the Five Mile Slough upstream (5M-28R) and downstream (5M-25R) receiving water monitoring locations are shown in **Figure 9-41** and **Figure 9-42**.

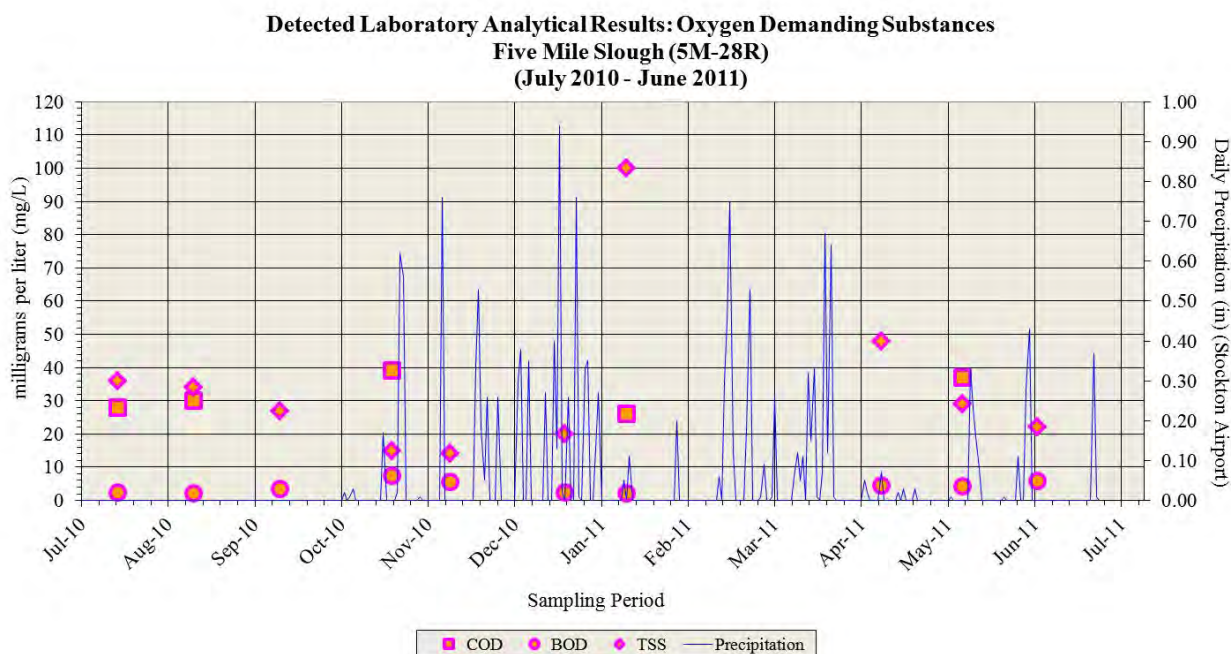


Figure 9-41. Detected Laboratory Analytical Results: Oxygen Demanding Substances – Upstream Receiving Water Five Mile Slough (5M-28R)

