San Joaquin County and Delta Water Quality Coalition

San Joaquin County Resource Conservation District
3422 W. Hammer Lane, Suite A
Stockton, California 95219
209-472-7127 ext 125

May 1, 2015

Pamela Creedon
Irrigated Lands Regulatory Program
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Dear Ms. Creedon,

The San Joaquin County and Delta Water Quality Coalition (SJCDWQC) is submitting the 2015 Annual Report for review by the Central Valley Regional Water Quality Control Board (CVRWQCB) as required by the Waste Discharge Requirements for Discharges from Irrigated Lands Resolution Order No. R5-2006-0053, Monitoring and Reporting Program Order No. R5-2008-0005 (MRP).

The attached documents report on the Coalition's monitoring program and management of water quality within the Coalition region for the period of January 1, 2014 through September 30, 2014. The 2015 Annual Report includes updates of monitoring results, a status update of constituents and subwatersheds requiring a management plan, an evaluation of the current Management Plan strategy including a status update of high priority site subwatershed performance goals, a summary of outreach and education activities, and a summary of current and newly implemented management practices in high priority site subwatersheds. In addition, the Annual Report includes an evaluation of management practice effectiveness, a summary of required grower submittals, and an analysis of spatial trends of the relationship between exceedances and use of various pesticides or the presence of dairies.

Electronic files will be mailed including:

1. 2015 Annual Report (electronic)
2. Appendices I – VIII (electronic)
3. SWAMP Comparable Database with SJCDWQC results through September 2014 (Microsoft Access; electronic) and GIS Geodatabase (electronic)
4. Pesticide Use Report Database (Microsoft Access; electronic)

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In every aspect, the Coalition seeks the best quality in its monitoring program by using the most scientifically reliable field and laboratory protocols, ensuring complete quality control and quality assurance of the data received from laboratories, and reporting on that data accurately and punctually to both the CVRWQCB and to the members of the Coalition. The Coalition and its technical staff process and review an immense quantity of data and provide a large number of reports in a timely manner to the CVRWQCB.

The Coalition's monitoring program met MRP and WDR requirements as described in the Annual Report. Sampling occurred during all twelve months (including two storm events and two sediment events), and all data generated are an accurate reflection of conditions in the Coalition region. Overall, there was compliance with completeness, accuracy, and precision requirements for data collected from January through September 2014. The Coalition addressed each of the programmatic questions and included conclusions and recommendations in the Annual Report.

"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 knowingly submitting false information, including the possibility of fine and imprisonment for violations."

This letter will be submitted with an original signature to the CVRWQCB.

Submitted respectfully,

Michael L. Johnson
SJCDWQC Technical Program Manager,
Michael L. Johnson, LLC

Annual Report

San Joaquin County & Delta Water Quality Coalition

January 2014 – September 2014

Submitted May 1, 2015

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LIST OF ACRONYMS

A	Assessment
AG	Agriculture
AI	Active Ingredient
AMR	Annual Monitoring Report
APN	Assessor Parcel Number
AWEP	Agricultural Water Enhancement Program
AQ	Aquatic
BMP	Best Management Practice
BU	Beneficial Use
C	Core
CalPIP	California Pesticide Information Portal
CEDEN	California Environmental Data Exchange Network
COC	Chain of Custody
CURES	Coalition for Urban and Rural Environmental Stewardship
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
DPR	(California) Department of Pesticide Regulation
DQO	Data Quality Objective
DWR	(California) Department of Water Resources
DWSC	Deep Water Ship Channel
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FD	Field Duplicate
HCH	Hexachlorocyclohexane
ILRP	Irrigated Land and Regulatory Program
Koc	Organic Carbon Partitioning Coefficient
LABQA	Laboratory Quality Assurance
LC50	Lethal Concentration at 50% mortality
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
MERP	Mercury Exposure Reduction Program

MLJ-LLC	Michael L. Johnson, LLC
MPM	Management Plan Monitoring
MPN	Most Probable Number
MPUR	Management Plan Update Report
MRP	Monitoring and Reporting Program Order No. R5-2008-0005
MRPP	Monitoring and Reporting Program Plan
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MUN	Municipal and Domestic Supply
MVP	Mid Valley Pesticide
NA	Not Applicable
ND	Not Detected
NM	Normal
NPS	Nonpoint Sources
NRCS	Natural Resource Conservation Service
OP	Organophosphate pesticides
PAM	Polyacrylamide
PCA	Pesticide Control Advisor
pH	Power of Hydrogen
PR	Percent Recovery
PTFE	Polytetraflouroethylene (Teflon™)
PUR	Pesticide Use Report
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
REC 1	Water Contact Recreation
RfD	Reference Dose
RL	Reporting Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SC	Specific Conductance
SD	Standard Deviation
SJCDWQC	San Joaquin County & Delta Water Quality Coalition
SG	Statistically significantly different from control; greater than 80% threshold
SL	Statistically significantly different from control; less than 80% threshold
SOP	Standard operating procedure
SWAMP	Surface Water Ambient Monitoring Program
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen

TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRS	Township, Range, Section
TSS	Total Suspended Solids
TU	Toxic Unit
UC ANR	University of California Division of Agriculture and Natural Resources
UCCE	University of California County Extension
VOA	Volatile Organic Analyte
WQO	Water Quality Objective
WQTL	Water Quality Trigger Limit
YSI	Yellow Springs Instruments

LIST OF UNITS

°C	degrees Celsius
cfs	cubic feet per second
cm	centimeter
dw	dry weight
g	gram
kg	kilogram
L	liter
lbs	pounds
mg	milligram
mL	milliliter
mm	millimeter
MPN/100mL	most probable number per 100 milliliters
ng	nanograms
NTU	Nephelometric Turbidity Units
sec	second
µg	microgram
µg/kg dw	microgram per kilogram of dry weight
µm	micrometer
µmhos	micromhos
µS	microsiemens

LIST OF TERMS

Agricultural Commissioner – County Agriculture Commissioner
ArcGIS – Geographic Information Systems mapping software
Central Valley or Valley – California Central Valley
Coalition –San Joaquin County and Delta Water Quality Coalition
Coalition/SJCDWQC region – The region within the Central Valley that is monitored by the San Joaquin County and Delta Water Quality Coalition
Drainage –Water that moves horizontally across the surface or vertically into the subsurface from land
General Order (WDR) –Waste Discharge General Order R5-2014-0029
Landowners – One or more persons responsible for the management of the irrigated land
Non project QA sample – Sample results from another project other than the Coalition are included to meet laboratory Quality Assurance requirements
Normal Monitoring –Refers to monitoring in the most recent Monitoring and Reporting Program Plan (MRPP).
Regional Board – Central Valley Regional Water Quality Control Board
Site subwatershed – Starting from the sampling site, all waterbodies that drain, directly or indirectly, into the waterbody before the point where sampling occurs.
Special study – A study conducted outside of Normal Monitoring activities that involves monitoring specific constituents in an effort to determine the mechanism responsible for the exceedances; also includes Total Maximum Daily Load (TMDL) monitoring.
Subwatershed – The topographic perimeter of the catchment area of a stream tributary (Environmental Protection Agency (EPA) terms of environment: http://www.epa.gov/OCEPAterms/sterms.html).
Tributary Rule – Beneficial uses for Coalition monitoring sites are applied based on the most immediate downstream waterbody (not applied to constructed agricultural drains such as ones in Delta islands).
Waiver – Central Valley Regional Water Quality Control Board Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order No. R5-2008-0005 amending Order No. R5-2006-0053.
Waterbody –Standing or flowing water of any size that may or may not move into a larger body of water, including lakes, reservoirs, ponds, rivers, streams, tributaries, creeks, sloughs, canals, laterals and drainage ditches.
Watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point (EPA terms of environment: http://www.epa.gov/OCEPAterms/wterms.html).

ANNUAL REPORT REQUIREMENTS – SECTION KEY

REQUIRED SECTION: ANNUAL MONITORING AND MANAGEMENT PLAN UPDATE REPORTS AS OUTLINED IN THE WASTE DISCHARGE REQUIREMENTS GENERAL ORDER (WDR OR GENERAL ORDER) FOR GROWERS WITHIN THE SAN JOAQUIN AND DELTA AREA (ORDER NO. R5-2014-0029)	SECTION NAME/LOCATION - AMR
1. Signed Transmittal Letter	Cover Letter
2. Title page	San Joaquin County & Delta Water Quality Coalition AMR
3. Table of contents	Table of Contents, List of Tables, List of Figures, List of Appendices
4. Executive Summary	Executive Summary
5. Description of the Coalition Group geographical area	Geographical Area
6. Monitoring objectives and design	Monitoring Objectives and Design
7. Sampling site descriptions and rainfall records for the time period covered under the AMR	Sampling Site Descriptions and Rainfall Records
8. Location map(s) of sampling/monitoring wells, crops and land uses	Sampling Site Descriptions and Rainfall Records, Appendix VII (Land Use Maps)
9. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible	Appendix III (Monitoring Results)
10. Discussion of data relative to water quality objectives/trigger limits, and water quality management plan milestones, Basin Plan Amendment Workplan (BPAW) updates, where applicable	Monitoring Results, Discussion of Results, Conclusions and Recommendations
11. Sampling and analytical methods used	Monitoring Results
12. Associated laboratory and field quality control samples results	Appendix IV (Lab and Field Results)
13. Summary of Quality Assurance Evaluation results (as identified in the most recent version of the third-party's approved QAPP for Precision, Accuracy and Completeness)	Precision, Accuracy, and Completeness
14. Specification of the method(s) used to obtain estimated flow at each surface water monitoring site during each monitoring event	Monitoring Results
15. Summary of exceedances of water quality objectives/trigger limits occurring during the reporting period and surface water related pesticide use information	Quarterly Data Submittals and Quarterly Exceedance Summary
16. Actions taken to address water quality exceedances that have occurred, including but not limited to, revised or additional management practices implemented	Coalition Actions to Address Exceedances of WQOs and Member Actions to Address Exceedances of WQOs
17. Evaluation of monitoring data to identify temporal and spatial trends and patterns	Programmatic Question 3: Spatial Trends Analysis
18. Summary of Nitrogen Management Plan information collected as part of Farm	Summary of Required Grower Submittals

Required Section: Annual Monitoring and Management Plan Update Reports as outlined in the Waste Discharge Requirements General Order (WDR or General Order) for Growers within the San Joaquin and Delta Area (Order No. R5-2014-0029)	Section Name/Location - AMR
Evaluations	
19. Summary of management practice information collected as part of Farm Evaluations	Member Actions Taken to Address Exceedances of WQOs, Appendix V (Pesticide Use Reports),
20. Summary of mitigation monitoring	Summary of Required Grower Submittals
21. Summary of education and outreach activities	Coalition Actions Taken to Address Exceedances of WQOs
22. Conclusions and recommendations	Conclusions and Recommendations

QC- Quality Control
SWAMP- Surface Water Ambient Monitoring Program

MONITORING AND REPORTING PROGRAM PLAN (MRPP) AND QUALITY ASSURANCE PROGRAM PLAN (QAPP) AMENDMENTS

SJCDWQC MRPP and QAPP amendments summary.

Original SJCDWQC MRPP and QAPP Plans submitted August 25, 2008 and approved September 15, 2008.

Item Number	Amendments Descriptions	Date Submitted	MRP Plan/QAPP Page Number	Date Approved
1	Removed sampling sites Stanislaus River Drain @ East Division Ave and Walthall Slough Drain @ Airport Way. Request to exchange sites: Stanislaus River Drain @ South Airport Rd for Walthall Slough @ Woodward Ave.	December 4, 2008	Table 3, Page 28 Figure 12, Page 31 Table 4, Page 36 Figure 13, Page 41 Verbiage, Pages 47-49 Table 6, Page 50 Table 9, Page 55 Verbiage, Page 56 Table 10, Page 58 Table 12, Page 64 Attachment 1	December 17, 2008
2	Request to update Five Mile Slough zone number from 5 to 4; site is represented by Roberts Island Drain @ Holt Rd for TMDL constituent diazinon.	December 4, 2008	Verbiage, Page 56 Table 10, Page 58	December 17, 2008
3	Request to reduce monitoring; Assessment Monitoring modified to include only one Assessment Monitoring location which rotates annually. Corrected Table 12, Page 64 typo indicating organochlorine monitoring at Mokelumne River @ Bruella Rd and Roberts Island Drain @ Holt Rd for 2009.	March 12, 2009	Verbiage, Pages 32-33, 35 Table 9, Page 55 Table 10, Page 58 Table 12, Page 64 Table 20, Page 86	March 30, 2009
4	Request to change monitoring schedule at French Camp Slough @ Airport Way, South Webb Tract to be exchanged for Drain @ Woodbridge.	October 20, 2009	Table 13, Page 71	November 16, 2009
5	Request to submit quarterly monitoring results in electronic format[1]	May 6, 2010	Table 16, Page 85[1]	May 17, 2010
6	Updated MRPP to consolidate all approved amendments since 9/15/2008 MRPP approval. Updates also included typo corrections.	October 20, 2010	Verbiage, Page 8 Table 11, Page 61 Table 13, Page 69	January 18, 2011

Item Number	Amendments Descriptions	Date Submitted	MRP Plan/QAPP Page Number	Date Approved
7	Request to replace sample locations Roberts Island Drain @ Holt Rd and Roberts Island Drain along House Rd and Core site in Zone 4 with Roberts Island @ Whiskey Slough Pump.	December 1, 2011	Verbiage, Page 8 Table 2, Page 10 Verbiage, Page 19 Figure 8, Page 20 Verbiage, Page 32 Table 4, Page 37 Table 5, Page 39 Verbiage, Page 46 Table 6, Page 51 Table 9, Page 55 Verbiage, Page 56	January 12, 2012
8	Request to replace Drain to Bishop Cut @ @ North Rio Blanco Rd with Empire Tract @ 8 Mile Rd.	July 5, 2013	Table 3, Page 28-30 Figure 12, Page 31 Table 4, Page 36-38 Figure 13, Page 41 Verbiage, Page 43 Table 6, Page 50-52 Table 9, Page 55-56	July 7, 2013
9	Request to update the SJCDWQC monitoring strategy for the Sacramento-San Joaquin Delta Chlorpyrifos and Diazinon TMDL with three new compliance monitoring sites.	April 27, 2012	NA	March 15, 2013
Modifications to Original SJCDWQC QAPP Plan				
1	QAPP updated to consolidate all approved amendments since 9/15/2008 QAPP approval. Updates include typo corrections.	October 20, 2010	Verbiage, Page 2 List of Acronyms, Page 6 Figure 1, Page 11 Verbiage, Page 8 Table 5, Page 22 Table 8, Page 26 Table 15, Page 46 Table 16, Page 47 Verbiage, Page 51 Table 17, Page 53 Table 18, Page 55 Table 19, Page 57 Verbiage, Page 58 Figure 4, Page 61 Appendices XI-XXXII Appendices XXXV-XXXVII	January 18, 2011

Item Number	Amendments Descriptions	Date Submitted	MRP Plan/QAPP Page Number	Date Approved
2	QAPP updated method validation package for analysis of pyrethroids in sediment using GC/MS-NCI SIM.	December 6, 2010	Table 2, Page 16 Table 13, Page 42 Table 15, Page 46 Table 16, Page 47	February 18, 2011
3	Request to update QAPP sampling collection, methods and quality control.	November 26, 2012	Verbiage, Page 62 Table 14, Pages 66-69	January 15, 2013
3	Request to update MRPP and associated QAPP sample preservation temperatures to be consistent with EPA method requirements, to update preservation and holding requirements for sediment chemistry and sediment Total Organic Carbon (TOC) analysis, and to update the analytical method for triazines to EPA 8141A.	November 26, 2012	Verbiage, Page 62; Table 12, Page 38; Table 14, Pages 138-160.	January 15, 2013

[1] All deliverables are submitted electronically (Quarterly Monitoring Data Reports, Annual Report/ Management Plan Progress Report).

SJCDWQC MANAGEMENT PLAN UPDATES AND AMENDMENTS

SJCDWQC Management Plan Updates and Amendments Summary.

Item Number	Amendments Descriptions	Date Submitted[1]	Management Plan Page Number	Date Approved
	Original SJCDWQC Management Plan Report	**September 30, 2008**		**January 23, 2009**
1	2009 Management Plan Update Report	April 1, 2009	NA	October 14, 2009
2	Request for additional guidance for Management Plan Update Reports	May 20, 2009	NA	October 22, 2009
3	Request to modify Management Plan schedules	August 3, 2009	NA	December 29, 2009
4	2010 Management Plan Update Report	April 1, 2010	NA	August 24, 2010
5	2010 Management Plan Update Report Addendum to Management Practice Summary section	June 1, 2010	Pages 1-16 of Addendum	August 24, 2010
6	Submittal of updated Addendum to 2010 Management Plan Update Report to correct Exceedance Tally results, Performance Goals table, and Appendix I Site Subwatershed table and verbiage	June 4, 2010	Table 4, page 9, Table 11, page 32-33, Appendix I Table IV-5, pages 102-104	August 24, 2010
7	Request to update Management Plan Performance Goals for 3rd priority	December 14, 2010	NA	January 10, 2011
8	2011 Management Plan Update Report	April 1, 2011	NA	June 8, 2011
9	Request to update Management Plan Performance Goals table for 4th priority	October 24, 2011	NA	November 14, 2011
10	Request to remove constituents from site specific management plans	January 6, 2012	NA	March 22, 2012 April 17, 2012 May 21, 2012
11	2012 Management Plan Update Report	April 1, 2012	NA	June 25, 2012
12	Due to a typo and inconsistency between Figures 1 and 2, follow-up due dates have been updated in Figure 1 to be consistent with the Coalitions approved Performance Goal deadline schedule	April 1, 2012	MPUR 2012, page 18	NA
13	Request to update Management Plan Performance Goals for 5th priority	October 31, 2012	NA	November 6, 2012
14	Request to remove constituents from site specific management plans	November 13, 2012	NA	February 27, 2013
15	Request to extend the MPUR 2013 submittal deadline from April 1, 2013 to April 30, 2013	March 7, 2013	NA	March 15, 2013
16	2013 Management Plan Update Report	April 30, 2013	NA	March 11, 2014
17	Request to update Management Plan Performance Goals for 6th priority	October 16, 2013	NA	November 15, 2013
18	2014 Management Plan Update Report	April 1, 2014	NA	Pending
19	Request to remove constituents from site specific management plans	June 9, 2014	NA	August 22, 2014
20	2008 Management Plan Amendment Request	July 1, 2014	NA	Pending
21	Request to update Management Plan Performance Goals for 7th priority	August 19, 2014	NA	October 10, 2014
	Revised SJCDWQC Management Plan Report	**May 1, 2015**		**Pending**

[1] All deliverables are submitted electronically (quarterly monitoring data reports, Annual Monitoring Report, Annual Management Plan Update Report) .
NA-Not applicable.

I. EXECUTIVE SUMMARY

The San Joaquin County and Delta Water Quality Coalition (SJCDWQC or Coalition) is submitting its Annual Monitoring Report and Management Plan Update Report (MPUR) as a single Annual Report on the status and methods used to 1) identify agriculture sources of discharges resulting in exceedances of Water Quality Trigger Limits (WQTL), 2) track implemented management practices, and 3) document progress toward meeting its performance goals as outlined in the SJCDWQC Surface Water Quality Management Plan. An Annual Report is to be submitted every May 1 to report the previous Water Year's (WY) monitoring results, outreach activities, and update management plan implementation schedules and timelines for reporting to the Central Valley Regional Water Quality Control Board (CVRWQCB or Regional Board).

This is the sixth yearly update report to the Coalition's Management Plan. In this report, previous year's monitoring data are reviewed and assessed for exceedances and water quality improvements. This update includes an assessment of water quality based on January through September 2014 monitoring results, including new exceedances and new site/constituents requiring management plans.

The San Joaquin County and Delta Water Quality Coalition (SJCDWQC) area includes San Joaquin County as well as portions of Contra Costa, Alameda, Calaveras, and Stanislaus Counties. There are three major rivers in the Coalition region other than the San Joaquin River: the Stanislaus River, the Calaveras River, and the Mokelumne River. The eastern boundary of the Coalition area is the crest of the Sierra Nevada, and the drainage area is bordered by the San Joaquin River to the west, the Stanislaus River to the south, and the Mokelumne River to the north.

The Coalition area is divided into six zones based on hydrology, crop types, land use, soil types, and precipitation. Zone names are based on the Core Monitoring location within that zone: 1) Mokelumne River @ Bruella Rd Zone, 2) French Camp @ Airport Way Zone, 3) Terminous Tract Drain @ Hwy 12 Zone, 4) Roberts Island @ Whiskey Slough Pump Zone, 5) Lower San Joaquin Zone, and 6) Contra Costa Zone. A Core Monitoring location was not established in Zone 5 until October 2008, therefore Zone 5 is not named after the Core Monitoring location (Walthall Slough @ Woodward Ave); the zone's name remains the Lower San Joaquin Zone. Due to increased urbanization in Contra Costa County and lack of agriculture in the southern portion of the zone, Zone 6 does not contain a Core or Assessment Monitoring location.