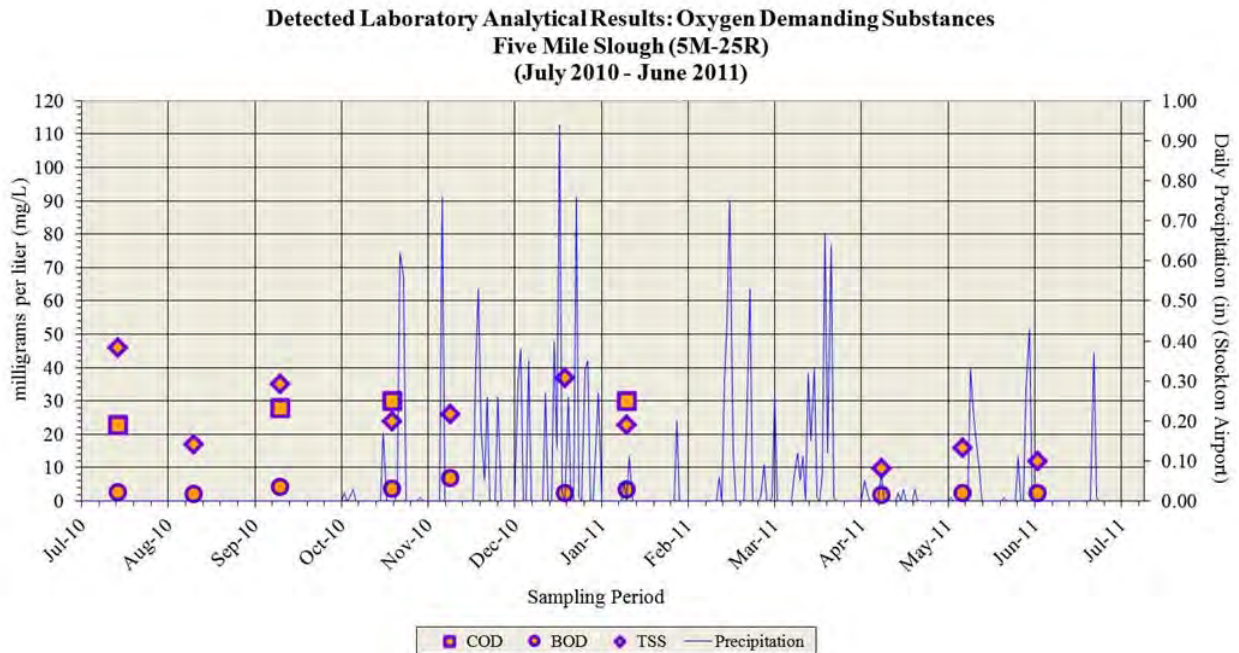


Figure 9-42. Detected Laboratory Analytical Results: Oxygen Demanding Substances – Downstream Receiving Water Five Mile Slough (5M-25R)

Samples of discharge water at 5M-28 and 5M-25 show spikes in COD and TSS associated with early and mid-season rain events, but also display low ODS data in the latter phases of the rainy season. Highest discharge contributions of TSS occurred at the upstream 5M-28R location well after the first flush in January and April, indicating TSS spikes occur sporadically throughout the rainy season. Charts showing ODS concentrations in samples collected from the Five Mile Slough 5M-28 and 5M-25 discharge monitoring locations are in **Figures 9-43 and 9-44**.

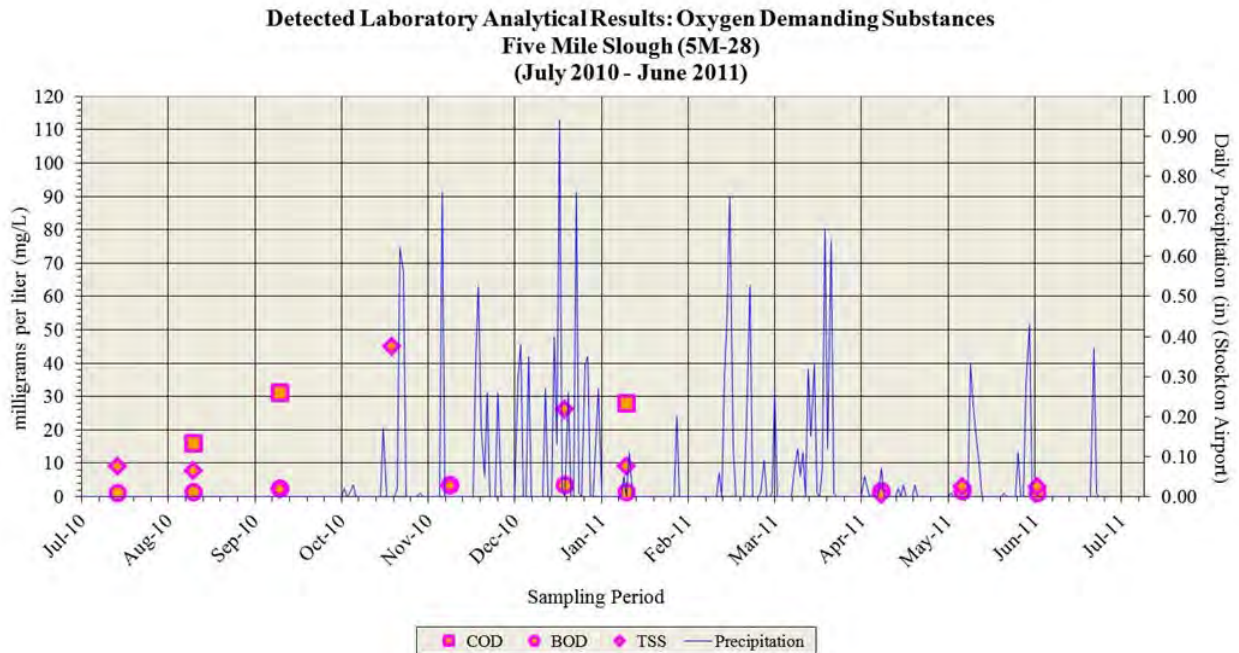


Figure 9-43. Detected Laboratory Analytical Results: Oxygen Demanding Substances – Upstream Urban Discharge Five Mile Slough (5M-28)