As required by the WDR (Page 6, Attachment B), monitoring occurred in the Coalition region from January through September 2014 according to the 2008 MRP (approved September 15, 2008). Based on the 2008 SJCDWQC MRP design, each zone in the SJCDWQC monitoring program includes a Core site and rotating Assessment site. Core sites establish trends in water quality and will be monitored continuously during the life of the Conditional Waiver program. There are fewer constituents monitored at Core Monitoring locations (primarily physical parameters and nutrients). Assessment Monitoring

locations characterize discharge in the zone in which they are located. Assessment Monitoring includes a larger suite of constituents than Core Monitoring. Assessment sites are rotated every year across the Coalition region. Core sites are monitored for Assessment constituents according to the rotating schedule outlined in the Monitoring and Reporting Program Plan (MRPP, Pages 53-55).

Monitoring Program Objectives

The primary objectives of the monitoring program are to characterize discharge from irrigated agriculture and to determine if the implementation of management practices can be effective in reducing or eliminating discharge and impairments of beneficial uses. In order to achieve the Normal Monitoring objectives, the Coalition monitored 18 sites from January through September 2014. Of these 18 sites, MPM took place at 15 sites as outlined in the 2014 SJCDWQC Management Plan Update Report (MPUR). The Coalition monitored eight of the 15 sites for MPM only, while all six Core sites were monitored for management plan constituents, and two management plan sites were also Assessment Monitoring sites where management plan constituents were sampled on a monthly basis.

MPM was conducted for copper, lead, chlorpyrifos, diazinon, dimethoate, diuron, and water column toxicity to *Ceriodaphnia dubia, Selenastrum capricornutum,* and sediment toxicity to *Hyalella azteca.*

From January through September 2014, monitoring parameters and constituents included 45 pesticides, *E. coli*, physical parameters (total dissolved solids (TDS), total suspended solids (TSS), and turbidity), nine metals, total organic carbon (TOC), five nutrients, field parameters (dissolved oxygen (DO), Power of Hydrogen (pH), specific conductivity (SC), water column toxicity to *Ceriodaphnia dubia*, *Pimephales promelas, Selenastrum capricornutum,* and sediment toxicity to *Hyalella azteca*. Monitoring constituents are established by the Irrigated Lands Regulatory Program (ILRP) Monitoring and Reporting Program (MRP) Order No. R5-2008-0005 (Table 11, Pages 61-63).

Monitoring Program Compliance

From January through September 2014, the Coalition was able to meet the monitoring program objectives by

1) Determining the concentration and load of specific contaminants in discharges to surface waters.
2) Evaluating compliance with existing narrative and numeric WQTLs to determine if additional management practices are necessary to protect water quality.
3) Assessing the impact of discharges from irrigated agriculture to surface water.

Coalition monitoring, conducted from January through September 2014, resulted in exceedances of WQTLs for field parameters, ammonia as N, arsenic, dichlorvos, diuron, molybdenum, simazine, and water column toxicity to *C. dubia* and *S. capricornutum*. Exceedances of the WQTLs for physical parameters, *E. coli*, and arsenic were the most common during January through September 2014 monitoring.

The series of actions taken to determine the potential sources of exceedances include: 1) the use of Pesticide Use Reports (PUR) to identify relevant applications that occurred upstream of the sample site and within a specified time period prior to the sampling event, and 2) an analysis of monitoring data and toxicity results to better understand the potential sources and toxicity of detected constituents.

As a result of January through September 2014 monitoring, several new site/constituent specific management plans are required including:

- DO
  - Bacon Island Pump @ Old River
  - Kellogg Creek along Hoffman Ln (reinstated management plan)
- SC
  - Bacon Island Pump @ Old River
  - Empire Tract @ 8 Mile Rd
- *E. coli*
  - Bacon Island Pump @ Old River
- Arsenic
  - Bacon Island Pump @ Old River
- Diuron
  - French Camp Slough @ Airport Way (reinstated management plan)
- *S. capricornutum* Toxicity
  - French Camp Slough @ Airport Way (reinstated management plan)
  - Mokelumne River @ Bruella Rd (reinstated management plan)

Focused Outreach and Education

The Coalition prioritizes subwatersheds in order to conduct focused outreach with individual members. The purpose of grower outreach is to review current farm management practices, determine if additional management practices could be implemented, and document implementation of any new practices.

In 2014, the Coalition completed focused outreach for all site subwatersheds within the first through fourth priorities. Focused outreach to document current management practices and track implementation of additional management practices occurred for site subwatersheds in the first priority set from 2008 through 2010, in the second priority set from 2010 through 2012, in the third priority set from 2011 through 2013, and in the fourth priority from 2012 through 2014.

The Coalition completed initial and follow-up surveys with 100% of targeted growers in all site subwatersheds in the first through fourth priority sets. Due to continued water quality impairments in the first and second priority site subwatersheds, particularly exceedances of the WQTL for chlorpyrifos, the Coalition initiated additional outreach in 2012 (complete summary in 2013 MPUR). Follow-up surveys were sent to all targeted growers who indicated the intention to implement new management practices in 2009 for first priority, 2010 for second priority, 2012 for third priority, and 2013 for fourth

priority site subwatersheds. The analyses of implemented management practices can be found in the 2011 MPUR (Pages 43-71) for first and second priority site subwatersheds, in the 2013 MPUR (Pages 56-65) for third priority site subwatersheds, and in the 2014 MPUR (Pages 43-55) for fourth priority site subwatersheds.

The Coalition continued focused outreach and management practice tracking in the fifth set of high priority site subwatersheds (2013-2015) and completed initial contact meetings in 2013 and follow-up surveys with 100% of targeted growers in 2014; a complete analysis of outreach and follow-up results is included in this report. In the lone sixth priority subwatershed, Drain @ Woodbridge Rd (2014-2016), the Coalition mailed follow-up surveys on February 27, 2015 and expect all surveys returned by the end of 2015. A final analysis of outreach and follow-up results will be provided in next year's (2016) Annual Report.

Conclusions

The results of the monitoring program for 2014 indicate that although there were substantial improvements in water quality in many site subwatersheds; water quality is still not protective of beneficial uses across the entire Coalition region. The most common exceedances of WQTLs were physical parameters such as DO, TDS, and SC which resulted in impaired Agricultural and Aquatic Life beneficial uses. Exceedances of the WQTL for *E. coli* contributed to impaired Recreational beneficial uses. The primary cause of impairment to Municipal beneficial use (drinking water) was exceedances of the WQTLs for arsenic.

Discharges from irrigated lands are only one of many possible sources of impairments to beneficial uses. For many parameters, it is not clear to what extent WQTL exceedances are the results of current agricultural activities. Source identification is difficult for non-conserved constituents, especially those that are untraceable upstream e.g. DO. Furthermore, samples collected from locations in the Delta resulted in numerous exceedances of the WQTLs for SC and TDS. These elevated detections are the result of the mixing of high salt content waters in the Delta.

Pesticide detections are the result of agricultural applications that enter surface waters due to spray drift or runoff from storm or irrigation water return flows; pesticide and herbicide detections could also result from urban applications such as household insect repellents. In the event of exceedances of the WQTLs of pesticides or toxicity, the Coalition identifies sources of the constituents with exceedances of WQTLs through the analysis of preliminary PUR data, assessment of water quality data, and evaluation of current management practices of targeted growers. The Coalition's sourcing strategy is further described in the Coalition's Management Plan.

The Coalition's outreach program is conducted through meetings across the Coalition region. Management practice information is provided by the Coalition in several forums, which range from smaller meetings to large meetings sponsored by the County Agricultural Commissioner. Monitoring data from 2014 indicate the Coalition's outreach strategy efforts improved water quality in the first through fifth high priority subwatersheds.

Based on the information provided in the report below, the Coalition will pursue the following in 2015:

1. Continue the current monitoring strategy as outlined in the SJCDWQC MRPP and Management Plan to evaluate water quality improvements and impairments.
2. Continue to document and assess management practices implemented by Coalition growers.
3. Continue to focus outreach and education efforts around high priority constituents while also educating growers about lower prioritized constituents to further improve water quality.

The Coalition identified several areas in which Regional Board involvement could result in improvement in water quality in the SJCDWQC region:

4. Identify and regulate dairies within priority subwatersheds that are using constituents of concern that could be affecting downstream beneficial uses.
5. Develop and deploy methods to monitor illegal dairy discharges and notify the Coalition of any known dairy discharges that may result in water quality impairments including nutrient and *E. coli* exceedances.
6. Continue enforcement actions against non-members who have the potential to discharge.
7. Move forward with the processes to develop plans to study constituents that are difficult to source such as contamination of surface waters with *E. coli*, causes of elevated pH, and low DO.
8. Continue to follow the CV-SALTS process to develop a better understanding of the sources and sinks of salt in surface and groundwater, and identify potential practices that can be effective in preventing exceedances.

II. INTRODUCTION

As outlined in the Waste Discharge Requirements General Order for Growers within the San Joaquin County and Delta Area (WDR or General Order; Order No. R5-2014-0029), the San Joaquin County and Delta Water Quality Coalition (SJCDWQC or Coalition) is submitting an Annual Report for monitoring results from January through September of the 2014 (the monitoring period did not include an entire water year). Results from October through December 2013 were included in the SJCDWQC Annual Monitoring Report submitted under the previous Monitoring and Reporting Program (MRP) Order No. R5-2008-0005 on March 1, 2014.

The 2015 Annual Report is the first report submitted by the SJCDWQC reporting on the monitoring activities under the WDR. The Annual Report includes sections which address the reporting requirements for the Monitoring Report (Attachment B to General Order R5-2014-0029) and Management Plan Progress Report (Appendix MRP-1). The Annual Report Requirements – Section Key (page xiii) lists the required components from both reports and in which section of this report they are found. The Annual Report includes the previous WY monitoring results and activities as well as the status of management plan implementation schedules and timelines in order to determine whether discharges from irrigated lands are protective of beneficial uses meeting water quality objectives as well as whether management practices implemented by irrigated agriculture are effective (Attachment A to Order R5-2014-0029-R1, Pages 12-13).

III. SJCDWQC GEOGRAPHICAL AREA

III. A. IRRIGATED LAND

Although exact acreage was difficult to estimate due to rapidly changing land use, the Coalition area contained approximately 1,478,985 acres of which 608,914 acres (41%) were considered irrigated agriculture (Table 2). To obtain irrigated acreages, the Coalition used data from two California Department of Water Resources (DWR) sources: 1) DWR Agricultural Land and Water Use data and 2) DWR Land Use Survey.

Agricultural Land and Water Use data (DWR, http://www.water.ca.gov/landwateruse/anaglwu.cfm) were used to estimate the acreage of irrigated crops for the entirety of each county. Land Use Survey data (DWR, http://www.water.ca.gov/landwateruse/lusrvymain.cfm) included more detailed information regarding specific crop uses (both irrigated and non-irrigated) than the Agricultural Land and Water Use data, but was updated less often. Because Land Use Survey data were available in GIS shape files, the information was mapped to the Coalition area and used for estimates of irrigated crop acreage. The data source depended on: 1) whether or not the entire county was within the Coalition boundary, and 2) which data were developed most recently.

For Alameda, Calaveras, Contra Costa, and Stanislaus Counties, the Coalition utilized DWR Land Use Survey data to determine irrigated land area because only sections of these counties were included in the Coalition boundary. For San Joaquin County, data from Agricultural Land and Water Use were used as all of San Joaquin County was encompassed in the Coalition boundary (Table 1).

Table 1. Acreage of irrigated land in SJCDWQC counties and available DWR data.

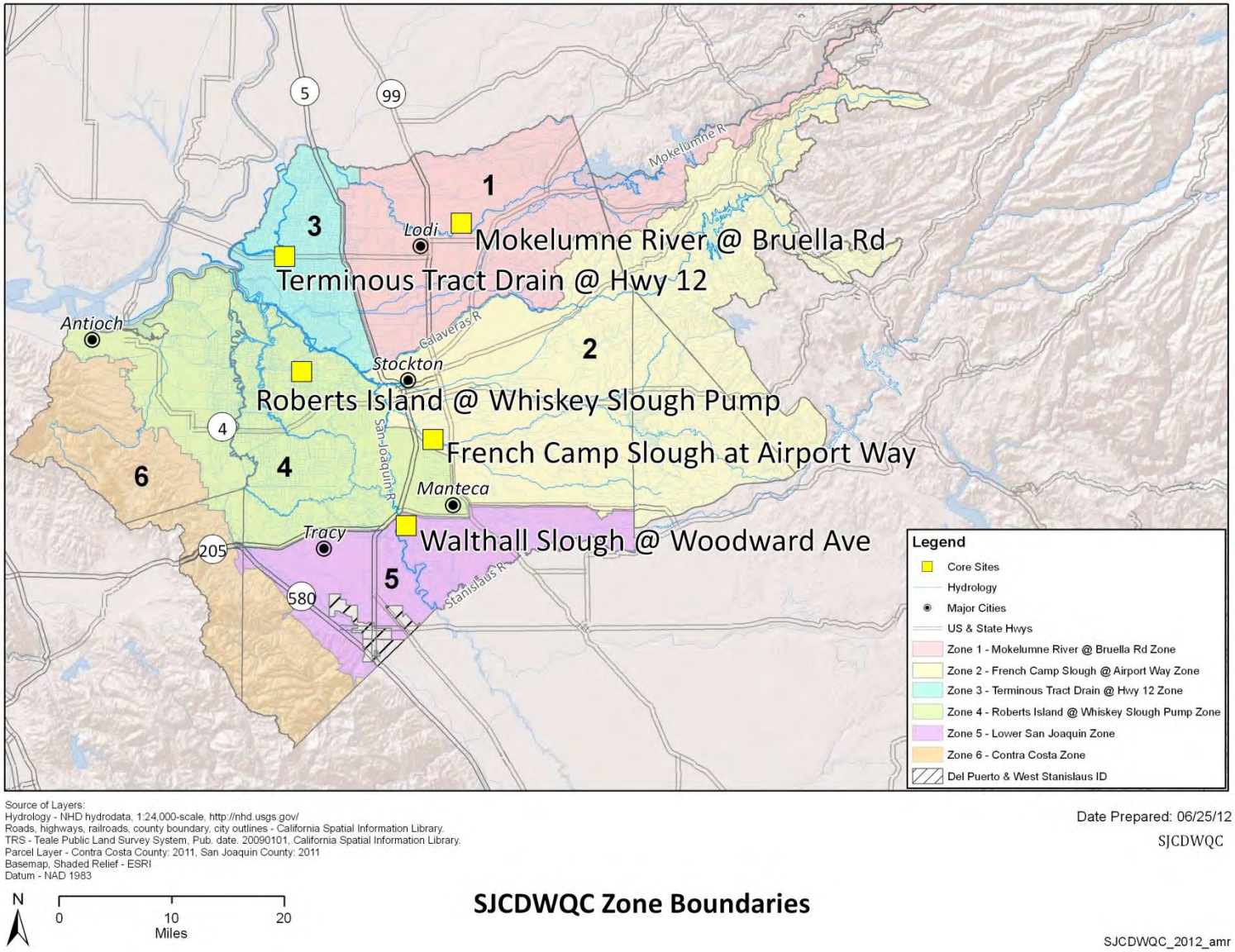
County	Total County Acreage (DWR Land Use)	County Irrigated Land Acreage (Land Use or Land and Water Use)	Data Source Year (Agricultural Land and Water Use)[1]	Data Source Year (Land Use Survey)[2]
Alameda	46,428	912		2006
Calaveras	237,690	1,098		2000
Contra Costa	184,679	48,925		1995
San Joaquin	912,481	539,000	2005	
Stanislaus	97,707	18,979		2004
Total	**1,478,985**	**608,914**		

[1]DWR Agricultural Land Use: http://www.water.ca.gov/landwateruse/anaglwu.cfm
[2]DWR Land Use Survey: http://www.water.ca.gov/landwateruse/lusrvymain.cfm

III. B. GEOGRAPHICAL CHARACTERISTICS AND LAND USE

In the 2008 MRPP, the Coalition area was divided into six zones to facilitate the implementation of a comprehensive monitoring program (Figure 1). These zones were based on hydrology, crop types, land use, soil types, and rainfall. Zone acreages were calculated using Land Use Survey Data (Table 2). Zone names were based on the Core Monitoring locations within the zone (except for zone 6): 1) Mokelumne River @ Bruella Rd Zone, 2) French Camp @ Airport Way Zone, 3) Terminous Tract Drain @ Hwy 12 Zone, 4) Roberts Island @ Whiskey Slough Pump Rd Zone, 5) Walthall Slough @ Woodward Ave, and 6) Contra Costa Zone. A Core site was not established in Zone 5 until October 2008, therefore Zone 5 was not named after the Core Monitoring location (Walthall Slough @ Woodward Ave); the zone's name remains the Lower San Joaquin Zone. Descriptions of zone-specific climate, water drainage and flow, soil characteristics, and land use were included in the Coalition's Monitoring and Reporting Program Plan (MRPP Pages 10-25). Land use maps for each zone are included in Figures 2 through 7.

Figure 1. SJCDWQC zone boundaries and Core sites.



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.
TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.
Parcel Layer - Contra Costa County: 2011, San Joaquin County: 2011
Basemap, Shaded Relief - ESRI
Datum - NAD 1983

Date Prepared: 06/25/12
SJCDWQC

N
0 10 20
Miles

SJCDWQC Zone Boundaries

SJCDWQC_2012_amr

Table 2. SJCWQC 2014 total and irrigated acreages for Zones 1-6.

Zones	Total Acres[1] (from ArcGIS)	Irrigated Acres[2] (from Land Use)
Zone 1: Mokelumne River @ Bruella Rd Zone	268,792	109,510
Zone 2: French Camp Slough @ Airport Way Zone	514,151	171,378
Zone 3: Terminous Tract Drain @ Hwy 12 Zone	88,019	70,704
Zone 4: Roberts Island @ Whiskey Slough Pump Zone	283,496	186,379
Zone 5: Walthall Slough @ Woodward Ave Zone	139,696	95,648
Zone 6: Contra Costa Zone	185,583	428
Total	**1,479,737**	**634,047**

[1]Total zone acreages calculated using ArcGIS. Total acres in Table 3 versus the amount reported elsewhere may differ.
[2]Irrigated acreage for each zone does not equal the sum of irrigated acres for all SJCDWQC counties due to differences in acreage sources obtained between the county DWR Land Use layers and the Agricultural Land and Water Use estimates for 2001.

Figure 2. Mokelumne River @ Bruella Rd Zone (Zone 1) Land Use.

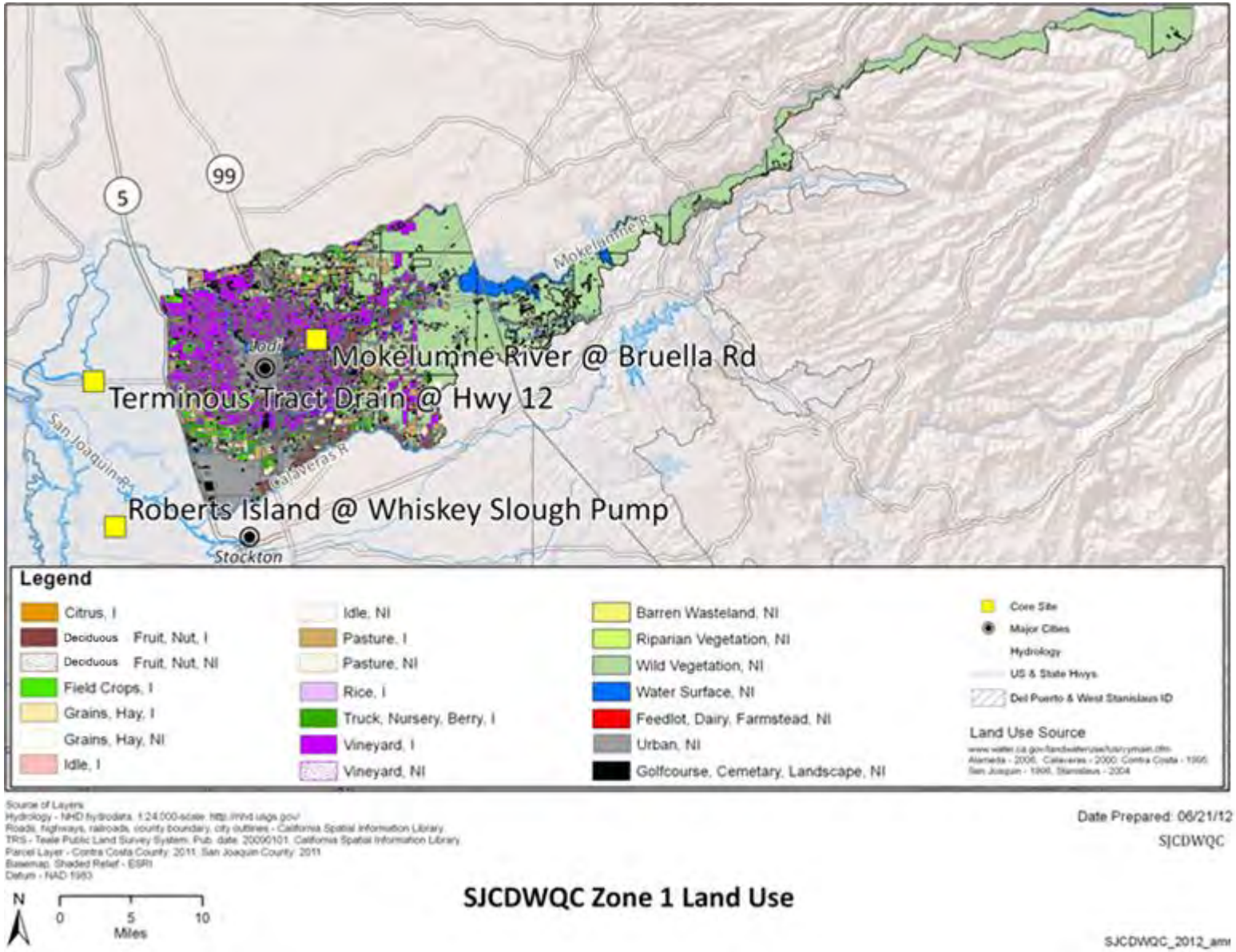


Figure 3. French Camp Slough @ Airport Way Zone (Zone 2) Land Use.