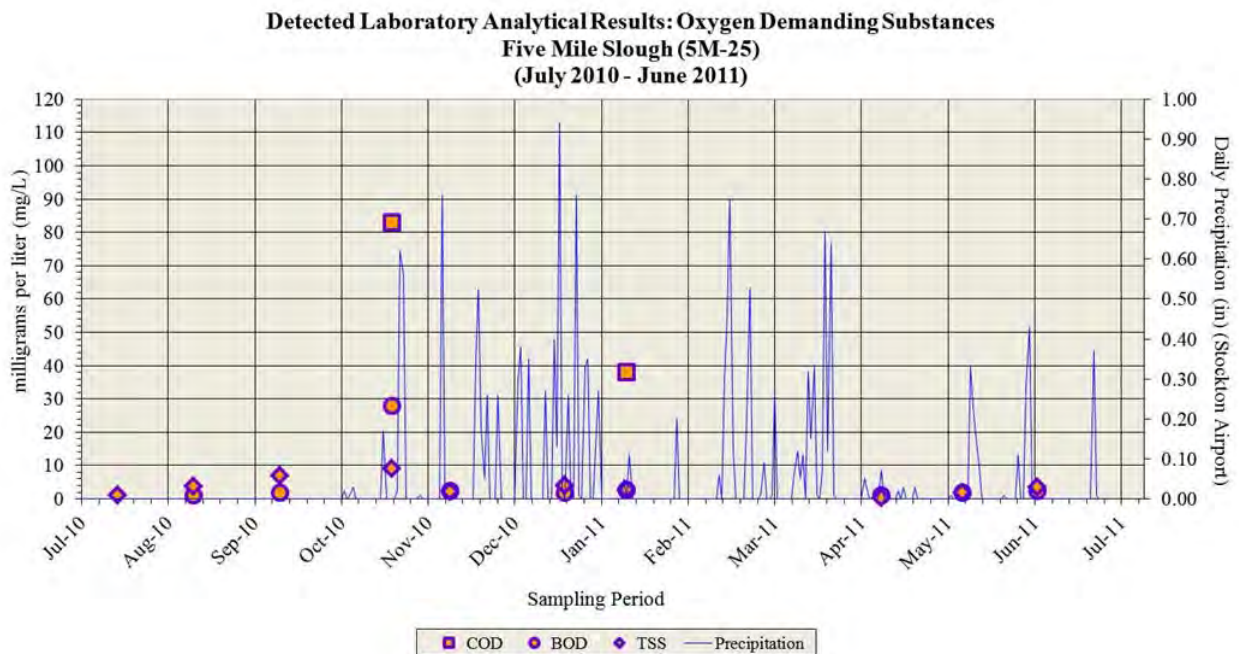


Figure 9-44. Detected Laboratory Analytical Results: Oxygen Demanding Substances – Downstream Urban Discharge Five Mile Slough (5M-25)

Chemical Effects - Nutrients

The uppermost receiving waters at Five Mile Slough (5M-28R) exhibit highest phosphorous (P) and phosphate concentrations (P ranges from 0.1 to 0.2 mg/L) during the wet season, when storm water inputs are highest (**Figure 9-45**). Nitrate and ammonia were not detected in summer when DO is depleted; plausibly related to random sampling error, denitrifying biological activity, nitrogen-fixing in organic molecules by algae, brief periods of high pH causing ammonia volatilization, or other processes that deplete soluble nitrogen (N). As with phosphorous, nitrate and ammonia only make a consistent appearance (N less than 1 mg/L) in the receiving water during the winter rainy season when temperatures are lower and biological activity is diminished. This is also when DO is above WQOs.

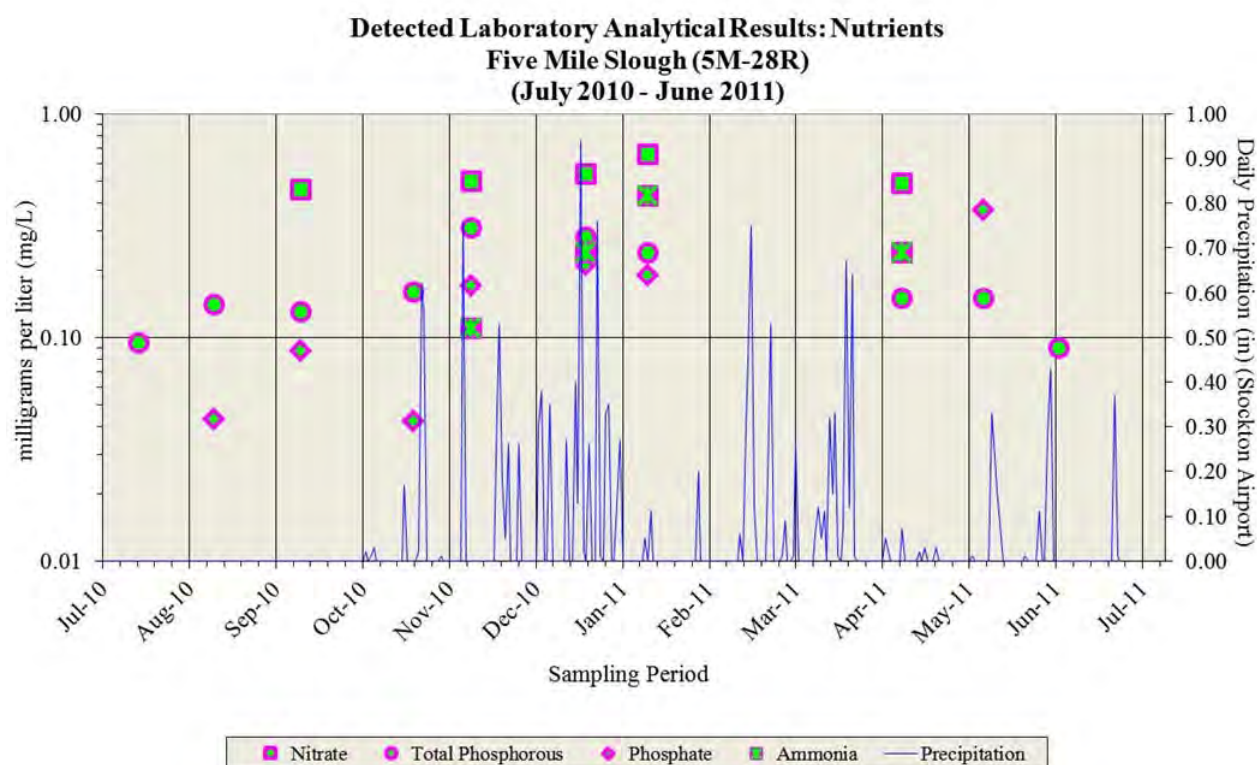


Figure 9-45. Detected Laboratory Analytical Results: Nutrients – Upstream Receiving Water Five Mile Slough (5M-28R)

Nutrients in samples from 5M-28, the upstream discharge to the slough, are more or less constant throughout the year (N approximately 2 mg/L and P approximately 0.4 mg/L; **Figure 9-46**). Discharge waters are more concentrated than the receiving waters and could contribute to the wet season nutrient spikes at 5M-28R, but only if their winter season flows were proportionally greater than in summer (no flow data is available). The year-round constant flux of nutrients at slightly higher concentrations than receiving waters provides fuel for biological DO depletion in the summer, when temperatures are more favorable for growth. The same nutrient contributions do not result in DO depletion during winter. It is unclear how much of the summer DO depletion is a result of upstream flows in the receiving waters.