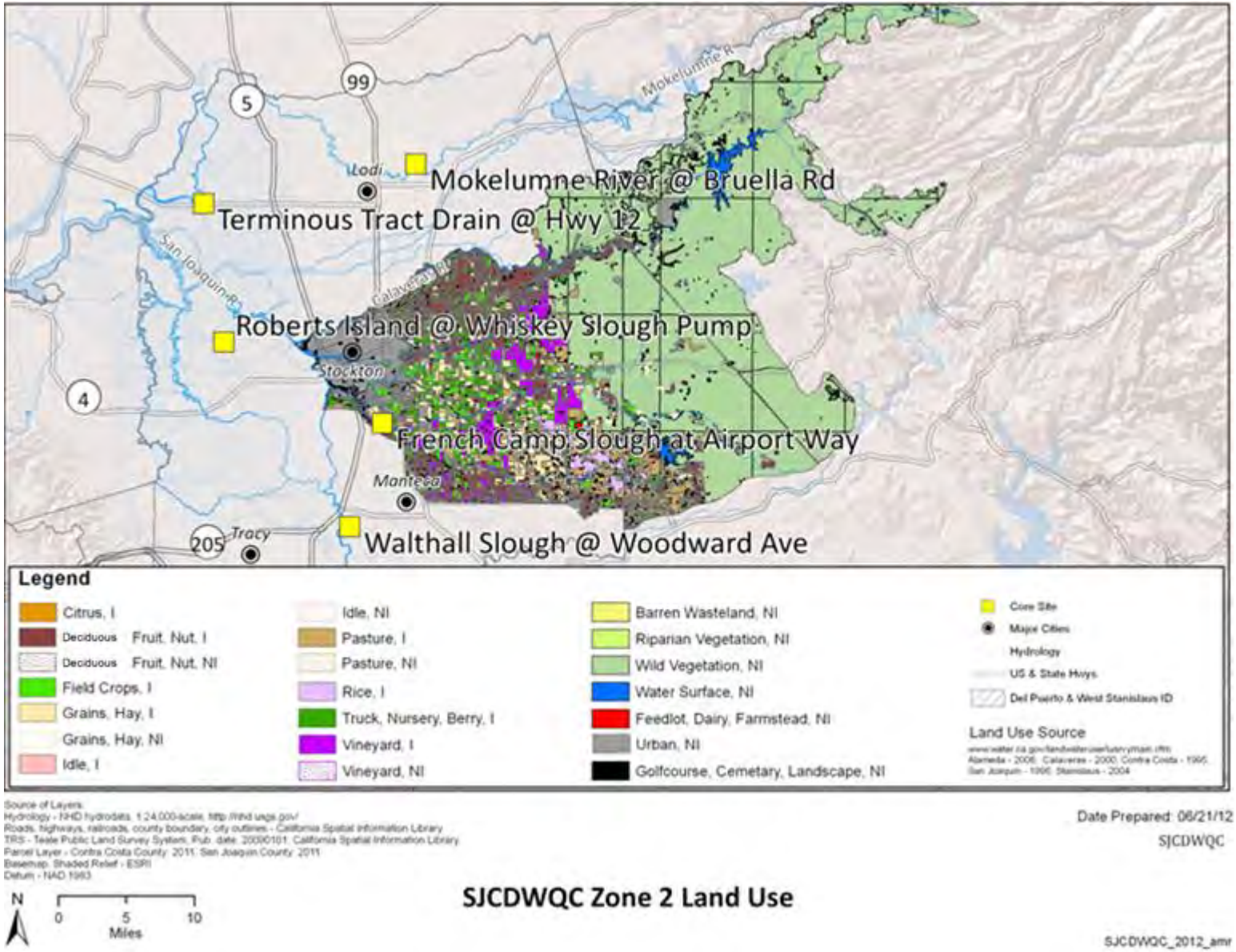


Figure 4. Terminous Tract @ Hwy 12 Zone (Zone 3) Land Use.

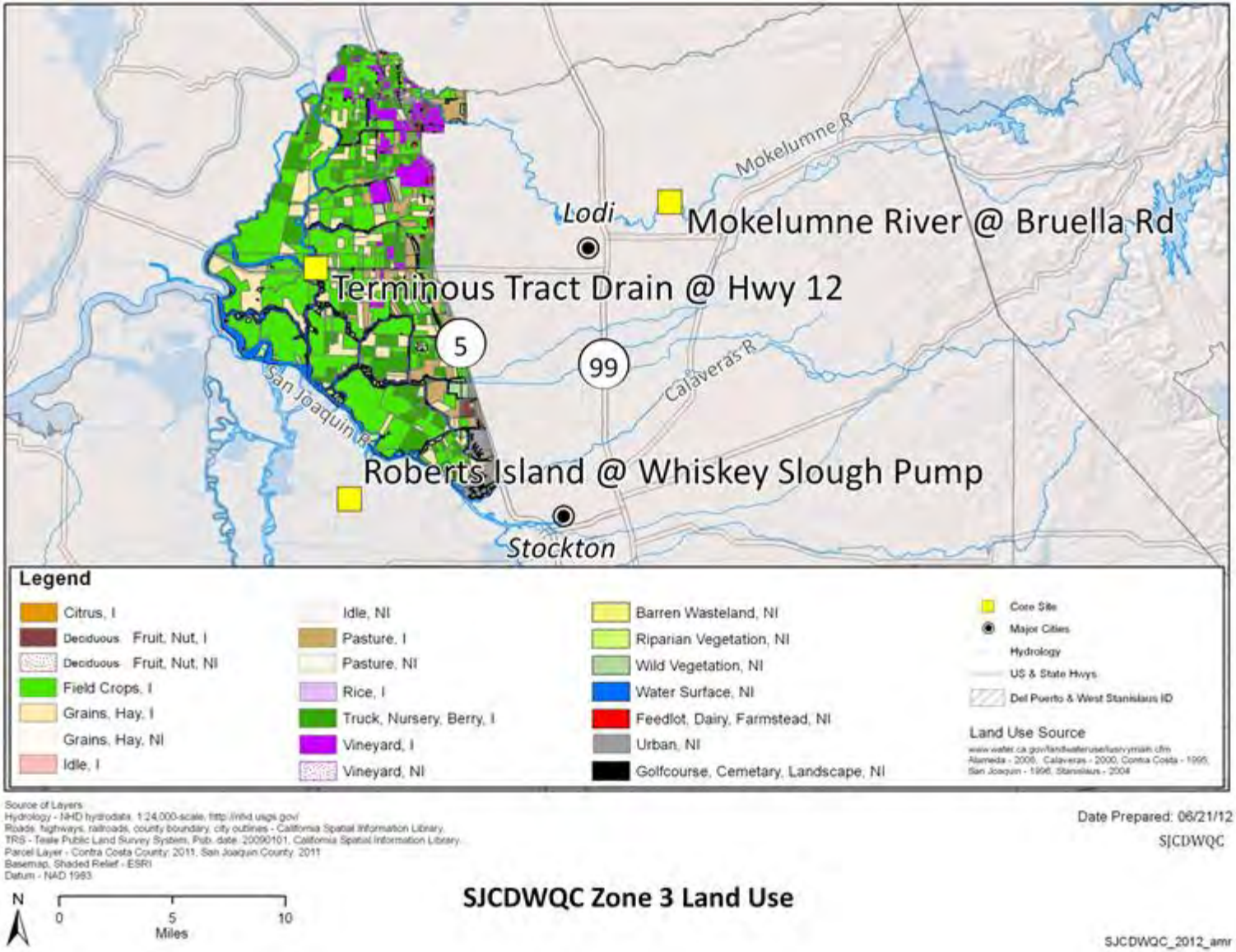


Figure 5. Roberts Island @ Whiskey Slough Pump Zone (Zone 4) Land Use.

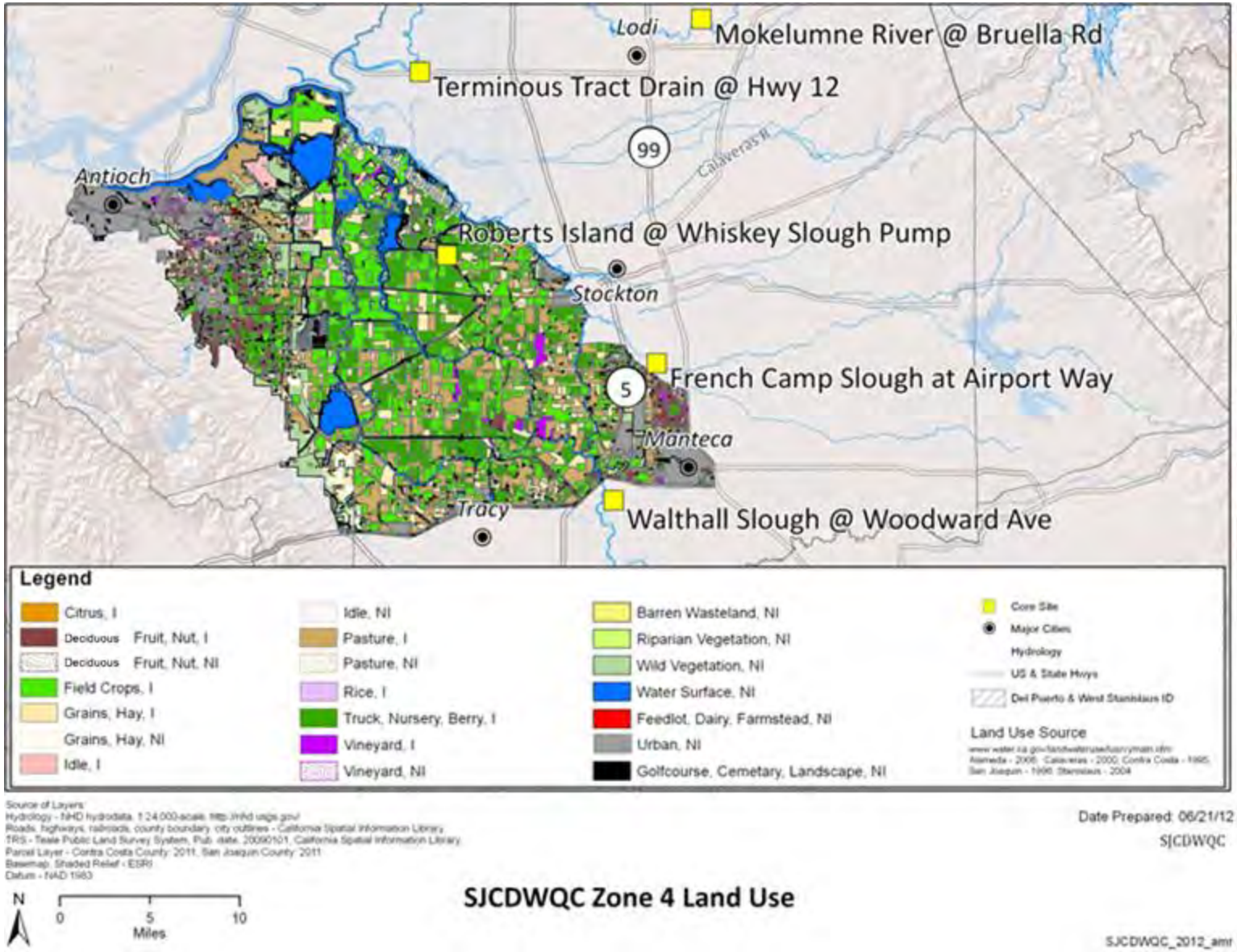


Figure 6. Lower San Joaquin Zone (Zone 5) Land Use.

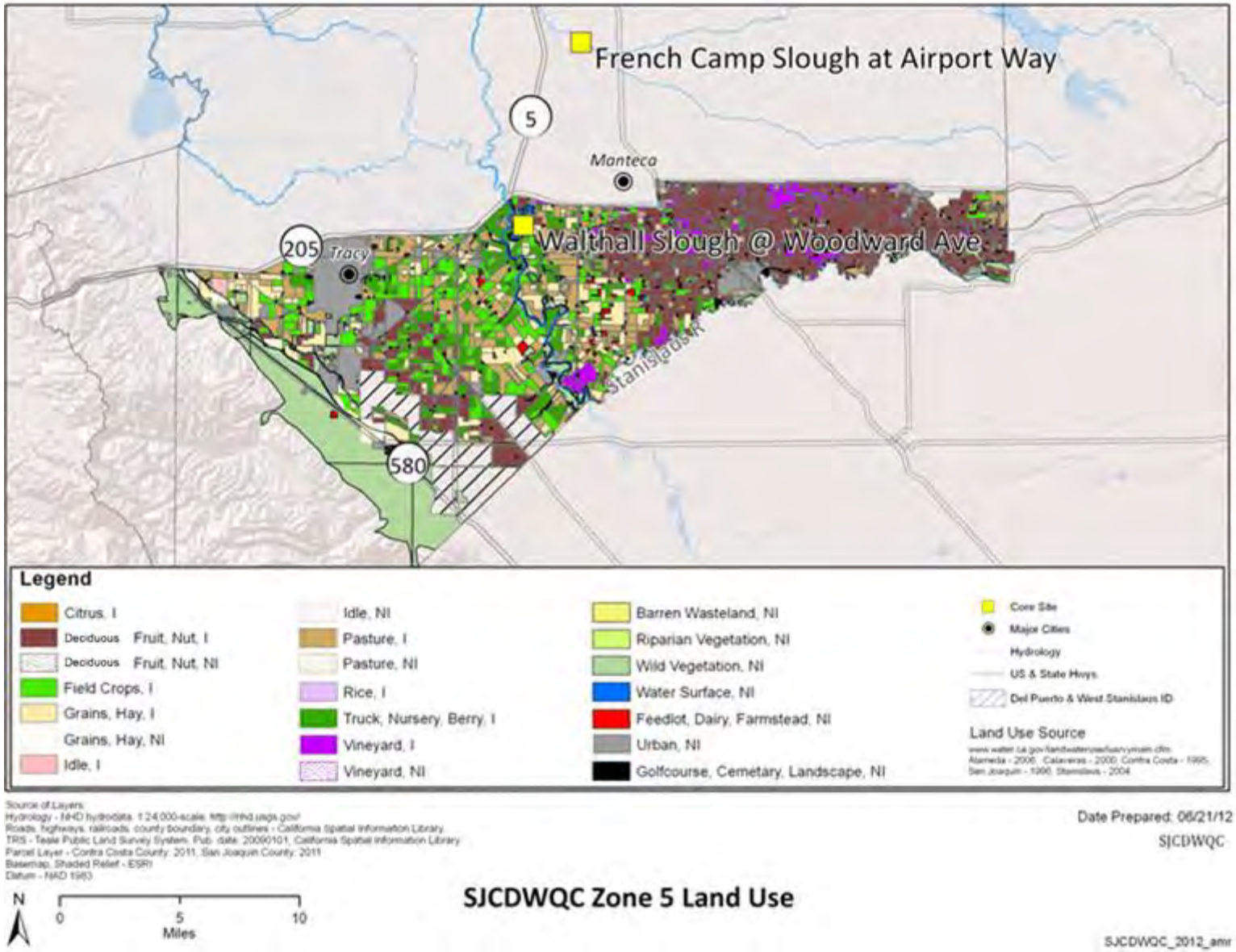
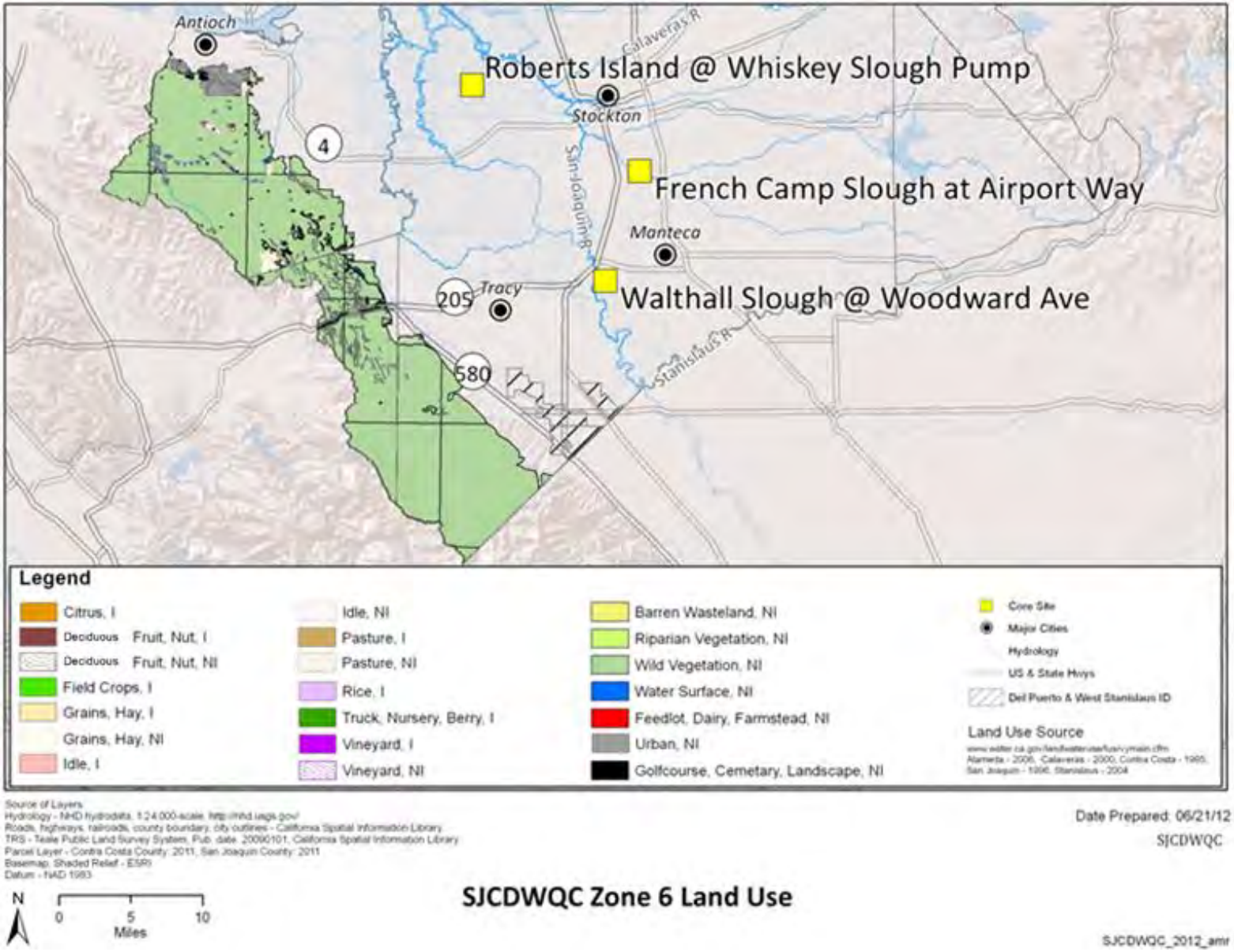


Figure 7. Contra Costa Zone (Zone 6) Land Use.



IV. SAMPLE SITE DESCRIPTIONS

The site names, zones, sample types, station codes, and locations of all sites monitored from January through September 2014 are provided in Table 3. Land use for each site subwatershed monitored from January through September 2014 is listed in Table 4.

A narrative description of each site subwatershed with respect to hydrology and agricultural production follows below. Location maps of sampling sites, crops and land uses are provided in the Land Use Maps Appendix VIII. Site summaries include information on monitoring and focused outreach activities for each site subwatershed.

Rainfall data for the SJCDWQC region for January through September 2014 are described in the "Rainfall Records" section of this report.

IV. A. SAMPLE SITE LOCATIONS

All site subwatersheds (Assessment, Core, and MPM) monitored from January through September 2014 are mapped in Figure 8 along with zone boundaries. The Figure 9 map includes the SJCDWQC four Diazinon and Chlorpyrifos TMDL compliance monitoring locations. Land use maps for all site subwatersheds are located in Appendix VIII.

Figure 8. SJCDWQC January through September 2014 monitoring sites and zone boundaries.