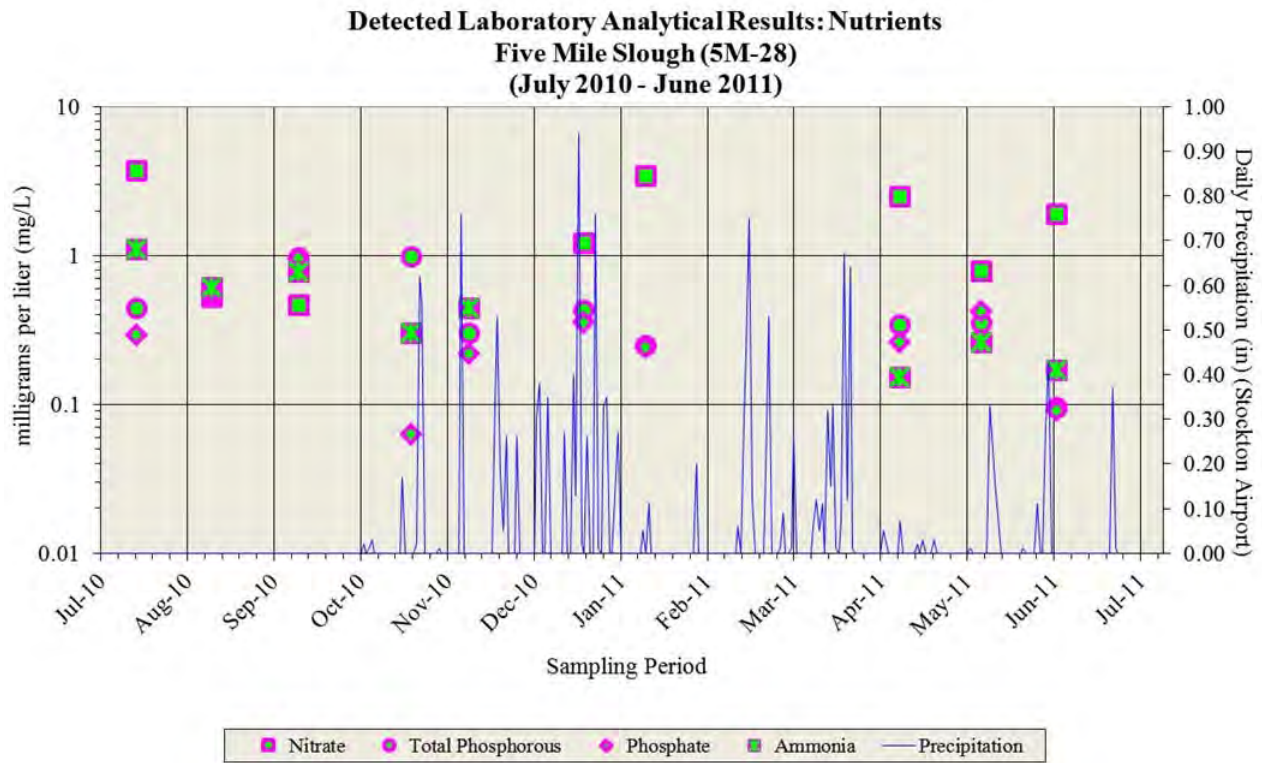


Figure 9-46. Detected Laboratory Analytical Results: Nutrients – Upstream Urban Discharge Five Mile Slough (5M-28)

Downstream receiving waters at 5M-25R are slightly lower in nitrate (by less than 1 mg/L) than discharges at 5M-25 (**Figures 9-47 and 9-48**). P compounds in discharge samples are slightly lower than in receiving waters at the downstream location. Depending on flow contributions, these discharges are less damaging to DO levels than the upstream discharge point.

Comparison of the receiving waters from upstream and downstream locations show little change with flow, although the upstream P concentrations exceeding 0.2 mg/L at 5M-28R during the rainy season were dissipated or diluted by the time they reached 5M-25R. Thus even though nutrients appear to be fueling biological activity, they do not have a severe impact on DO within the reach of the two sampling locations.

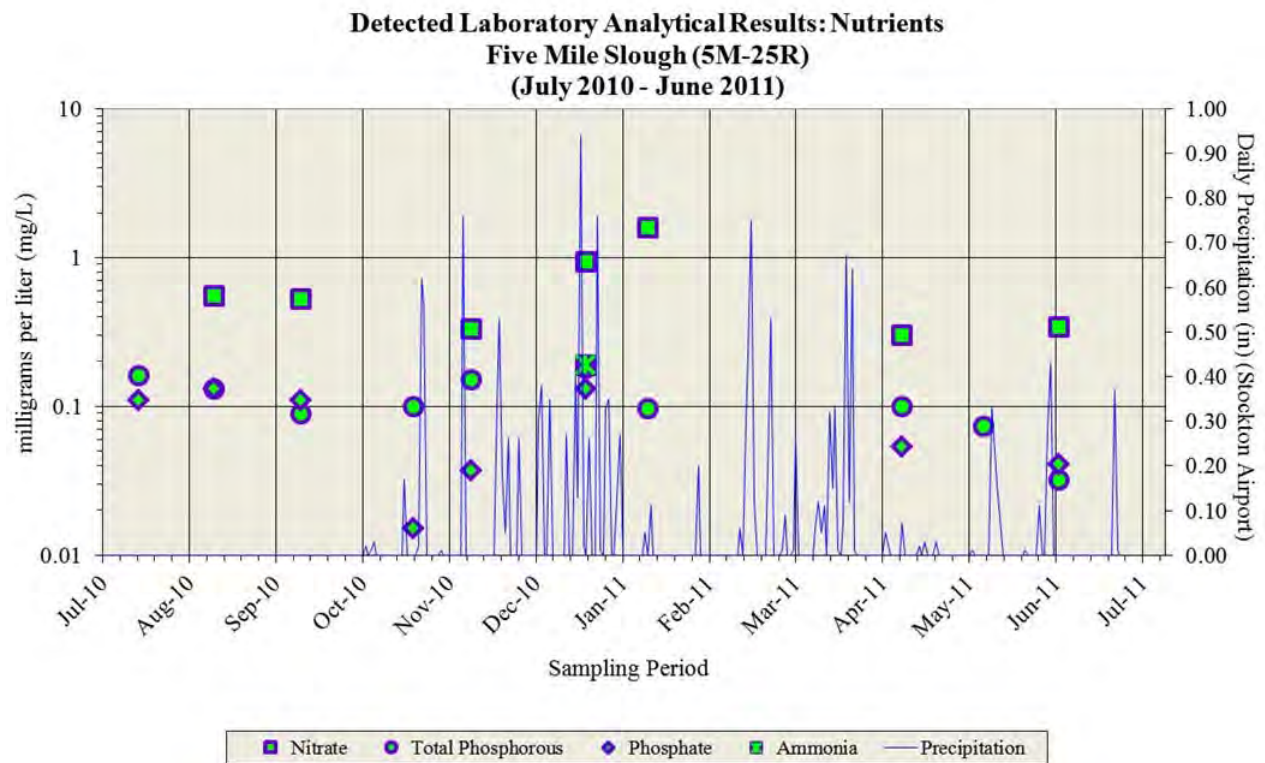


Figure 9-47. Detected Laboratory Analytical Results: Nutrients –Downstream Receiving (5M-25R)

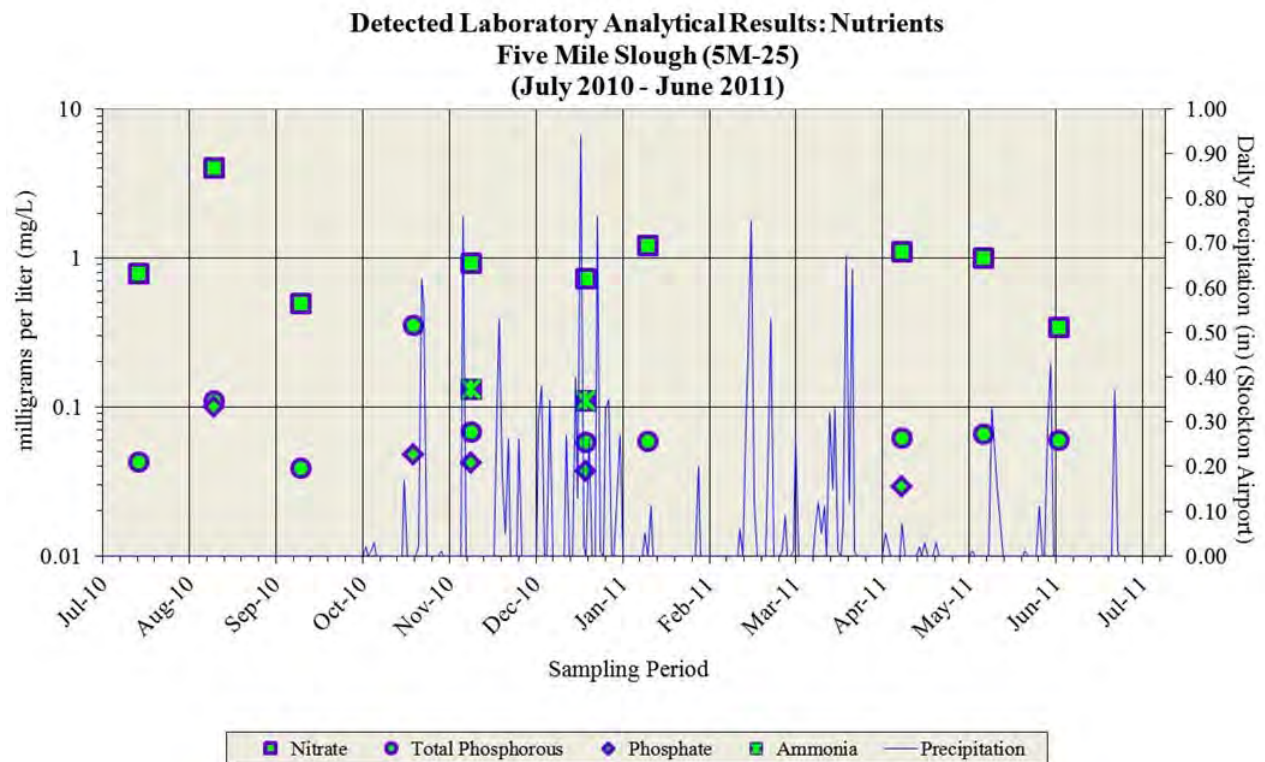


Figure 9-48. Detected Laboratory Analytical Results: Nutrients –Downstream Discharge 5M-25