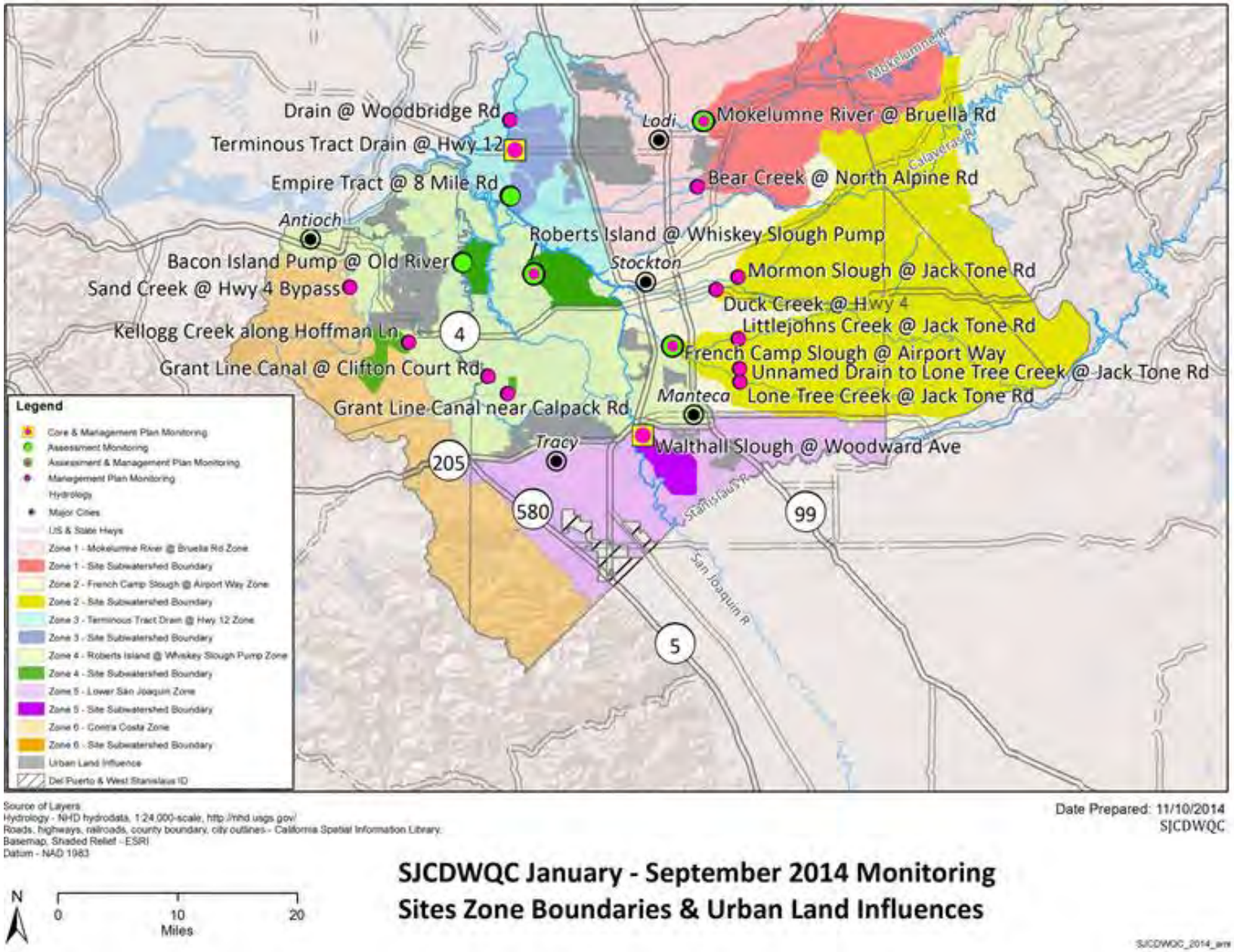


Figure 9. SJCDWQC January through September 2014 Chlorpyrifos and Diazinon TMDL compliance locations.

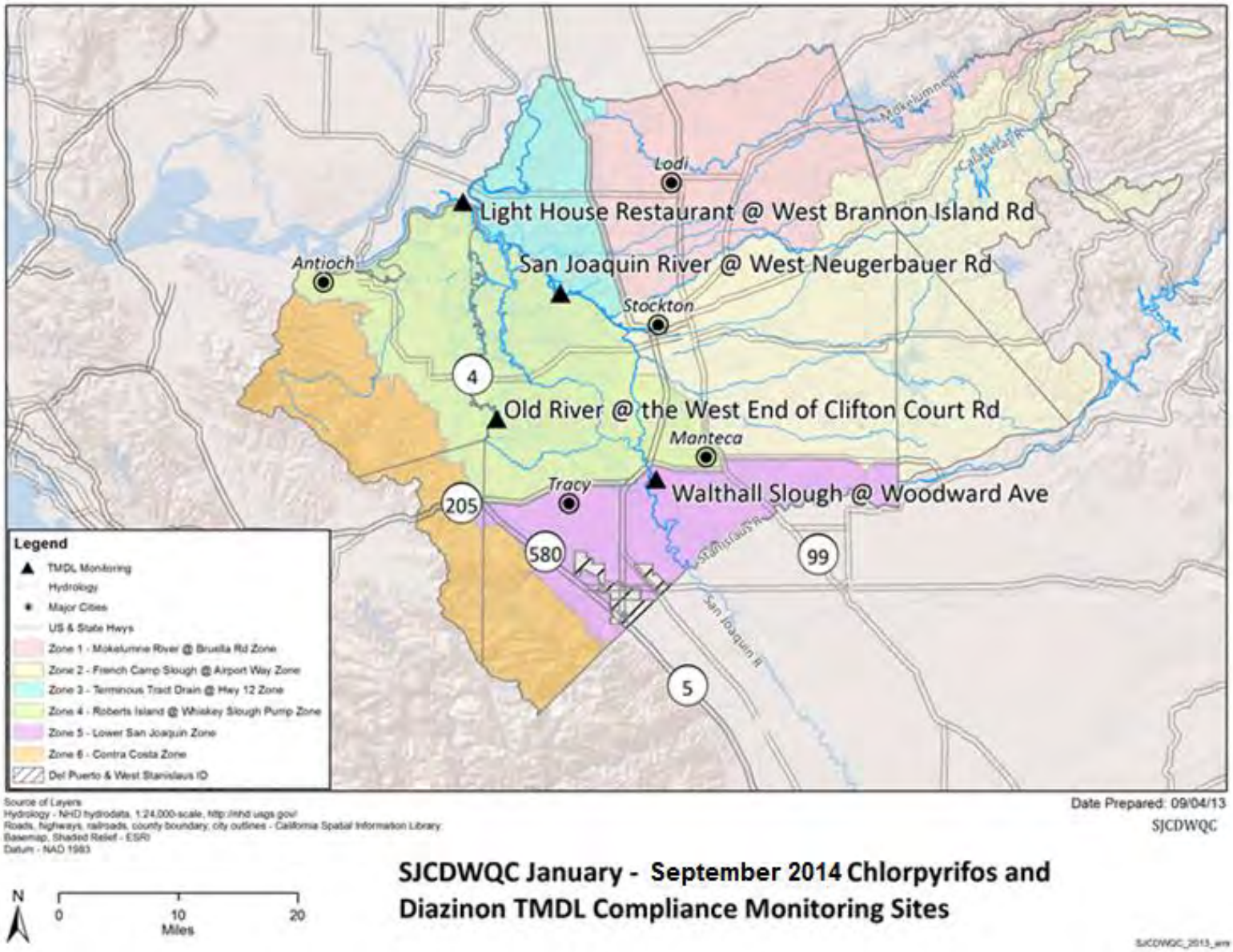


Table 3. SJCDWQC January through September 2014 sample locations (sorted by zone and site).

Zone	Site Type[1]	January-September 2014 Monitoring	Site Name	Station Code	Latitude	Longitude
Zone 1	Assessment	MPM	Bear Creek @ North Alpine Rd	531BCANAR	38.07386	-121.21215
	Core	A, MPM	Mokelumne River @ Bruella Rd	531XMRABR	38.16022	-121.20643
Zone 2	Assessment	MPM	Duck Creek @ Hwy 4	531XDCAHF	37.94949	-121.18208
	Core	A, MPM	French Camp Slough @ Airport Way	531SJC504	37.88172	-121.24933
	Assessment	MPM	Littlejohns Creek @ Jack Tone Rd	531XLCAJR	37.88958	-121.14727
	Assessment	MPM	Lone Tree Creek @ Jack Tone Rd	531XLTCJR	37.83754	-121.14460
	Assessment	MPM	Mormon Slough @ Jack Tone Rd	544MSAJTR	37.96470	-121.14880
	Assessment	MPM	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	531UDLTAJ	37.85360	-121.14570
Zone 3	Assessment	MPM	Drain @ Woodbridge Rd	544DAWRXX	38.15246	-121.50220
	Assessment	A	Empire Tract @ 8 Mile Rd[2]	544ETAEMR	38.06012	-121.49912
	Core	C, MPM	Terminous Tract Drain @ Hwy 12	544XTTHWT	38.11558	-121.49380
Zone 4	Assessment	A	Bacon Island Pump @ Old River	544BIPAOR	37.97916	-121.57023
	Assessment	MPM	Grant Line Canal @ Clifton Court Rd	544XGLCAA	37.84182	-121.52999
	Assessment	MPM	Grant Line Canal near Calpack Rd	544XGLCCR	37.82084	-121.50009
	Assessment	MPM	Kellogg Creek along Hoffman Ln	544XKCAHL	37.88188	-121.65221
	Core	A, MPM	Roberts Island @ Whiskey Slough Pump	544RIAWSP	37.96737	-121.46434
Zone 5	Core	C, MPM, TMDL	Walthall Slough @ Woodward Ave	544WSAWAV	37.77046	-121.29227
Zone 6	NA	MPM	Sand Creek @ Hwy 4 Bypass	544SCAHFB	37.94750	-121.74300
NA	TMDL	TMDL	Light House Restaurant @ West Brannon Island Rd	510LHRWBI	38.10487	-121.59299
NA	TMDL	TMDL	Old River @ the West End of Clifton Court Rd	544ORAWCC	37.84195	-121.53721
NA	TMDL	TMDL	San Joaquin River @ West Neugerbauer Rd	544SJCAWN	37.99493	-121.44173

A-Assessment Monitoring
C-Core Monitoring
MPM-Management Plan Monitoring
NA-Not Applicable; site is not a Core Site and no Assessment Monitoring takes place in the zone.
TMDL-Total Maximum Daily Load monitoring
[1] Site types are either Assessment or Core based on the MRPP (Pages 33-35).
[2] Assessment Monitoring at Empire Tract @ 8 Mile Rd (July through December 2013) replaced monitoring at Drain to Bishop Cut @ North Rio Blanco Rd (January through March 2013) beginning in July.

Table 4. SJCDWQC land use acreage of site subwatershed and TMDL compliance locations, January through September 2014.

Land uses designated as irrigated/non-irrigated (I/NI), sites listed alphabetically from Bacon Island Pump @ Old River to Walthall Slough @ Woodward Ave; numbers are rounded to nearest whole number.

Land Use*	I/NI	Bacon Island Pump @ Old River	Bear Creek @ North Alpine Rd	Drain @ Woodbridge Rd	Drain to Bishop Cut @ North Rio Blanco Rd	Duck Creek @ Hwy 4	Empire Tract @ 8 Mile Rd	French Camp Slough @ Airport Way	Grant Line Canal near Calpack Rd	Grant Line Canal @ Clifton Ct	Kellogg Creek along Hoffman Ln	Light House restaurant @ West Brannon Island Rd	Littlejohns Creek @ Jack Tone Rd	Lone Tree Creek @ Jack Tone Rd	Mokelumne River @ Bruella Rd	Mormon Slough @ Jack Tone Rd	Old River @ the West End of Clifton Rd	Roberts Island @ Whiskey Slough Pump	San Joaquin river @ West Neugerbauer rd	Sand Creek @ Hwy 4 Bypass	Terminous Tract @ Hwy 12	Unnamed Drain to Lone Creek @ Jack Tone Rd	Walthall Slough @ Woodward Ave
Citrus	I		63					11			4	39		5	5	234		39	418			6	
Citrus	NI															33			33				
Deciduous Nut And Fruit	I		3217	5	5	1871		13185			902	940	2587	6949	2537	11687	969	13	86028	39		1471	835
Deciduous Nut And Fruit	NI		19												4	2			2	5			
Field Crop	I	3149	1282	2309	488	2336	2234	8627	184	25	225	45051	2220	1887	519	1290	14021	4357	30012		5032	3229	1311
Grain And Hay	I	852	1277	761	78	3428	664	14292	49	235		16297	3589	2698	79	2159	8214	2297	34956	70	2051	4533	2552
Grain And Hay	NI		480			44		1332					977	272	2	138	2083		1915	12		80	
Idle	I	14	756			91		697			161	2142	85	245	453	453	474	18	3880	9	34	325	57
Idle	NI		102					42											104			42	
Barren Wasteland	NI	13										60			11	710			741				
Riparian Vegetation	NI		92				53	261			5	3608	235	6	311	56	324	65	1382		23	19	37
Wild Vegetation	NI	358	45773	229	96	17757	136	106211	2		5329	10270	92625	2016	15105	70931	6836	611	244870	7010	272	14101	437
Water Surface	NI	7	501		5	67	52	1720			16	16814	183	95	4410	617	2120	362	7333		221	1433	190
Pasture	I		6005	650	66	1698		25777	423	0.5	52	5880	3047	11071	843	2351	17070	2159	48715		988	8711	2706
Pasture	NI		6					166					46	120		21			242			30	
Rice	I							7017				13	244	1577					7025			5025	
Feedlot, Dairy, Farmstead	NI	23	445	10		228		3443			45	396	492	1200	154	429	904	90	6485	2	20	1300	370
Truck, Nursery, Berry	I	1097	824	306	371	2017	490	5176	26		486	18869	1690	257	342	3062	9334	2832	27874		1273	842	941
Urban	NI	14	1586	7	49	113	3	3191			151	2069	600	1170	599	3689	7288	868	56539	204	139	403	95
Golf Course, Cemetery, Landscape	I				7															284			
Golf Course, Cemetery, Landscape	NI		170			18		260				363	100	51	14	123	63		2119				
Vineyard	I		6219	508		1516		8447				868	2705	1098	5189	3378	750		19329		351	3757	24
Vineyard	NI		26																				
Total Acres		**5528**	**68861**	**4785**	**1165**	**31185**	**3631**	**199856**	**683**	**260**	**7377**	**123680**	**111425**	**30720**	**30576**	**101364**	**70451**	**13711**	**579999**	**7635**	**10403**	**45308**	**9555**
Irrigated Acres		**5112**	**19642**	**4540**	**1009**	**12958**	**3388**	**83229**	**682**	**260**	**1831**	**90100**	**16167**	**25789**	**9966**	**24615**	**50833**	**11716**	**258234**	**402**	**9728**	**27900**	**8426**

I-Irrigated

NI-Non-irrigated

* Land use information was obtained from data provided by California Department of Water Resources, http://www.water.ca.gov/landwateruse/anaglwu.cfm. Data was compiled in 2005 and land use in some parts of the SJCDWQC area may have changed since that time.

IV. B. SITE SUBWATERSHED DESCRIPTIONS

Site descriptions, irrigated acreages and monitoring histories of SJCDWQC sites monitored from January through September 2014 are listed alphabetically below. Water was not present at all sites during every event. Irrigated acres are included in the site subwatershed descriptions and are subject to change due to updated GIS layers and subwatershed boundary modifications. Maps of land use in each site subwatershed are included in Appendix VIII.

Bacon Island Pump @ Old River (5,113 irrigated acres) – This site subwatershed represents drainage from Bacon Island with the sample site on the eastern limit of the Island. The island borders Middle River on the east and Old River on the west. Land use is primarily field crops (sunflower, corn and sorghum) with some potatoes, grains, and hay.

Bear Creek @ North Alpine Rd (19,642 irrigated acres) – This site subwatershed is located on the northern edge of the Coalition region; the site boundary starts in the north eastern region of San Joaquin County and includes sections of Calaveras County in the upstream site region. Land use in the site subwatershed primarily includes pasture, vineyards, and deciduous orchards with some field crops, grains, and hay.

Drain @ Woodbridge Rd (4,540 irrigated acres) – This site is located on the northern side of the Coalition region. Water from the drain is pumped to the Mokelumne River near the sample location. The site drains an area of land to the east of the site between Hog Slough and Sycamore Slough. Land use in the site subwatershed includes field crops, truck/nursery/berry crops, vineyards, pasture, grains, hay, and dairy.

Duck Creek @ Hwy 4 (12,958 irrigated acres) – This site subwatershed is located just to the east of the city of Stockton. Duck Creek drains a section of southern San Joaquin County between Stockton and the Lone Tree Creek site subwatershed. During the summer, flow is typically low in the creek. The predominant land uses for irrigated agriculture are grains, hay, and field crops. There are also relatively large amounts of deciduous nuts, truck farm/nursery, berry crops, irrigated pasture, and vineyards in this site subwatershed.

Empire Tract @ 8 Mile Rd (3,388 irrigated acres) – This site subwatershed represents drainage from Empire Tract and the sample site is located at the western pumping station on 8 Mile Rd. The pump drains water into Little Connection Slough which in turn drains into Potato Slough and then the San Joaquin River. The primary agriculture in the site subwatershed is row crops, grains, and truck/nursery/berry crops.

French Camp Slough @ Airport Way (83,229 irrigated acres) – French Camp Slough is formed by the confluence of Littlejohns Creek and Lone Tree Creek. This site was selected as a downstream companion site to the Littlejohns Creek @ Jack Tone Road, Unnamed Drain @ Jack Tone Rd, and Lone

Tree Creek @ Jack Tone Road sites. These waterbodies drain agricultural land to the east of Manteca and Stockton and eventually flow through urban areas prior to their confluence, and discharge to the San Joaquin River. This site includes all of the major types of agriculture present in the Coalition region including field crops, orchards, grains, hay, rice, tomatoes, irrigated pasture, and vineyards.

Grant Line Canal @ Clifton Court Rd (260 irrigated acres) – This site subwatershed is located on the southwest section of Union Island. The site is west of the Grant line Canal near Calpack Rd site, immediately south of Clifton Court, and drains fields east and south. The crops are primarily alfalfa, field crops, grains, and hay.

Grant Line Canal near Calpack Rd (682 irrigated acres) – This site subwatershed is located on the southwest section of Union Island. Grant Line Canal near Calpack Rd is adjacent to Grant Line Canal and drains fields immediately north and east. The predominant land use at this site is pastureland. The crops grown are primarily alfalfa, field crops, and grains.

Kellogg Creek along Hoffman Ln (1,831 irrigated acres) – This site subwatershed is located just southwest of Discovery Bay and drains field crops directly upstream. The headwaters originate in the Black Hills north of Livermore. Kellogg Creek runs through Discovery Bay and drains into Indian Slough in the western Delta. The agricultural land is primarily deciduous orchards, truck crops, and field crops.

Light House Restaurant @ West Brannon Island Rd (90,100 irrigated acres) – This subwatershed is represented by the drainage from Tyler and Staten Islands to the north, Venice and Bouldin Islands to the east and south. Islands within the area are bordered by San Joaquin River on the east, Hwy 4 to the south, and to the west, Discovery Bay and Frank's Tract State recreational Area. The primary agriculture in this subwatershed is row crops, grains and truck/nursery/berry crops with some deciduous nuts and crops, pasture, and vineyards.

Littlejohns Creek @ Jack Tone Rd (16,167 irrigated acres) – This site subwatershed is upstream from the French Camp Slough @ Airport Way site. The crops in the site subwatershed include all of the major types of agriculture present in the Coalition region: field crops, orchards, grains, vineyards, and irrigated pasture.

Lone Tree Creek @ Jack Tone Rd (25,789 irrigated acres) – This site subwatershed is upstream from the French Camp Slough @ Airport Way site. Lone Tree Creek drains a large portion of the southern SJCDWQC region and confluences downstream with Littlejohns Creek eventually French Camp Slough, where it flows through urban areas before emptying into the Delta. The main agricultural land use upstream consists of deciduous nuts, field crops, grains, irrigated pasture, and dairies.

Mokelumne River @ Bruella Rd (9,966 irrigated acres) – The amount of water released from the Comanche Reservoir controls water flow in the Mokelumne River. Water in the Mokelumne River integrates the water quality signal from a relatively large upstream area. Upstream agriculture consists of vineyards that are primarily irrigated by drip systems and orchards irrigated by microspray. The main

agricultural land use is fruit and nut orchards, vineyards, and small amounts of field crops throughout the subwatershed.

Mormon Slough @ Jack Tone Rd (24,615 irrigated acres) – This site subwatershed is located in the eastern portion of San Joaquin County and extends upstream into Calaveras County. The primary crops consist of orchards (mostly walnut) with smaller amounts of truck farm/nursery, berry crops, and vineyards.

Old River @ the West End of Clifton Court Rd (50,833 irrigated acres) – This subwatershed is represented by drainage from Fabian Tract south of Clifton Court Rd. The subwatershed borders the San Joaquin River on the eastern edge, highways 120, 205 and 580 to the southern edge, and the foothills on the western side of San Joaquin Valley. The primary agriculture in this subwatershed is pasture, row crops, grains, and truck/nursery/berry crops.

Roberts Island @ Whiskey Slough Pump (11,716 irrigated acres) – This site subwatershed drains the entirety of Roberts Island north of Hwy 4 by a pump station located along McDonald Road on the western edge of the island. The primary agriculture upstream of the sample site includes asparagus, field crops, grains, hay (alfalfa), and pasture.

Sand Creek @ Hwy 4 Bypass (402 irrigated acres) – This site subwatershed is located west of Brentwood at the intersection of Hwy 4 Bypass and Sand Creek. The Roddy Ranch Golf Club, located off Empire Mile Rd in Horse Valley, is adjacent to an upstream tributary of Sand Creek. The DWR map for land use identifies deciduous nuts, grains and hay; however, recent visits to the site subwatershed indicate the area consists of field crops, grains, hay, and pasture. In recent years, areas to the east and west of Highway 4 Bypass have significant urban development consisting of new residential neighborhoods and shopping outlets. USDA Cropland Data layer from 2009 (http://www.nass.usda.gov/research/Cropland/SARS1a.htm) indicate approximately 25 acres of planted corn, wheat, safflower, alfalfa, tomatoes, and approximately 775 acres of pasture and grassland.