9.5.13 2010-2011 Low DO Monitoring Program - Summary

Results of the sediment sample analytical results collected during the 2010-2011 Low DO Work Plan monitoring program indicate a substrate consisting of highly reduced anoxic sediments with the potential for a very high oxygen demand in the pore water.

It appears that there is a general tendency for oxygen consuming potential in sediments to be lower during the rainy season. This is consistent with mobilization of light organic matter that accumulated during low flows in the summer dry season. Analyses of oxygen demanding substances from winter paired samples from upstream and downstream in the Calaveras River and Mosher Slough are consistent with downstream transport of organic matter during higher flows. Summertime upstream and downstream samples from Five Mile Slough show that BOD and COD of interstitial fluids increased with transport downstream, but TOC decreased, consistent with breakdown of organic matter in sediment during warm summer months of relatively lower flow. In general, SOD results increased at those locations where winter flow increases were most pronounced.

Vertical DO profiling conducted at the Stockton Channel, Calaveras River, Five Mile and Mormon Slough in-situ monitoring locations indicate that DO concentrations followed a general decreasing trend with depth which appeared most pronounced during the warm summer months. With the exception of Mormon Slough at MM-4R during October 2010, DO concentrations reported during the vertical depth measurements generally were above Basin Plan WQOs.

A review of the precipitation amounts and recorded DO levels in the receiving waters indicate a period of marked oxygen depletion following the early season storm events (October 17 and 23, 2010; 0.17 and 0.62 inches, respectively). In general, average monthly DO concentrations below the WQO were limited to the very shallow waterways during the warm summer months.

The monitoring data does not reflect a simple relationship between rainfall amounts and turbidity levels with respect to DO concentrations. Although resuspension of biologically-active (reduced) lake sediments by early season storm events are a likely source¹⁸ of oxygen sags within Stockton's shallow "closed system" waterways (Smith Canal, Five Mile Slough); periods of algal growth, recreational activities, and storm water discharges are likely the source of high turbidity episodes recorded during the warm summer periods. DO sags are preceded by spikes in turbidity; this relationship is most pronounced during the early wet season, particularly following the "first flush" rain event. Later in the wet season, DO levels generally remained above the WQO regardless.

Warmer summer water temperatures promote oxygen depletion; however the interplay between photosynthesizing algae in the heat of the day and oxygenating bacteria in the cool of the night overprint the temperature effects at a smaller scale. Overall, warmer summer temperatures and nightly decay of algal growth put downward pressure on DO. Other fluctuations in DO are caused by the introduction of organic constituents (e.g. TSS) and nutrient chemical constituents (N and P) that promote algal growth and eventual deoxidation during bacteria decay.

There appears to be little change in nutrient chemistry of receiving water from upstream to downstream except for depletion of P compounds in winter. Summertime P contributions likely have already been consumed in discharge waters before entering the receiving stream, and analysis of field parameters (DO, ORP) could show if this occurs. The discharge at 5M-28 has highest nutrient contributions and may have an effect on the winter season receiving waters; however; observed N and P enrichment in winter could be caused by upstream flows in receiving waters as well. Discharge and receiving water flow volumes

¹⁸ *Smith Canal Drainage Area Analysis and Dissolved Oxygen Work Plan Final Report*, dated October 2, 2006.

could be measured or estimated to evaluate the importance of upstream discharges at affecting receiving water chemistry. The discharges at 5M-25 are similar to receiving waters.

9.5.14 Low DO Plan Program Modifications

Every April, the City submits an annual work plan for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for the Water Quality Based Programs. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual report, as well as the experience that staff has had in implementing the program, and determines if any additional program modifications are necessary.

The program modifications that were identified during 2010-2011 include the following:

- **Monitoring:** Sample each of the 5 monitoring locations for 18 months, including 2 wet seasons. Monitoring during the wet season will allow for a closer examination of DO sags, and with the proposed modification, sufficient data will have been collected for the purpose of this study.