San Joaquin River @ West Neugerbauer Rd (258,234 irrigated acres) – This site subwatershed drains all of the acreage within the Coalition boundary that is south of West Neugerbauer Rd, east of the San Joaquin River, and south of the Mokelumne Aqueduct. Native vegetation accounts for approximately 40% of the land use in this subwatershed. The irrigated acres include deciduous nuts and fruit, row crops, grain, pastureland, truck/nursery/berry crops, and vineyards.

Terminous Tract Drain @ Hwy 12 (9,728 irrigated acres) – This site subwatershed drains all of the acreage north and south of State Highway 12 on Terminous Tract. This sampling site is located near the confluence of White Slough/Potato Slough and the Mokelumne River. The primary agricultural crops are field crops, turf, truck/nursery/berry crops, grains, and hay.

Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (27,900 irrigated acres) – This site subwatershed is located to the north of the Lone Tree Creek site subwatershed and south of Littlejohns Creek. The drain

forms in east San Joaquin County and flows west eventually converging with Lone Tree Creek, just west of Jack Tone Rd. Unlike most of the SJCDWQC area, rice is a major crop in this site subwatershed. The rest of the agriculture consists of irrigated pasture, deciduous orchards, field crops, grains, and vineyards.

Walthall Slough @ Woodward Ave (8,426 irrigated acres) – This site subwatershed is located just upstream of the residential area at the confluence of Walthall Slough and the San Joaquin River. The site subwatershed drains land to the south and to the east. Land use includes pasture, field crops, truck/nursery/berry crops, fruits/nuts, grains, hay, and dairy.

V. RAINFALL RECORDS

The SJCDWQC considers a rainfall event a "storm sampling event" when an area receives at least 0.50 inches of rain within a 24 hour period. The Coalition attempts to sample two storm events per year. Monthly sampling is pre-scheduled; therefore if a storm is forecasted within a week before a scheduled sampling event or predicted within two days after the scheduled sampling event, the Coalition adjusts the sampling date to capture the storm.

In 2014, the Coalition sampled two storm events: February 11 and March 3, 2014. Below is a description of all the storms that occurred during the 2014 monitoring year.

Daily rainfall records are provided for the two major cities in and near the Coalition region, Modesto and Stockton (January 2014 through March 2014, Figure 10; April 2014 through June 2014, and Figure 11; July 2014 through September 2014, Figure 12).

V. A. JANUARY THROUGH MARCH 2014

From January through March 2014, the Coalition monitored two storms events that met the trigger limit.

The first substantial storm system of 2014 lasted four days, from January 30 through February 2, 2014, and resulted in a total of 0.29 inches of precipitation in Stockton and 0.5 inches in Modesto (Figure 10). The rainfall in Stockton is better representative of the Coalition region; therefore the Coalition did not conduct sampling because the trigger limit was not met in Stockton. The next storm with measurable precipitation occurred February 6 through February 10, 2014. During this storm, Stockton received 0.85 inches of precipitation, and Modesto received 0.61 inches (Figure 10). The precipitation exceeded the trigger limit during this storm system and was captured with a sampling event that occurred on February 11, 2014.

The next small rain event occurred on February 16 , 2013 where Stockton and Modesto both reported 0.06 inches of precipitation (Figure 10). The last storm event in February occurred on February 26 through March 4, 2014 and produced 1.59 inches of rain in Stockton and 0.94 inches in Modesto (Figure 10). The precipitation exceeded the trigger limit during this storm system and was captured with a sampling event that occurred on March 3, 2014.

Five rain events occurred during the month of March, none of which resulted in enough precipitation to reach the trigger limit in either counties. The first rain event occurred on March 6, 2014, and produced 0.18 inches of precipitation in Stockton and 0.05 inches in Modesto. The second rain event occurred March 10, 2014; Stockton received a total rainfall of 0.01 inches, while Modesto received 0.09 inches. The third rain event occurred on March 26, 2014, and produced 0.66 inches of precipitation in Stockton and 0.43 inches in Modesto. Precipitation was again recorded on March 29, 2014; Stockton received a

total rainfall of 0.17 inches, while Modesto received 0.04 inches. The final rain event of March occurred from March 31 through April 1, 2014. During this event, Stockton received 0.16 inches of precipitation and Modesto received 0.17 inches (Figures 10 and 11).

V. B. APRIL THROUGH JUNE 2014

No rain events met the trigger limit from July through September 2014 and therefore storm monitoring did not take place. Two storms were previously captured in March.

During the month of April, there were two rainfall events that resulted in measureable precipitation (Figure 11). The first rain event occurred on April 4, 2014, and produced 0.00 inches of precipitation in Modesto, and 0.04 inches in Stockton. The second rainfall event occurred on April 25, 2014. This event produced 0.36 inches of precipitation in Modesto, and 0.4 inches in Stockton.

During the months of May and June, there were three days of measureable precipitation of 0.05 inches or less, these systems were isolated and resulted in very little rainfall in either city (Figure 11).

V. C. JULY THROUGH SEPTEMBER 2014

No rain events met the trigger limit from July through September 2014 and therefore storm monitoring did not take place.

The San Joaquin area has typical Mediterranean climate conditions in July through September with hot and dry weather. However, there was one storm event with measureable precipitation on September 25, 2014. This storm produced 0.59 inches of precipitation in Stockton, and 0.3 inches in Modesto (Figure 12). Rainfall exceeded the trigger limit in Stockton; however, storm sampling was not scheduled because the trigger limit was not met or exceeded in Modesto.

Figure 10. Precipitation history for Stockton and Modesto, January through March 2014.

The shaded gray area represents the trigger to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com.

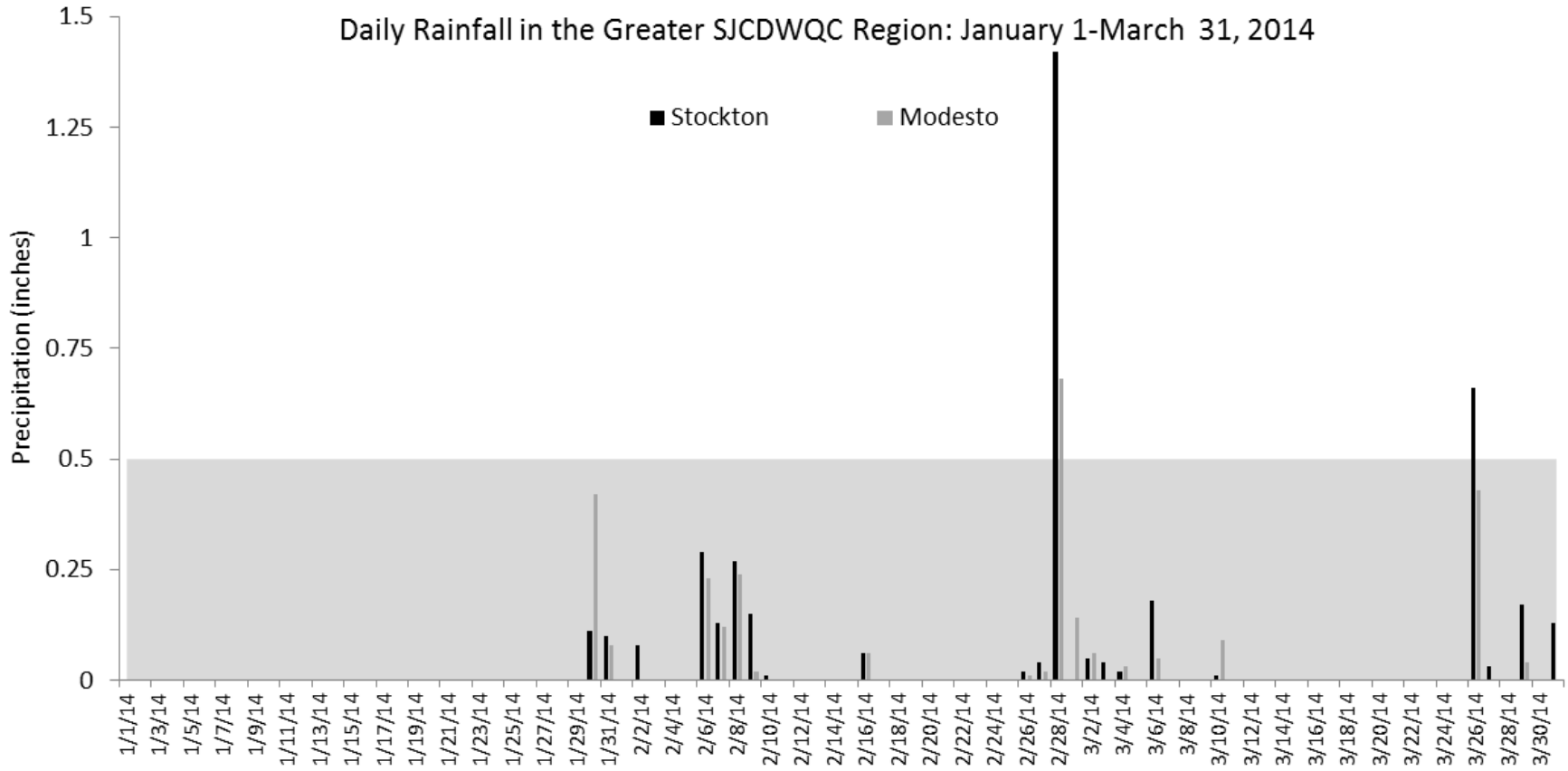


Figure 11. Precipitation history for Stockton and Modesto, April through June 2014.

The shaded gray area represents the trigger to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com.

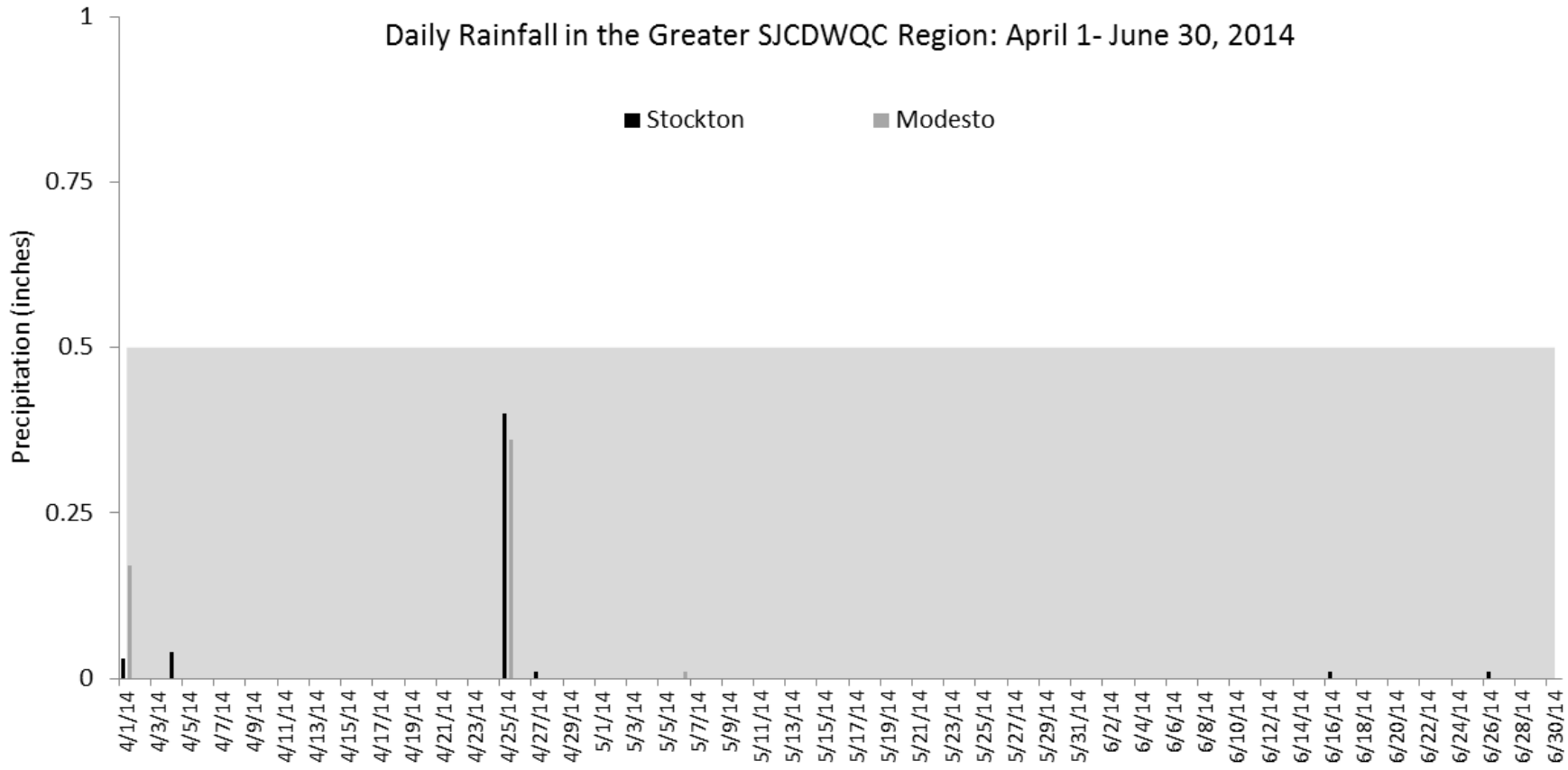
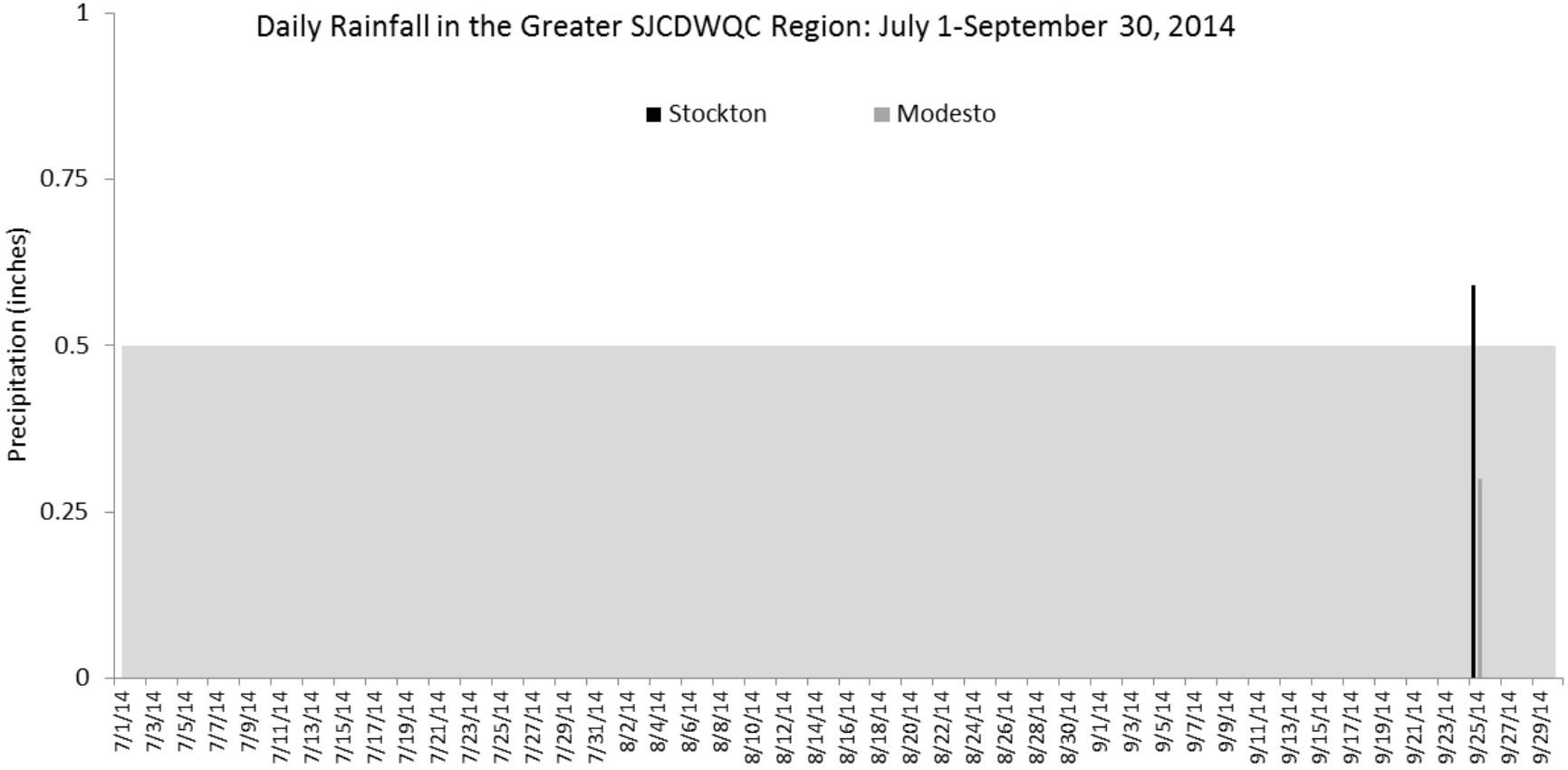


Figure 12. Precipitation history for Stockton and Modesto, July through September 2014.

The shaded gray area represents the trigger to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com



VI. MONITORING OBJECTIVES AND DESIGN

VI. A. NORMAL MONITORING OBJECTIVES

The objectives of the SJCDWQC monitoring program are:

9. Determine the concentration and load of waste(s) in discharges to surface waters.
10. Evaluate compliance with existing narrative and numeric water quality objectives to determine if implementation of additional management practices is necessary to improve and/or protect water quality.
11. Assess the impact of waste discharges from irrigated agriculture to surface water.
12. Determine the degree of implementation of management practices to reduce discharges of specific wastes that impact water quality in watersheds within the Coalition region.
13. Determine the effectiveness of management practices and strategies to reduce discharges of wastes that impact water quality.

VI. B. NORMAL MONITORING DESIGN

From January through September 2014, the Coalition conducted three types of monitoring: Normal Monitoring (NM), Management Plan Monitoring (MPM), and Total Maximum Daily Load (TMDL) compliance monitoring. The Coalition conducted NM to characterize discharge from irrigated agriculture and MPM to monitor for constituents that required a management plan. TMDL compliance monitoring occurred in order to satisfy Basin Plan requirements. Monitoring included two storm events and two sediment monitoring events. As required by the WDR (Page 6, Attachment B), monitoring occurred in the Coalition region according to the 2008 MRPP (approved September 2008). Monitoring constituents are established in the Monitoring and Reporting Program (MRP), Order No. R5-2014-0029 (Attachment B, Table 2, Pages 8-9).

Five Core Monitoring locations and 12 Assessment Monitoring locations were monitored for the Coalition's NM program. Due to the large urban influence in Zone 6, there was neither a Core nor Assessment Monitoring location in the Contra Costa Zone. The monitoring schedule outlined in the 2008 SJCDWQC MRPP (MRPP Table 9, Page 55) required yearly rotation of the Assessment Monitoring location within different zones. During each year the rotating Assessment site was sampled in a zone where the Core site was also monitored for all Assessment Monitoring constituents. A more detailed description of the types of NM is discussed below.

VI. B. i. Core Monitoring

Core Monitoring occurs at Core sites within the SJCDWQC zones and is designed to track water quality trends over time. There are fewer constituents (primarily physical parameters and nutrients) monitored at Core sites. The Coalition assesses water quality data associated with Core Monitoring in order to

evaluate the effectiveness of the Coalition's efforts to reduce or eliminate the impact of irrigated agriculture on surface waters. Core sites undergo Assessment Monitoring every third year.

VI. B. ii. Assessment Monitoring

Assessment Monitoring occurs at Assessment sites that are rotated between the SJCDWQC zones annually (with the exception of Contra Costa Zone), and occurs at Core sites every third year. Assessment Monitoring sites are selected to adequately characterize water quality of all waterbodies that receive irrigated discharge within the Coalition region. Samples collected from Assessment Monitoring locations are analyzed for a large suite of constituents to effectively characterize water quality.

VI. B. iii. Sediment Monitoring

Sediment samples are collected twice a year at annual rotating Assessment Monitoring locations within each zone. The first set of sediment samples are collected after the winter rainfall events and before the height of the irrigation season (between March 1 and April 30). The second set of sediment samples are collected at the end of the irrigation season when irrigation is mostly complete, and water levels are low and safe enough to sample sediment (between August 15 and October 15). In 2014, sediment samples were collected on March 05, 2014 and September 16, 2014.

VI. B. iv. Storm Monitoring

The Coalition attempts to sample two storm events per year, where storm monitoring is defined as occurring within three days of a rainfall event that exceeds 0.5 inches within 24 hours. During 2014, storm samples were collected at sites in the Coalition region on February 11, 2014 and March 03, 2014. A description of the rainfall that occurred in 2014, including when samples were collected relative to the amount of precipitation, is included in the Rainfall Records section of this report.

VI. C. MANAGEMENT PLAN MONITORING OBJECTIVES

The objectives of the SJCDWQC Management Plan include:

1. Identification of irrigated agriculture source (general practice or specific location) that may be the cause of the water quality problem or a study design to determine the source.
2. Identification of management practices to be implemented to address the exceedances.
3. Development of a management practice implementation schedule designed to address the specific exceedances.
4. Development of management practice performance goals.
5. Development of waste-specific monitoring schedule.
6. Development of a process and schedule for evaluating management practice effectiveness.

Management Plan Monitoring (MPM) is conducted as part of the Coalition's management plan strategy to identify contaminant sources and evaluate effectiveness of newly implemented management practices. For details on January through September 2014 MPM results, refer to the Status of Special Projects section of this report.

Management plans are required as a result of a single exceedance of the Water Quality Trigger Limit (WQTL) of a TMDL constituent (DO, SC, boron, chlorpyrifos, and diazinon), or more than one exceedance within a three year time period for all other constituents. In the Status of Management Plans and Special Projects section of this report, Table 52 lists all of the specific site/constituent pairs approved for removal from active management plans and MPM to date.

VI. D. MANAGEMENT PLAN MONITORING DESIGN

The SJCDWQC Management Plan process was first outlined in the SJCDWQC Management Plan submitted on September 30, 2008 and updated in the 2010 MPUR. Updates were made to reflect the monitoring strategy outlined in the SJCDWQC MRPP (Pages 32-34) of rotating Core and Assessment Monitoring locations. The Coalition focused its efforts on documenting changes in management practices and performing outreach. Reference the SJCDWQC September 30, 2008 Management Plan (approved January 23, 2009) and April 1, 2010 MPUR (approved August 24, 2010) for further details on the Coalition's Management Plan Monitoring Strategy, Management Practice Tracking Strategy, Prioritization of Constituents with Exceedances, and Priority Site Management. The Coalition will also submit a revised SJCDWQC Surface Water Quality Management Plan on May 1, 2015.

The Coalition developed a schedule (Table 5) establishing when sites become high priority and undergo a focused management plan approach. This schedule was submitted as an addendum to the SJCDWQC Management Plan and was approved on January 23, 2009 (Table C); a request to extend the dates in the Coalition's prioritization schedule by one year was submitted on June 5, 2009. The schedule is evaluated and updated in each yearly MPUR with the inclusion of 1) new sites requiring a management plan, and 2) changes involving focused outreach. Based on the Management Plan process, any new site that requires a management plan is added to the schedule. Changes such as timeline extensions, removal of sites and/or changing the year of prioritization must be approved by the Regional Board's Executive Officer before initiation.

Table 5 is an updated schedule including the approved changes to the prioritization scheme. There are currently 19 site subwatersheds included in the SJCDWQC Management Plan scheduled for high priority status between 2008 and 2018.

As a result of monitoring from January through September 2014, the priority schedule was updated to include new site/constituent specific management plans required for Bacon Island Pump @ Old River.

Table 5. Schedule for addressing each site subwatershed with a detailed focused Management Plan approach.

Site Subwatershed Name	Priority Set	Year for focused approach	Management Plan Monitoring Initiation Year[1]
Duck Creek @ Hwy 4	First Priority	2008-2010	NA
Lone Tree Creek @ Jack Tone Rd		2008-2010	NA
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd		2008-2010	NA
Grant Line Canal @ Clifton Court Rd	Second Priority	2010-2012	NA
Grant Line Canal near Calpack Rd		2010-2012	NA
Littlejohns Creek @ Jack Tone Rd		2010-2012	NA
French Camp Slough @ Airport Way	Third Priority	2011-2013	2010
Mokelumne River @ Bruella Rd		2011-2013	2010
Terminous Tract Drain @ Hwy 12		2011-2013	2010
Kellogg Creek along Hoffman Ln	Fourth Priority	2012-2014	2011
Mormon Slough @ Jack Tone Rd		2012-2014	2011
Sand Creek @ Hwy 4 Bypass		2012-2014	2011
Bear Creek @ North Alpine Rd	Fifth Priority	2013-2015	2012
Roberts Island @ Whiskey Slough Pump[2]		2013-2015	2012
Walthall Slough @ Woodward Ave		2013-2015	2012
Drain @ Woodbridge Rd	Sixth Priority	2014-2016	2013
Empire Tract @ 8 Mile Rd	Seventh Priority	2015-2017	NA
Bacon Island Pump @ Old River	Eighth Priority	2016-2018	NA
Re-evaluate All Site Subwatersheds and Revise Schedule		Annually	

[1]Year 0 monitoring was incorporated into the Coalition's Management Plan Process beginning in 2010.
[2]Roberts Island @ Whiskey Slough Pump monitoring occurred for all management plan constituents from the two previous sites.
NA- Not Applicable; all constituents in a management plan for these sites are Priority E and do not have scheduled MPM.

Based on the requirements in the WDR, a monitoring schedule is submitted annually in the Monitoring Plan Update (MPU) which is due August 1 prior to the monitoring WY. The Coalition submitted the first version of the MPU on August 1, 2014 which was revised and resubmitted on October 10, 2014 (approved January 5, 2015). The Coalition reviewed relevant data from July through September 2014 and included an addendum to the 2015 WY MPU and an updated MPM schedule in Appendix VIII.

VI. E. TOTAL MAXIMUM DAILY LOAD MONITORING

In June 2006, the Regional Board finalized the *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Sacramento-San Joaquin Delta* (hereafter referred to as the Basin Plan Amendment), establishing a TMDL for the organophosphate pesticides (OP) chlorpyrifos and diazinon in the Delta. As dictated by the Basin Plan Amendment, a surveillance and monitoring program was developed by the SJCDWQC to collect the required information necessary to assess compliance with the seven monitoring objectives dictated in the Basin Plan Amendment. The monitoring objectives are 1) determine load capacity compliance, 2) determine load allocation compliance, 3) determine degree of implemented management practices, 4) determine effectiveness of implemented management practices, 5) determine if alternative pesticides are impairing water quality, 6) determine if additive or synergistic effects of multiple pollutants are causing toxicity, and 7) demonstrate that management practices achieve the lowest pesticide levels technically and economically achievable. The Sacramento-San

Joaquin Delta is divided into seven areas that include agricultural drainages monitored by the SJCDWQC under the ILRP. The Coalition evaluates compliance with water quality objectives, loading capacity, and load allocations within the Delta waterway subareas as well as 303 (d) listed waterbodies that are within the SJCDWQC boundaries through representative monitoring.

In 2014, the Coalition conducted TMDL monitoring at four Delta monitoring locations to evaluate compliance with approved TMDL's for chlorpyrifos, diazinon, SC, TDS, boron, and DO. The Status of Special Projects section of this Report includes further details on Coalition monitoring and activities concerning these TMDL constituents.

VII. MONITORING RESULTS

In order to achieve the objectives listed above, the Coalition monitored 21 sites (including four TMDL sites) from January through September 2014. Management Plan Monitoring took place at 15 of the 21 sites. There were 11 sites that were monitored as MPM only; MPM also occurred at four sites that were scheduled for Assessment or Core Monitoring (Table 3).

In 2014, the Coalition sampled for 45 pesticides, *E. coli*, physical parameters (TDS, TSS, and turbidity), nine metals, TOC, five nutrients, field parameters (DO, pH, SC), and water column toxicity to *C. dubia*, *P. promelas,* and *S. capricornutum.* The Coalition also sampled for sediment physical parameters (grain size and TOC), sediment toxicity to *H. azteca,* and nine pesticides in sediment as needed (Table 9).

VII. A. SAMPLING AND ANALYTICAL METHODS

Sample collection procedures and descriptions of the field instruments are provided in Tables 6 and 7, respectively. Site-specific discharge methods are included in Table 8. Analytical methods and reporting limits (RLs) are provided in Table 9.

All field sampling and analytical methods were performed as outlined in the Standard Operating Procedures (SOPs) provided in the QAPP amended on February 23, 2011 (Appendix I-XXXVII). Any deviations from these procedures are documented in the Precision, Accuracy, and Completeness section of this report.

Table 6. Sampling procedures.

Groups	Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
Physical Parameters3	Total Suspended Solids	2000 mL	1x 2000 mL Polyethylene	Store at ≤6°C	7 Days
	Turbidity	2000 mL			7 Days
	Soluble Orthophosphate[3]	2000 mL			48 Hours
Nutrients	Ammonia and Nitrate-Nitrite as N	500 mL	1x 500 mL Polyethylene	Store at ≤6°C, with H2SO4	48 Hours
	Metals/Trace Elements, Hardness	500 mL	1x 500 mL Polyethylene	store at ≤6°C, pH≤2 with H2SO4	28 Days
Metals/ Trace Elements	*E. coli* (pathogens)	150 mL	1x 150 mL Polyethylene	Filter as necessary; preserve to ≤pH 2 with HNO3, store at ≤6°C	180 Days
Drinking Water	Total Organic Carbon	120 mL	1x 150 mL Polyethylene	Preserved with Na2S2O3, store at <8 °C	24 Hours[4]
	Carbamates	2 L	3x 40 mL Amber glass VOA with PTFE-lined cap	Preserve with HCl, store at ≤6°C	28 Days
Pesticides	Organochlorines	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Organophosphates	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides (paraquat)	500 mL	1X 500 mL polyethylene	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides	80 mL	1x L Brown Polyethylene	Store at ≤6°C; extract within 7 days	21 days

Groups	Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
	(glyphosate)				
	Aquatic Toxicity	3 Gallons	3X 1 Gallon Amber Glass Jar	Store at ≤6°C; freeze (-20°C) within 2 weeks	6 Months
Water and Sediment Column Toxicity	Sediment Toxicity	2 L	2x 1L Clear Glass Jar	Store at ≤6°C	36 Hours
	Sediment Grain Size	8 oz.	1x 8 oz. Clear Glass Jar	Store at ≤6°C, do not freeze	14 Days
	Sediment Total Organic Carbon	8 oz.	1x 8 oz. Clear Glass Jar	Store at ≤6°C, do not freeze	28 days
	Sediment Chemistry	8 oz.	1 X Clear Glass Jar	Store at ≤6°C (not frozen), analyze or freeze (-20C) within 28 days	28 days (not frozen) 12 Months (frozen)

[1] Additional volume may be required for Quality Control (QC) analyses. The sample volume listed for aquatic toxicity represents the volume collected for a single species.

[2] Holding time is after initial preservation or extraction.

[3] Volume of water necessary to analyze the physical parameters and soluble orthophosphate is typically combined in one 2000 mL polyethylene bottle, which provides sufficient volume for re-analyses and lab spike duplicates.

[4] Communication is established with the laboratory for sample collection and analysis for *E. coli* to assure hold times are met.

Table 7. Field parameters and instruments used to collect measurements.

Parameter	Instrument
Dissolved Oxygen	YSI Model 556 and Professional Plus
Temperature	YSI Model 556 and Professional Plus
pH	YSI Model 556 and Professional Plus
Specific Conductance	YSI Model 556 and Professional Plus
Flow	Marsh-McBirney Flo-Mate 2000

YSI- Yellow Springs Instruments

Table 8. Site specific discharge methods from January through September 2014.

Site	Discharge Method[1]	Meter/ Gauge
Bacon Island Pump @ Old River	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Bear Creek @ North Alpine Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Drain @ Woodbridge Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Duck Creek @ Highway 4	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Empire Tract @ 8 Mile Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
French Camp Slough @ Airport Way	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Grant Line Canal @ Clifton Court	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Grant Line Canal near Calpack Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Kellogg Creek along Hoffman Ln	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Light House Restaurant @ West Brannon Island Rd	Discharge from CDEC station	San Joaquin River at Prisoners PT NR Terminus gauge
Littlejohns Creek @ Jack Tone Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lone Tree Creek @ Jack Tone Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Mokelumne River @ Bruella Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Mormon Slough @ Jack Tone Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Old River @ the West End of Clifton Court Rd	Discharge from CDEC station	Old River at Clifton Court Intake gauge
Roberts Island @ Whiskey Slough Pump	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
San Joaquin River @ West Neugerbauer Rd	Discharge from CDEC station	Rough and Ready Island gauge
Sand Creek @ Hwy 4 Bypass	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Terminous Tract Drain @ Hwy 12	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Walthall Slough @ Woodward Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000

[1]USGS R2 Cross Streamflow Method is only conducted when the stream is safe to wade across. Observed flow is recorded for every site.

Table 9. Field and laboratory analytical methods.

Group	Constituent	Matrix	Analyzing Lab	RL	MDL	Analytical Method
Physical Parameters	Flow	Fresh Water	Field Measure	1 cfs	NA	USGS R2Cross Streamflow Method
	pH	Fresh Water	Field Measure	0.1 pH units	NA	EPA 150.1
	Specific Conductivity	Fresh Water	Field Measure	100 µmhos/cm	NA	EPA 120.1
	Dissolved Oxygen	Fresh Water	Field Measure	0.1 mg/L	NA	SM 4500-O
	Temperature	Fresh Water	Field Measure	0.1 °C	NA	SM 2550
	Turbidity	Fresh Water	Caltest	0.05 NTU	0.15 NTU	EPA 180.1
	Total Suspended Solids	Fresh Water	Caltest	3 mg/L	2 mg/L	SM 2540 D
Inorganics	Hardness	Fresh Water	Caltest	5 mg/L	1.7 mg/L	SM2340C
	Total Organic Carbon	Fresh Water	Caltest	0.5 mg/L	0.30 mg/L	SM 5310 B
Bacteria	*E. coli*	Fresh Water	Caltest	1 MPN/100 mL	1 MPN/100 mL	SM 9223
Toxicity	Water Column Toxicity	Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-012

Group	Constituent	Matrix	Analyzing Lab	RL	MDL	Analytical Method
		Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-013
	Sediment Toxicity	Sediment	AQUA-Science[1]	NA	NA	EPA 600/R-99-064
Carbamates	Aldicarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
	Carbaryl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Carbofuran	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Methiocarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
	Methomyl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Oxamyl	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
Organochlorines	DDD	Fresh Water	APPL Inc	0.01 µg/L	0.003 µg/L	EPA 8081A
	DDE	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
	DDT	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Dicofol	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8081A
	Dieldrin	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endrin	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Methoxychlor	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
Group A Pesticides	Aldrin	Fresh Water	APPL Inc	0.01 µg/L	0.009 µg/L	EPA 8081A
	Chlordane	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Heptachlor	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
	Heptachlor Epoxide	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Hexachlorocyclohexane (alpha-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Hexachlorocyclohexane (beta-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
	Hexachlorocyclohexane (gamma-BHC; Lindane)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Hexachlorocyclohexane (delta-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endosulfan I	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endosulfan II	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
	Toxaphene	Fresh Water	APPL Inc	0.5 µg/L	0.380 µg/L	EPA 8081A
Organophosphates	Azinphos-methyl	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
	Chlorpyrifos	Fresh Water	APPL Inc	0.015 µg/L	0.0026 µg/L	EPA 8141A
	Diazinon	Fresh Water	APPL Inc	0.02 µg/L	0.004 µg/L	EPA 8141A
	Dichlorvos	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
	Dimethoate	Fresh Water	APPL Inc	0.1 µg/L	0.08 µg/L	EPA 8141A
	Demeton-s	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8141A
	Disulfoton	Fresh Water	APPL Inc	0.05 µg/L	0.02 µg/L	EPA 8141A
	Malathion	Fresh Water	APPL Inc	0.1 µg/L	0.03 µg/L	EPA 8141A
	Methamidophos	Fresh Water	APPL Inc	0.2 µg/L	0.1 µg/L	EPA 8321A
	Methidathion	Fresh Water	APPL Inc	0.1 µg/L	0.04 µg/L	EPA 8141A
	Parathion, methyl	Fresh Water	APPL Inc	0.1 µg/L	0.075 µg/L	EPA 8141A
	Phorate	Fresh Water	APPL Inc	0.1 µg/L	0.07 µg/L	EPA 8141A
	Phosmet	Fresh Water	APPL Inc	0.2 µg/L	0.06 µg/L	EPA 8141A
Herbicides	Atrazine	Fresh Water	APPL Inc	0.5 µg/L	0.10 µg/L	EPA 8141A
	Cyanazine	Fresh Water	APPL Inc	0.5 µg/L	0.15 µg/L	EPA 8141A
	Diuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
	Glyphosate	Fresh Water	NCL Ltd	5 µg/L	1.3 µg/L	EPA 547
	Linuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
	Paraquat	Fresh Water	NCL Ltd	0.4 µg/L	0.19 µg/L	EPA 549.2M
	Simazine	Fresh Water	APPL Inc	0.5 µg/L	0.12 µg/L	EPA 8141A
	Trifluralin	Fresh Water	APPL Inc	0.05 µg/L	0.05 µg/L	EPA 8141
Metals	Arsenic	Fresh Water	Caltest	0.5 µg/L	0.060 µg/L	EPA 200.8 (ICPMS)
	Boron	Fresh Water	Caltest	10 µg/L	2.0 µg/L	EPA 200.8 (ICPMS)
	Cadmium	Fresh Water	Caltest	0.1 µg/L	0.05 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Copper	Fresh Water	Caltest	0.5 µg/L	0.15 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Lead	Fresh Water	Caltest	0.25 µg/L	0.03 µg/L	EPA 200.8 (ICPMS Collision Cell)

Group	Constituent	Matrix	Analyzing Lab	RL	MDL	Analytical Method
	Molybdenum	Fresh Water	Caltest	0.25 µg/L	0.07 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Nickel	Fresh Water	Caltest	0.5 µg/L	0.06 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Selenium	Fresh Water	Caltest	1 µg/L	0.07 µg/L	EPA 200.8 (ICPMS)
	Zinc	Fresh Water	Caltest	1 µg/L	0.7 µg/L	EPA 200.8 (ICPMS)
Nutrients	Nitrate + Nitrite (as N)	Fresh Water	Caltest	0.05 mg/L	0.02 mg/L	EPA 353.2
	Total Ammonia	Fresh Water	Caltest	0.1 mg/L	0.040 mg/L	SM 4500-NH3C
	Soluble Orthophosphate	Fresh Water	Caltest	0.01 mg/L	0.006 mg/L	SM 4500-P E
Sediment	Bifenthrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
	Cyfluthrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
	Cypermethrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
	Deltamethrin: Tralomethrin	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
	Esfenvalerate	Sediment	Caltest	0.33 ng/g dw	0.13 ng/g dw	GCIS/NCI/SIM
	Lambda-Cyhalothrin	Sediment	Caltest	0.33 ng/g dw	0.06 ng/g dw	GCIS/NCI/SIM
	Permethrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
	Fenpropathrin	Sediment	Caltest	0.33 ng/g dw	0.07 ng/g dw	GCIS/NCI/SIM
	Chlorpyrifos	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
	Piperonyl Butoxide	Sediment	Caltest	0.34 ng/g dw	0.031 ng/g dw	GCIS/NCI/SIM
	Total Organic Carbon	Sediment	Caltest[2]	200 mg/kg	100 mg/kg dw	Walkley Black
	Grain Size	Sediment	Caltest[2]	1% sand, silt, clay, gravel	0.4 µm	ASTM D422, ASTM D4464M-85

cfs- Cubic Feet per Second
MDL- Minimum Detection Limit
MPN- Most Probable Number
NA- Not applicable
[1]Monitored at a single location during Assessment Monitoring years as needed to characterize 303d listed waterbodies.
RL-Reporting limit
[2]Subcontracted to Nautilus Laboratory.
[3]Subcontracted to PTS Laboratory.

VII. B. MONITORING SEASONS

The Coalition categorizes monitoring by fall, winter, irrigation, and storm seasons (Table 10). Fall monitoring (October – December) occurs after irrigation is finished across the majority of crops in the Coalition region and generally before dormant sprays. Winter monitoring occurs from January through March when dormant sprays and significant rainfalls are expected. Irrigation monitoring (April – September) characterizes the discharge from irrigated agriculture and irrigation return flows. A storm event can occur at any time of the year but is expected to occur during the winter season. Additional details regarding storm sampling events and their rainfall trigger are included in the Rainfall Records section of this report. Table 11 provides the locations and seasons of Coalition monitoring from Fall 2013 through 2014.

Table 10. Sample sites and years monitored.

Season	Month Range	Description
Fall	October through December	No irrigation.
Winter	January through March	No irrigation, possible dormant sprays.
Storm	Anytime	Storm is triggered by > 0.5 inches of rain within 24 hours; may occur during any month although generally occurs from January through March.
Irrigation	April through September	Summer months with possible irrigation.

Table 11. Sample sites and seasons monitored.

	2013	2014		
Station Name	Fall	Winter	Storm	Irrigation
Bacon Island Pump @ Old River		x	x	
Bear Creek @ North Alpine Rd	x	x		x
Drain @ Woodbridge Rd				x
Duck Creek @ Hwy 4		x	x	Dry
Empire Tract @ 8 Mile Rd[1]	x	x	x	x
French Camp Slough @ Airport Way	x	x	x	x
Grant Line Canal @ Clifton Court Rd		x	x	x
Grant Line Canal near Calpack Rd		x	x	x
Kellogg Creek along Hoffman Ln		x		x
Littlejohns Creek @ Jack Tone Rd	x	x	x	x
Lone Tree Creek @ Jack Tone Rd		x	x	x
Mokelumne River @ Bruella Rd	x	x	x	x
Mormon Slough @ Jack Tone Rd				x
Roberts Island @ Whiskey Slough Pump	x	x	x	x
Sand Creek @ Hwy 4 Bypass		x		x
Terminous Tract Drain @ Hwy 12	x	x	x	x
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	x	x	x	x
Walthall Slough @ Woodward Ave	x	x	x	x

1-Monitoring at Empire Tract @ 8 Mile Rd occurred from January through July 2014 as specified in the July 5, 2013 approval letter.
A blank cell indicates that no sampling occurred at that site during the specified season.
"Dry" indicates that the site was dry during one or more events during the specified monitoring season.