Section 10

Program Implementation, Assessment, and Reporting

10.1 OVERVIEW

The City is actively and adaptively managing the SWMP through the implementation, assessment, and reporting of the Program Elements and the related Control Measures and Performance Standards.

10.2 CONTROL MEASURES

The City has developed several Control Measures and accompanying performance standards to ensure that program implementation, assessment, and reporting-related Permit requirements are effectively developed and implemented. For each Control Measure there are accompanying performance standards which, once accomplished, constitute compliance with the SWMP/Permit.

The Control Measures consist of the following:

Control Measure
Program Implementation
Evaluation/Assessment
Reporting

This section of the Annual Report provides information on the specific tasks that have been initiated and/or completed during the reporting period pursuant to the Performance Standards and implementation schedules.

10.3 PROGRAM IMPLEMENTATION

The SWMP has been structured to identify the specific activities that must be implemented, as well as the responsible party for implementing the activities. This has been accomplished through the establishment of Control Measures and Performance Standards. However, 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.

Successful implementation of the SWMP also requires an extensive training effort by the City to ensure that its employees understand the Stormwater Program and conduct their activities in a manner to minimize pollutants from stormwater discharges. The City's proposed training effort is described within each of the SWMP Program Elements.

10.3.1 Annual Work Plan

An Annual Work Plan is submitted to the Regional Water Board by **April 1** of each year. The Annual Work Plan summarizes the proposed activities that the City will undertake during the next fiscal year (July 1 – June 30). While the Annual Work Plan generally follows the Control Measures and Performance Standards outlined within the SWMP, it may also include additional activities that the City has identified as being necessary during the previous reporting period.

The City submitted the annual work plan for 2011-2012 to the Regional Water Board on April 1, 2011. The work plan identified the various performance standards that would be initiated and/or completed during the next fiscal year.

10.4 EVALUATION/ASSESSMENT

Paramount to the success of the stormwater program is the need for the City to evaluate the effectiveness of its program by compiling and reviewing program data. As a part of this process and overall effectiveness assessment strategy, the City is currently assessing effectiveness as a part of the annual reporting process (see each of the Program elements). The strategy for assessing effectiveness will continue to build upon the results of the annual reports and initial assessments and will address the stormwater program in terms of achieving both programmatic goals and environmental goals.

By utilizing the iterative process and conducting effectiveness assessments, the City can use the information gained to adapt its programs and ensure that the resources expended are providing commensurate benefit and are protective of water quality. The results of these assessments and proposed modifications to the SWMP will be provided to the Regional Water Board on an annual basis as a part of the reporting process.

10.5 REPORTING

The City will continue to coordinate with the County in developing standardized formats for all reports that are required pursuant to the stormwater Permit. This will include annual reports, fiscal analysis reports, and program effectiveness assessments. Pursuant to the federal regulations, all work plans and reports will be signed and certified.

For this annual report, the reporting templates for both the City and the County were updated to ensure that the report would address the performance standards that needed to be initiated and/or completed during the 2010-2011 reporting year. The templates will continue to be updated as needed.

10.5.1 Annual Report

An annual report is submitted in both electronic and hard copy form to the Regional Water Board by **September 1** of every year. The purpose of the Annual Report is to document the status of the SWMP implementation, present results from activities implemented, provide a compilation of deliverables and milestones reached during the previous fiscal year (July 1 – June 30), and report on the overall status and effectiveness of the SWMP. Updates, improvements, or revisions to the SWMP are also identified in the Annual Report.

This report covers the period from July 1, 2010 through June 30, 2011.

10.5.2 Report of Waste Discharge

The municipal stormwater Permit expires on December 6, 2012. As a result, the City is required to submit a Report of Waste Discharge (ROWD) to the Board 180 days prior to its expiration (June 6, 2012). The ROWD serves as the application for the re-issuance of the Permit. The ROWD will be submitted as required.

10.6 PROGRAM MODIFICATIONS

Every April, the City submits an annual work plan to the Regional Board for the upcoming fiscal year. The 2011-2012 work plan identified several key tasks for Program Implementation, Assessment, and Reporting. In addition to the anticipated tasks that are identified within the annual work plan, the City evaluates the results of the annual progress report as well as the experience that staff has had in implementing the program and determines if any additional program modifications are necessary in order to comply with Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable.

There were no program modifications identified for Program Implementation, Assessment, and Reporting for 2011-2012.