VII. C. TABULATED RESULTS

Complete monitoring results from January through September 2014 are located in Appendix III. Results are provided for field parameters, organics (pesticides), inorganic constituents including metals and *E. coli*, toxicity (water and sediment), sediment chemistry, and loads for any detectable analytes with corresponding flow data. Monitoring data include results from samples collected during MPM, NM, sediment monitoring, and TMDL compliance monitoring.

During 2014 monitoring, all sample collection procedures were followed as outlined in the Monitoring and Reporting Program (MRP) Order No R5-2008-005 (Attachment C, Page 17). Sampling occurred for both water and sediment under no flow and low flow conditions. If a site had no flow, discharge was recorded as zero. If a waterbody had "puddle-like conditions" the entire sample was grouped as "non-contiguous". All results, including field parameters, chemistry, and toxicity were therefore associated with the non-contiguous flag. From January through September 2014, the Coalition samples were collected from three non-contiguous waterbodies (twice at Lone Tree Creek @ Jack Tone Rd and once at Mormon Slough @ Jack Tone Rd). Samples were not collected on April 15, 2014 at Duck Creek @ Hwy 4 due to lack of water (dry).

Instantaneous loads are calculated for all detections (Appendix III, Table III-7) according to the following formula:

$$\text{Instantaneous Load } (\mu g/sec) = \text{Discharge (cfs)} \times 28.317 L/ft^3 \times \text{Concentration } (\mu g/L).$$

To convert a concentration measured in mg/L to µg/L, the load is multiplied by 1000. The load values calculated for pesticides or other constituents represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal, or annual). The primary purpose for reporting instantaneous loads is to provide the Regional Water Board with a context for the concentrations of various constituents at the time that samples were collected.

VII. D. QUARTLERY SUBMITTALS

As required in Attachment B to the General Order R5-2014-0029, the Coalition submits the Quarterly Monitoring Reports in an electronic format. Table 12 includes the Quarterly Monitoring Report submittal schedule. Each Quarterly Monitoring Report included the following data for sampling that occurred during the previous monitoring quarter:

1. An excel workbook containing exported data that was uploaded into the California Environmental Data Exchange Network (CEDEN) comparable database.
2. The most recent eQAPP.
3. Electronic pdf copies of all field sheets.
4. Electronic submittal of site photos labeled with CEDEN comparable station codes and dates.
5. Electronic pdf copies of all laboratory analytical reports including:
    a. Quality Control Reports including all QC samples and narratives describing QC failures, analytical problems and anomalous occurrences,

b. Laboratory Analytical Reports including units, RLs, MDLs, sample preparation, extraction, and analysis dates,
c. Chain of Custodies (COCs),
d. Toxicity Reports with raw data including copies of the original bench sheets.

Table 12. SJCDWQC Quarterly Monitoring Report Submittal Schedule.

QUARTERLY SUBMITTAL DUE DATES	REPORTING PERIOD
March 1	July 1 through September 30 of previous calendar year
June 1	October 1 through December 31 of previous calendar year
September 1	January 1 through March 31 of same calendar year
December 1	April through June 30 of same calendar year

All field data sheets, site photos, laboratory reports, and COCs were submitted for monitoring that occurred for January through September 2014. If any discrepancies between the COCs and sample delivery occur, the issues are resolved and documented either directly on the COC or on an anomaly form filled out by the laboratory. There were no COC discrepancies or anomalies during the January through September 2014 reporting period. All COC forms were faxed by the laboratories to Michael L. Johnson, LLC (MLJ-LLC) after samples were received. As such, the COCs are complete and accurate records of sample handling and processing, and they reflect the timing of sample collection as well as delivery to the laboratories. Sample collection and delivery were performed according to the amended SJCDWQC Quality Assurance Project Plan (QAPP), approved on February 23, 2011.

Discharge measurements for the three TMDL compliance sites, Light House Restaurant @ West Brannon Island Rd, Old River @ the West End of Clifton Court Rd, and San Joaquin River @ West Neugerbauer Rd are taken online from their respective CDEC stations (Table 8). The discharge measurements at the time closest to when the sites were sampled were recorded on the field sheets and entered into the database. Due to a copy and paste error, the note to remind sampling crew to look up the discharges recorded for the each site was deleted from the field sheets. The sampling crew did not notice the deletion and subsequently, did not record discharge measurements for the TMDL compliance sites after each sampling event for the 2014 reporting year. The discharge measurements were updated on the field sheets and the database in February 2015. However, the data submitted for the quarterly submittals do not contain the discharge measurements for the three sites because the mistake was not noticed until after all quarterly submittals were submitted

VIII. COMPLETENESS, PRECISION, AND ACCURACY

An assessment of completeness, precision, and accuracy is tabulated in Tables 13 through 29 for data analyzed from January 2014 through September 2014. All data generated during this time were acceptable and useable. In a few instances, some Data Quality Objectives (DQOs) were not met; however the evaluation below demonstrates that the usability of data is not affected.

All results are tabulated in the Monitoring Results and Lab and Field Quality Control (QC) Results sections of this report (Appendix III and IV). If a DQO(s) is not met, the result is flagged accordingly. The Coalition works with the Central Valley Regional Data Center (CV RDC) to ensure that all data remain CEDEN comparable and that all data are uploaded to the CEDEN database. A copy of the database is submitted to the Regional Board with the hardcopy of this report. The database includes all data from January through September 2014 sampling events.

For some chemical constituents the concentration in the environmental sample may exceed the highest level in the calibration standard and could only be accurately quantified by diluting the sample. The result reported is the concentration of the diluted sample multiplied by the dilution factor to represent the amount of the analyte present in the original sample. Diluted samples are flagged accordingly in the database. The reporting limit (RL) associated with a diluted sample is multiplied by the dilution factor, thereby, increasing the reporting limit. Therefore, for each dilution that occurs, there is a corresponding increase in the limit of quantification.

For sediment, variation in minimum detection limits (MDLs) and reporting limits (RLs) is a result of different initial sample weights or dry weight values of samples run within the same batch.

VIII. A. COMPLETENESS

Completeness is assessed on three levels: field and transport completeness, analytical completeness, and batch completeness (Tables 13 through 15). Field and transport completeness assesses how many of the scheduled samples were collected and sent for analysis. Field and transport completeness may be less than 100% for reasons such as bottle breakage during transportation or inability to access a site. Dry sites are considered “collected” and do not count against completeness for field and transport. Analytical completeness assesses the number of samples that arrived at a laboratory and were analyzed. Analytical completeness may be less than 100% for various reasons including bottle breakage while the sample was stored at the laboratory or laboratory error resulting in an analysis not being performed. Batch completeness assesses whether chemistry and toxicity batches have all of the required laboratory quality control. For batch completeness, the number of batches with complete laboratory quality control is compared to the overall number of batches. Table 17 includes an evaluation of completeness for the three levels.

VIII. A. i. Field and Transport Completeness

Field and transport completeness was assessed for all monitoring events that occurred from January through September 2014. Duck Creek @ Hwy 4 was dry for the April 15, 2014 sampling event. Field and transport completeness is calculated by dividing the number of samples collected by the number of samples scheduled to be collected for each analyte. From January through September 2014, 100% of field and transport completeness for each sample collected for analysis was achieved (Table 13).

Field parameter measurements (discharge, DO, pH, SC, and temperature) were taken at each site for all sampling events whenever there was enough water to collect a sample. The overall percentage for field parameter completeness decreases when those parameters could not be measured. On July 15, 2014, DO values measured at seven sites were not recorded on field sheets; therefore completeness for DO was 95%. Discharge was measured at 56 site locations during the nine months of monitoring (Table 14). Discharge was not measured at sites if the waterbody at the monitoring site was too deep to safely measure discharge (56 times across 13 site locations). The overall field parameter completeness was 90% for this reporting period (Table 14).

VIII. A. ii. Analytical Completeness

Analytical completeness assesses the number of samples that arrived at a laboratory and were analyzed. The environmental, field duplicate, and field blanks are included in the overall count for analytical completeness. All samples collected were preserved and analyzed according to the SJCDWQC QAPP.

A field duplicate and field blank must be analyzed with each sampling event with an overall percentage of at least 5% of the total samples analyzed to meet the requirement of chemistry analytical completeness. Analytical completeness for field blanks and field duplicates for all constituents was over 5% (Table 15).

Although not a requirement in the QAPP, equipment blanks and travel blanks are analyzed for dissolved and total metals, respectively. The analytical completeness for these blanks was over 5% (Table 19).

For toxicity testing, a field duplicate must be analyzed with each sampling event with an overall percentage of at least 5% of the total samples. Field duplicates were collected for toxicity testing for every sampling event. The overall percentage of field duplicates are as follows: *C. dubia* 16%, *P. promelas* 17%, *S. capricornutum* 14%, and *H. azteca* 7% (Table 13).

VIII. A. iii. Batch Completeness

All chemistry and toxicity batches were reviewed for Quality Assurance/Control (QA/QC) completeness. A complete chemistry batch must have a minimum of one laboratory blank (method blank), laboratory duplicate, laboratory control spike (LCS) and matrix spike (MS) with the exception of turbidity, *E. coli*, Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) which do not require a MS. For the reporting period, 241 of 243 batches had 100% completeness. In one instance, completeness was not met because MS and MSD samples for total kjeldahl nitrogen (TKN) were not run for the June 17, 2014

sampling event. Samples were collected for a MS/MSD; however, during the sample preparation for the analysis of TKN, an analyst broke the MS/MSD vials. In another instance, MS/MSD results were omitted from one batch and re-analyzed in another batch. All toxicity batches were run with a negative control. Toxicity batch completeness was 100%.

Batches are determined by the laboratory and, for chemistry analyses, generally do not include more than 20 samples (environmental and QC samples). Although the Coalition selects a site to collect extra sample volume for a MS and it's duplicate, the laboratory may not be able to use that sample for every batch associated with that event. For example, the total number of samples collected for one event may exceed the maximum amount of sample for the laboratory batch and, therefore, the laboratory splits the samples from one event into two or more separate batches.

A MS associated with an environmental sample collected as part of another project, a non-project matrix spike (NONPJ MS) can be used for laboratory quality assurance purposes. The use of NONPJ samples allows the Coalition to evaluate the accuracy and/or precision of the batches and ensures that the laboratory can achieve batch completeness. When a NONPJ MS is used, the batch is flagged accordingly. Matrix interference can be determined by both project and NONPJ samples. Non-project samples were used for analyses conducted from January through September 2014 to meet batch completeness and address potential matrix interferences.

VIII. A. iv. Hold Time Compliance

Each constituent must be stored and/or extracted and analyzed within a specific time frame to meet hold time requirements. All hold time requirements are summarized in the SJCDWQC QAPP and in Table 7 of this report. In a few instances, the Coalition accepted constituent data that exceeded hold time limits. The overall hold time compliance for all chemistry analyses performed during this reporting period is 97% (Table 16).

One batch analyzed by EPA method 8141A for the March 3, 2014 sampling event was re-extracted due to acceptability of several DQOs not being met. In the original batch, cyanazine and diazinon recovered below the acceptable limits in the LCS and MS/MSD samples. Surrogate recoveries for tributylphosphate and triphenylphosphate were above the acceptable limit in nine of 12 and two of 12 samples, respectively. Of the environmental samples, there was a detection of simazine in one sample. Due the poor recoveries in the original batch, the batch was re-extracted 10 days past hold time. In the re-extracted batch, recoveries in the LCS, MS/MSD, and tributylphophate recovered within acceptable limits. Triphenylphosphate recovered above the acceptable limit in four of the 12 samples. Simazine was detected in the same environmental samples, but at a higher concentration (above the WQTL). The Coalition accepted the data in the re-extracted batch because the overall QC improved and the concentration of simazine did not show signs of degradation.

Paraquat batches for the March 3, 2014 and August 21, 2014 sampling event were re-extracted due to QC recoveries below the acceptable limit. The paraquat batch analyzed for the March 3, 2014 sampling event was re-extracted 2 days past hold time because paraquat recovered below the acceptable limit in

the LCS and MS/MSD. Paraquat was not detected in any of the environmental or field duplicate samples. In the re-extracted batch, paraquat recovered below the acceptable limit in the MS/MSD samples; however the recoveries were higher than those in the original batch. Paraquat recovered within acceptable limits in the LCS and LCSD. The paraquat batch analyzed for the August 21, 2014 sampling event was re-extracted 14 days past hold time due to recoveries below the acceptable limit in LCS/LCSD and MSD samples. All environmental and field duplicate sample results were non-detect. Recoveries in the re-extracted batch were within acceptable limits for the LCS/LCSD and MS/MSD samples. The Coalition accepted the data in both re-extracted batches, even though sample results were non-detect, due to improved recoveries in the QC samples.

VIII. B. PRECISION AND ACCURACY

A review of the number of samples analyzed and the percentage per analyte that met acceptability criteria are listed in the tables following this section (Tables 17 through 29). DQOs are addressed as follows:

- Field and laboratory blank quality control sample evaluations (Tables 17 and 20)
- Equipment and travel blank quality control sample evaluations (Table 18)
- Field precision met by analyzing field duplicates (Tables 19 and 27)
- Laboratory accuracy met by analyzing LCS and MS percent recoveries (Tables 21 and 23)
- Precision met by analyzing LCSD, MSD, and laboratory duplicates (Tables 22, 24, and 25)
- Surrogate recoveries to evaluate laboratory quality assurance (Table 26)
- Summary of holding time evaluations (Table 16)
- Laboratory quality assurance for water column toxicity tests (Table 28)
- Laboratory and field precision met when analyzing sediment grain size (Table 29)

The tables provide an overview of the precision and accuracy per analyte. All pesticides, metals, and nutrients are grouped by the analytical group to which they belong and discussed together. All data must meet the acceptable criteria listed in Tables 13-29. Data that does not meet the criteria will undergo a review and all aspects of the quality of the data will be assessed (SJCDWQC QAPP, page 59). If data is considered acceptable, the data is flagged accordingly in the CEDEN database. Batches are approved by evaluating all measures of precision and accuracy such that, although a single quality control sample may be outside of acceptability criteria, the entire batch may be accepted due to the other quality control samples within that batch meeting acceptability criteria. Overall, precision and accuracy criteria were met for more than 90% of the samples for all criteria and all data are considered usable.

VIII. B. i. Chemistry

E. coli: Positive/negative controls, positive/positive controls, and negative/negative non-coliform controls, and laboratory blanks were performed with every batch. Due to the nature of the analysis method and *E. coli* distribution within the water column, precision of *E. coli* analysis is conducted by

evaluating Rlog values of environmental and duplicate samples with the Rlog criterion developed by the laboratory using similar samples. The mean Rlog for the laboratory was calculated to be 0.40. This value multiplied by 3.27 resulted in a precision criterion of 1.30.

One hundred percent of the controls and the laboratory and field blanks for *E. coli* met acceptability criteria. One hundred percent of *E. coli* laboratory and field duplicates had Rlog values below the criteria acceptance level. The analysis for *E. coli* does not require a LCS and/or MS. Since all *E. coli* QC acceptability criteria were met and the data are useable.

Hardness: One hundred percent of hardness field and laboratory blanks were below the reporting limit. All of the hardness field duplicates were within 20% for RPDs. One hundred percent of LCSD and MSD RPDs were within 20%. All hardness data collected from January 2014 through September 2014 is useable.

Metals (dissolved): Equipment blanks were analyzed with all dissolved metal batches. Dissolved zinc results in the equipment blanks were below the RL in 89% of samples collected. One hundred percent of dissolved metal field blanks met acceptability criteria. Laboratory blanks were run with each metals batch and 100% met acceptability criteria. Laboratory Control Spikes and MS samples were analyzed with all of the dissolved metals analyses. All LCS/LCSD percent recoveries and RPDs met acceptability. Matrix spike samples recovered within acceptable limits 95% of the time. Overall, 82% of the RPDs for dissolved metal field duplicates were within 20%.

Of the nine equipment blanks analyzed for dissolved zinc, eight met the acceptability criterion. Equipment blank bottles are filled with filtered water at the sampling warehouse and placed in a cooler to be transported with the sampling crew during each monitoring event, when dissolved metals monitoring is scheduled at sites. The purpose of an equipment blank is to detect contamination in the filtration system if detections above the RL occur. When zinc was detected in the equipment blank (1.3 µg/L), the laboratory re-analyzed leftover sample volume again to confirm the contamination. The detection in the re-analyzed sample was consistent with the original result. Zinc was not detected in the field blank sample, which is filtered with the same filtration system. Therefore, the dissolved zinc detection in the equipment blank is difficult source; however, the source is unlikely from contaminated sampling equipment.

Seventy-nine percent of dissolved zinc MS samples recovered within the acceptable limits (85-115%). Five of the MS samples did not recover dissolved metals within acceptable limits and the recoveries ranged between 78% and 83%. Three of the MS samples with low recoveries were performed on NONPJ samples. Of the MS samples that recovered below the acceptable limits, Mokelumne River @ Bruella Rd was designated as the MS sample on August 19, 2014. The water at the Mokelumne River @ Bruella Rd site location is not typically turbidity and there is no indication that the water column is heterogeneous. However, the low recoveries are only slightly outside of the lower control limit. The low recoveries for dissolved zinc could be due to the quality of the extractions performed by the laboratory.

The acceptability criterion was met for dissolved nickel and dissolved zinc field duplicate samples in 44% (4 of 9) and 67% (6 of 9) of the samples, respectively. Environmental and field duplicate samples collected on February 11, April 15, May 20, June 17, and July 15 for dissolved nickel did not meet the acceptability criterion for RPDs; samples were collected from Mokelumne River @ Bruella Rd at all of these monitoring events. All results were below the RL for dissolved nickel. The high RPDs are likely due to the results being below the RL because these results are considered estimates. The RPDs for dissolved zinc in field duplicates did not meet the acceptable criterion in samples collected on January 28, April 15, and June 17, 2014; samples were collected from Mokelumne River @ Bruella Rd for all these monitoring events. The high RPDs could be attributed to the high variability associated with one result being reported below the RL.

The quality of dissolved metals data is acceptable. Within the batches for which analytes did not meet 90% acceptability overall, several other QC samples met their respective acceptability criteria. Therefore, the data are useable.

Metals (total): Travel blanks were analyzed with all total metals batches; all results were below the RL. One hundred percent of field blanks met acceptability criteria. Results were below the RL in the laboratory blanks in 97% of all total metals samples. Of the nine metals analyzed, results were below the RL in laboratory blanks for boron (91%), total copper (92%), and total nickel (90%). One hundred percent of LCS samples met the acceptability criteria. Acceptability criteria in MS/MSD samples were met in 93% of all the total metal samples. The only total metals MS/MSD samples that did not recover within limits in more than 90% of samples was total zinc; only 72% of total zinc MS samples recovered within acceptable limits. The RPDs in MS/MSD samples were less than or equal to 20% in all samples. The RPDs in the field duplicate samples were less than or equal to 20% for 84% of the samples.

Seventy-two percent of total zinc MS samples recovered within acceptable limits (26 of 36). All 10 of these samples were from NONPJ samples. In one batch where total zinc recovered below the acceptable limit, total copper also recovered below the acceptable limit in the MS sample. In another batch, boron recovered below the acceptable limit along with total zinc in the MS sample. Since the recoveries fell below the acceptable limits, potential matrix interferences were likely occurring in the NONPJ samples.

Of the nine total metals, field duplicate RPDs were less than or equal to 20% in three of the metals; cadmium, total copper, and selenium met the acceptability criteria in 100% of samples. Field duplicate samples analyzed for arsenic, boron, total lead, molybdenum, total nickel, and total zinc had RPDs that were greater than 20% in 1 or more samples. All of the total lead and total nickel results for the environmental and field duplicate samples were below the RL. There were also several sets of environmental and field duplicate samples with results for which one of the sample results were below the RL: boron (1 out of 2 sets), molybdenum (1 out of 1 set) and zinc (3 out of the 4 sets). When results are reported below the RL, the concentration measured by the laboratory can lack precision. Therefore, RPDs for duplicate samples where either both or one of the two results are below the RL can be associated with high variability be results below the RL are considered estimates. .

Nutrients: The Coalition monitors five nutrients; ammonia, nitrate + nitrite as N, total kjeldahl nitrogen (TKN), orthophosphate, and total phosphorous. The Coalition used the ammonia results received by the laboratory to calculate the fraction of unionized ammonia. Unionized ammonia values were determined by calculating the fraction of unionized ammonia in the total ammonia result based on water temperature and pH collected in the field. Ammonia and calculated unionized ammonia results can be found in Table 6 in Appendix III and Table 8 in Appendix III. Unionized ammonia values were calculated with the following formula:

Ammonia as N, unionized = Ammonia as N, total * f

Where:

f = unionized ammonia fraction of total ammonia
= $1/(10(pK_a\text{-}pH)+ 1$
pK_a = the temperature related equilibrium constant
= $0.0901821 + (2729.92/T_k)$
T_k = temperature in degrees Kelvin
= field temperature (°C) +273.2
pH = field pH

One hundred percent of ammonia as N field and laboratory blanks met acceptability criteria. Laboratory Control Spike and MS samples were analyzed with every batch; LCS and MS samples recovered within acceptable limits in 100% and 97% of samples. One hundred percent of the RPDs for the LCS/LCSD and MS/MSD were within acceptable limits. Seventy-eight percent of field duplicates had RPDs below 20% (7 of 9). The two sets of environmental and field duplicate samples with RPDs greater than 20% had at least one of the samples measured at a concentration below the RL, which are considered estimated values.

Nitrate + nitrite as N field and laboratory blanks met the acceptability criteria for 100% of the samples. Laboratory Control Spike and MS samples were analyzed with every batch; LCS and MS samples recovered within acceptable limits in 100% for both. One hundred percent of the RPDs for the LCS/LCSD and MS/MSD were less than or equal to 20%. Eighty-nine percent of field duplicates had RPDs below 20%. Only one of the nine sets of environmental and field duplicate samples did not meet the acceptability criterion. In the one set of samples with a RPD greater than 20%, one of the nitrate + nitrite as N result was below the RL.

All TKN field and laboratory blanks had concentrations that met acceptable limits. Laboratory Control Spike and MS samples were analyzed with every batch; LCS and MS samples recovered within acceptable limits in 100% and 96% of samples respectively. One hundred percent of the RPDs for the LCS/LCSD and MS/MSD were within acceptable limits. Field duplicates met the acceptance criteria (RPDs $\leq$ 20%) in 100% of the samples analyzed.

Orthophosphate as P field blanks and field duplicates met 100% acceptance criteria. Laboratory blanks were run with every batch and 100% were less than the reporting limit. Laboratory Control Spike and MS samples were analyzed with every batch; LCS and MS samples recovered within acceptable limits in 100% for both. One hundred percent of the RPDs for the LCS/LCSD and MS/MSD were within acceptable limits. Field duplicates met the acceptance criteria (RPDs $\leq$ 20%) in 100% of the samples analyzed.

Phosphorus as P field and laboratory blanks met acceptance criteria in 100% of the samples collected. Laboratory Control Spike and MS samples were analyzed with every batch; LCS and MS samples recovered within acceptable limits in 100% and 70% (14 of 20) of samples, respectively. One hundred percent of the RPDs for the LCS/LCSD and MS/MSD were within acceptable limits. Field duplicates met acceptable criteria in 89% of samples collected. Only one set of environmental and field duplicate samples had an RPD greater than 20%. The result for the environmental sample was below the RL. The high RPD is likely due to the high variability associated with low concentrations, specifically those that are reported below the RL.

Pesticides in water: Pesticides were analyzed in seven different groups: organochlorines and group A pesticides (EPA 8081A), organophosphates and triazines (EPA 8141A), carbamates and methamidophos (EPA 8321A), paraquat (EPA 549.2M), and glyphosate (EPA 547M). Group A pesticides consist of constituents that are no longer registered for use and not routinely monitored. Walthall Slough @ Woodward Ave is in a management plan for HCH isomers (alpha, beta, delta, and gamma) and is the only site where samples are collected for Group A pesticides. Samples were only collected from this site for the analysis of HCH during this reporting period.

All pesticide field and laboratory blank results were below the RL. All pesticide field duplicate sample RPDs were less than 25%. Surrogates are compounds that share similar chemical and physical properties to the target analytes. Surrogate data are used to evaluate laboratory capabilities to carry out the methods to detect the target analytes. Surrogates were run with every type of sample for each applicable pesticide analysis (surrogates are not performed for glyphosate and paraquat analysis) and in every batch. When a surrogate is recovered outside of the acceptability criteria, the associated environmental sample is flagged as well. All surrogate recoveries were within the acceptability criteria

Matrix spikes and LCS samples were analyzed in each batch to assess accuracy as well as possible matrix interference. Overall, recoveries met the acceptability criteria in 99% of LCS and 95% of MS samples. The analytes that were not recovered in 90% of the LCS run during this reporting period were: phosmet and trifluralin (89%, 8 of 9 for both). The analytes that were not recovered in 90% of MS were: paraquat (72%, 13 of 18), HCH, delta (50%, 1 of 2), chlorpyrifos (83%, 15 of 18), diazinon (89%, 16 of 18), demeton-s (83%, 15 of 18), dimethoate (89, 16 of 18), malathion (67%, 12 of 18), phorate (72%, 13 of 18), phosmet (89%, 16 of 18). Glyphosate and paraquat RPDs for LCS/LCSD were less than 25%. Laboratory control spike duplicates were not run with the other pesticide analyses. The RPDs for MS/MSD samples were not less than 25% occurred for paraquat (78%, 7 of 9), and dicofol, demeton-s, disulfoton, phosmet, and methamidophos (89%, 8 of 9).

Eighty-nine percent of phosmet and trifluralin LCS samples recovered within limits (8 of 9). One LCS sample for phosmet and trifluralin each did not meet the acceptable recovery. Phosmet recovered above the acceptable limit in the batch run for the July 15, 2014 sampling event. Within the same batch chlorpyrifos, malathion, phorate, and triphenylphosphate recovered above the acceptable limit in the MS sample. In the same batch, there was a detection of dichlorvos and a detection of atrazine. Trifluralin recovered below the acceptable limit for the April 17, 2014 sampling event. Within the same batch, tributyl phosphate recovered above the acceptable limit in samples collected from Mokelumne River @ Bruella Rd and disulfoton recovered below the acceptable limit in the MS sample. In the same batch, all sample results were non-detect.

Samples were collected for paraquat analyses every month; MS samples did not recover within acceptable limits in batches analyzed for the January 28, February 11, March 3, and September 16, 2014 sampling events at Mokelumne River @ Bruella Rd. Only one of the two MS samples in each of the batches for the sampling events from January through March met the acceptability criteria. Within the same batches, the LCS/LCSD recoveries were within limits. Both of the paraquat MS samples analyzed in the batch for the September 16, 2014 sampling event did not meet acceptability; however, both LCS samples met the acceptability criteria. Paraquat strongly binds to suspended organic particles in the water column and the extraction process is ineffective when levels of particles are high. The turbidity results for the site ranged from 0.75 - 1.80 NTU during the sampling events. However, EPA method 549.2 indicates that hard water samples could result in low recoveries by interferences with the ion exchange process. The hardness of Mokelumne River @ Bruella Rd was consistently 110 mg/L during these sampling events. Therefore, the poor recoveries were attributed to the combination of the hardness of the water samples and an extraction that was not rigorous enough to recover the spiked concentration. All sample results were non-detect in the batches and data were accepted.

Samples were collected for HCH isomers analysis only once in January during MPM at Walthall Slough @ Woodward Ave. All of the HCH isomers recovered within the acceptable MS limits except HCH, delta. One of the two MS samples recovered HCH, delta above the acceptable limit (98%). The acceptable MS limits for HCH, delta are 12-97%. Therefore, the recovery of the one MS that did not meet the acceptability criteria recovered only slightly over the upper limit. Due to the limited times samples are collected for the analysis of HCH isomers, assuring the required 90% acceptability is met is difficult. The data were accepted based on the other QC meeting their respective DQOs.

Seven organophosphate MS analytes (chlorpyrifos, diazinon, demeton-s, dimethoate, diazinon, malathion, phorate, and phosmet) did not meet acceptability in 90% of MS/MSD samples. The analytes did not meet MS sample acceptability in five separate batches. In all five batches, the analytes recovered above the acceptable limits. In three of the batches, all environmental results were non-detect. In another batch, chlorpyrifos, malathion, phorate, and phosmet recovered above the acceptable limit in the MS samples. A detection of atrazine and dichlorvos occurred in one sample. In another batch, malathion recovered above the acceptable limit and there was a detection of simazine in a sample. The data in these batches were accepted because the analytes that recovered above

acceptable limits were not detected in any samples and the analytes that were detected in the environmental samples recovered within acceptable limits (Table 26).

Total Dissolved Solids (TDS): Field and laboratory blanks met acceptability criteria for 100% of the samples analyzed. The LCS samples met acceptability criteria for 100% of the samples analyzed. The RPDs were less than 20% for 100% of the laboratory duplicates analyzed for TDS. Matrix spikes are not performed for TDS analysis. Field duplicates met acceptability criteria for 89% of the TDS samples analyzed. All TDS QC samples analyzed met their respective acceptability criteria in 97% of the samples.

Eight of the nine field duplicate samples collected had RPDs within 20%. The one environmental and associated field duplicate that did not meet the acceptable RPD occurred during the April 15, 2014 sampling event. The RPD also exceeded 20% for TSS in the analysis for the same sampling event. The coinciding RPDs for TDS and TSS exceeding the acceptability criterion indicate the water was heterogeneous during the side by side collection.

Total Organic Carbon (TOC) in water: One hundred percent of field and laboratory blank results were below the RL. One hundred percent of field duplicates had RPDs less than or equal to 20%. One hundred percent of LCS/LCSD samples met acceptance criteria. Ninety-three percent of TOC MS samples were within QC limits and 100% of MSD samples analyzed met acceptability requirements; therefore all data are useable.

Total Suspended Solids (TSS): One hundred percent of field and laboratory blanks met acceptability criteria. One hundred percent of LCS samples met acceptability. Laboratory duplicates were performed for TSS and RPDs were within 20% in 100% of the samples.

Seventy-eight percent of field duplicate RPDs were less than 20% (7 of 9). In one batch, the duplicate TSS results was below the RL, which are low concentrations and considered estimates. In another batch, both TSS concentrations were low (4 mg/L and 6 mg/L), while the RL for TSS is 3 mg/L. The precision of low-level concentrations are more variable and that is likely the reason for the high RPD in this case.

Turbidity: One hundred percent of turbidity field and laboratory blanks results were below the RL. Laboratory Control Spikes were analyzed with each turbidity batch and recoveries were within acceptable limits. Laboratory duplicates met the acceptability criteria in 100% of samples. The RPDs between the environmental and field duplicate samples were less than or equal to 20% in 100% of samples.

Sediment Pesticides: Sediment samples are collected for toxicity to *Hyalella azteca* twice a year; during this reporting period, sediment samples were collected in March and September 2014. If survival of *H. azteca* is less than 80% compared to the control, sediments are analyzed for pyrethroids and chlorpyrifos. There were no sediment toxicities and therefore, no sediment pesticides analyses occurred at sites in the SJCDWC region.

Sediment Grain Size and TOC: Sediment samples are collected twice a year; during this reporting period, sediment samples were collected in March and September 2014. Sediment grain size and TOC were analyzed for sediments collected at all sites scheduled for monitoring in March and September.

Relative standard deviation is used to assess precision of grain size of the environmental and field duplicate samples instead of RPDs because grain size is reported as percentages of sediment composition (silt, clay, etc.). Therefore, precision of grain size is addressed as RSD throughout this section. The total standard deviation of each grain size class in a sample is calculated using the Folk and Ward 1957 logarithmic equation:

Individual grain size classes are reported as a percentage based on the composition of the entire sample and therefore are not values that can be evaluated individually (they are not independent from other percentages in the sample). Therefore it is more accurate to assess precision of the entire sample rather than each grain size class for both field and laboratory duplicates. The grain size standard deviation (SD) for all classes of a single sample was calculated using the following Folk and Ward (1957) Logarithmic equation:

$$SD = \sigma 1 = \frac{\Phi_{84} - \Phi_{16}}{4} + \frac{\Phi_{95} - \Phi_{5}}{6.6}$$

Where Φ_{84} = phi value of the 84th percentile sediment grain size category
Φ_{16} = phi value of the 16th percentile sediment grain size category
Φ_{95} = phi value of the 95th percentile sediment grain size category
Φ_{5} = phi value of the 5th percentile sediment grain size category

The RSD is traditionally defined as the standard deviation divided by the mean multiplied by 100 (equivalent to the Coefficient of Variation). Precision was calculated based on the relative percent difference between the standard deviation of the environmental sample and the standard deviation of a duplicate sample using the following formula

$$RPD_{SD} = \left| \frac{2(SD_i - SD_D)}{(SD_i + SD_D)} \right| \times 100$$

SD_i= standard deviation of the initial or environmental sample based on the Folk and War Logarithmic equation
SD_D= standard deviation of the field or laboratory duplicate sample based on the Folk and War Logarithmic equation

Field and laboratory duplicates are used to assess precision for sediment grain size and TOC; the acceptable RSD (grain size) and RPD (TOC) is ≤ 20% (Table 29). Fifty percent of RSDs in field duplicate samples were within 20%. The one out of two field duplicate samples that did not meet acceptability had an RSD that was 21.12, which is only a slight difference above the acceptable limit. One hundred percent of field duplicate samples for TOC were within acceptable limits. One hundred percent of the laboratory duplicates for sediment grain size and TOC were within the acceptable limits.

VIII. B. ii. Toxicity

For water column toxicity testing, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include monthly reference toxicant testing and negative and solvent controls (for TIEs). Test acceptability requirements are documented in the method documents for each bioassay method and are included in the SJCDWQC QAPP.

Water Column Toxicity: Field duplicates were collected during every monitoring event where water column toxicity samples were collected. Samples were tested for toxicity to one or more of the following test species: *C. dubia*, *S. capricornutum* and *P. promelas*. The field duplicate RPDs for all species met acceptability (RPD $\leq$25%) with the exception of *S. capricornutum*. Ninety-percent of *S. capricornutum* field duplicates met acceptability (Table 27). All laboratory controls (CNEGs) met acceptability criteria (Table 28).

Sediment Toxicity: Sediment samples were collected on March 5 and September 16, 2014 for this reporting period. Two field duplicates were collected and both had FD RPDs less than 25%. All laboratory controls (CNEGS) met acceptability criteria (Table 28).

VIII. C. CORRECTIVE ACTIONS

Corrective actions for QA/QC results that did not meet acceptance criteria were addressed during the reporting period from January through September 2014. Corrective actions were performed by Coalition laboratories as outlined in the SJCDWQC QAPP (approved on February 23, 2011). Some of the corrective actions, such as rationale for re-extractions, are explained in the above sections. The few instances that warrant additional details are provided below.

Hold time violations occurred for 3% of all Coalition samples collected from January through September 2014. Hold time violations occurred as a result of corrective actions performed by the laboratory to address QC samples not meeting DQOs. The Coalition accepted data with hold time violations because 1) concentrations of an analyte detected in a sample did not show signs of degradation 2) recoveries of QC samples were acceptable upon re-extractions outside of hold time. In some cases recoveries in the re-extracted samples did not meet the acceptability criteria, but data were accepted because overall the recoveries improved.

During MPM for HCH isomers analyses, MS samples were not collected in the field. However, the laboratory analyzed a NONPJ sample with the batch to meet batch completeness requirements. Non-project samples are acceptable to preserve batch completeness. The sampling crew is now aware that QC needs to be collected for HCH isomers during scheduled monitoring events. No further corrective action is necessary.

Table 13. SJCDWQC field and transport and analytical completeness: environmental sample counts and percentages.

Samples collected from January through September 2014. . The table counts environmental grabs only; field duplicates are not included. Each constituent is sorted by method and in alphabetical order. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Env. Samples Scheduled	Dry sites	Env. Samples Collected	Field and Transport Completeness (%)	Env. Samples Analyzed	Analytical Completeness (%)
EPA 8321A CARB	Aldicarb	42	0	42	100.00	42	100.00
EPA 8321A CARB	Carbaryl	42	0	42	100.00	42	100.00
EPA 8321A CARB	Carbofuran	42	0	42	100.00	42	100.00
EPA 8321A CARB	Methiocarb	42	0	42	100.00	42	100.00
EPA 8321A CARB	Methomyl	42	0	42	100.00	42	100.00
EPA 8321A CARB	Oxamyl	42	0	42	100.00	42	100.00
EPA 8321A CARB	Diuron	44	0	44	100.00	44	100.00
EPA 8321A CARB	Linuron	42	0	42	100.00	42	100.00
EPA 547M	Glyphosate	42	0	42	100.00	42	100.00
EPA 549.2M	Paraquat	42	0	42	100.00	42	100.00
EPA 8081A	DDD(p,p')	42	0	42	100.00	42	100.00
EPA 8081A	DDE(p,p')	42	0	42	100.00	42	100.00
EPA 8081A	DDT(p,p')	42	0	42	100.00	42	100.00
EPA 8081A	Dicofol	42	0	42	100.00	42	100.00
EPA 8081A	Dieldrin	45	0	45	100.00	45	100.00
EPA 8081A	Endrin	42	0	42	100.00	42	100.00
EPA 8081A	Methoxychlor	42	0	42	100.00	42	100.00
EPA 8081A	HCH, alpha-	1	0	1	100.00	1	100.00
EPA 8081A	HCH, beta-	1	0	1	100.00	1	100.00
EPA 8081A	HCH, delta-	1	0	1	100.00	1	100.00
EPA 8081A	HCH, gamma-	1	0	1	100.00	1	100.00
EPA 8141A	Azinphos methyl	42	0	42	100.00	42	100.00
EPA 8141A	Chlorpyrifos	96	1	95	100.00	95	100.00
EPA 8141A	Diazinon	62	0	62	100.00	62	100.00
EPA 8141A	Dichlorvos	42	0	42	100.00	42	100.00
EPA 8141A	Dimethoate	42	0	42	100.00	42	100.00
EPA 8141A	Demeton-s	42	0	42	100.00	42	100.00
EPA 8141A	Disulfoton	45	0	45	100.00	45	100.00
EPA 8141A	Malathion	45	0	45	100.00	45	100.00
EPA 8141A	Methidathion	42	0	42	100.00	42	100.00
EPA 8141A	Parathion, Methyl	42	0	42	100.00	42	100.00
EPA 8141A	Phorate	42	0	42	100.00	42	100.00
EPA 8141A	Phosmet	42	0	42	100.00	42	100.00
EPA 8141A	Trifluralin	42	0	42	100.00	42	100.00
EPA 8141A	Atrazine	42	0	42	100.00	42	100.00
EPA 8141A	Cyanazine	42	0	42	100.00	42	100.00
EPA 8141A	Simazine	42	0	42	100.00	42	100.00
EPA 8321A	Methamidophos	42	0	42	100.00	42	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	51	0	51	100.00	51	100.00
SM 2540 C	Total Dissolved Solids	60	0	60	100.00	60	100.00
SM 2540 D	Total Suspended Solids	60	0	60	100.00	60	100.00
EPA 180.1	Turbidity	60	0	60	100.00	60	100.00

Method	Analyte	Env. Samples Scheduled	Dry sites	Env. Samples Collected	Field and Transport Completeness (%)	Env. Samples Analyzed	Analytical Completeness (%)
SM 4500-NH3 C v20	Ammonia as N	60	0	60	100.00	60	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	60	0	60	100.00	60	100.00
EPA 353.2	Nitrate + Nitrite as N	60	0	60	100.00	60	100.00
SM 4500-P E	OrthoPhosphate as P	60	0	60	100.00	60	100.00
SM 4500-P E	Phosphorus as P	60	0	60	100.00	60	100.00
SM 5310 B	Total Organic Carbon (Water)	60	0	60	100.00	60	100.00
SM 9223B	*E. coli*	60	0	60	100.00	60	100.00
EPA 200.8	Arsenic	42	0	42	100.00	42	100.00
EPA 200.8	Boron	42	0	42	100.00	42	100.00
EPA 200.8	Cadmium (Total)	42	0	42	100.00	42	100.00
EPA 200.8	Copper (Total)	51	0	51	100.00	51	100.00
EPA 200.8	Lead (Total)	42	0	42	100.00	42	100.00
EPA 200.8	Molybdenum	42	0	42	100.00	42	100.00
EPA 200.8	Nickel (Total)	42	0	42	100.00	42	100.00
EPA 200.8	Selenium	42	0	42	100.00	42	100.00
EPA 200.8	Zinc (Total)	42	0	42	100.00	42	100.00
EPA 200.8	Cadmium (Dissolved)	42	0	42	100.00	42	100.00
EPA 200.8	Copper (Dissolved)	51	0	51	100.00	51	100.00
EPA 200.8	Lead (Dissolved)	42	0	42	100.00	42	100.00
EPA 200.8	Nickel (Dissolved)	42	0	42	100.00	42	100.00
EPA 200.8	Zinc (Dissolved)	42	0	42	100.00	42	100.00
Walkley-Black	Total Organic Carbon (Sediment)	25	0	25	100.00	25	100.00
ASTM D4464M, ASTM D422	Sediment Grain Size	25	0	25	100.00	25	100.00
EPA 8270M_NCI	Bifenthrin	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Permethrin	NA	NA	NA	NA	NA	NA
EPA 600/R-99-064	*Hyalella azteca*	25	0	25	100.00	25	100.00
EPA 821/R-02-012	*Ceriodaphnia dubia*	56	1	55	100.00	55	100.00
EPA 821/R-02-012	*Pimephales promelas*	48	0	48	100.00	48	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	63	0	63	100.00	63	100.00
	TOTAL	**3016**	**2**	**3014**	**100.00**	**3014**	**100.00**

Table 14. SJCDWQC field and transport completeness: field parameter counts and percentages.

Samples collected from January through September 2014. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Samples Scheduled[1]	Dry Sites	Measurements taken[2]	Completeness (%)
USGS R2Cross streamflow	Discharge, cfs	113	1	56	**50.44**
SM 4500-O	Dissolved Oxygen, mg/L	143	1	135	95.10
EPA 150.1	pH	143	1	142	100.00
EPA 120.1	Specific Conductivity, uS/cm	143	1	142	100.00
SM 2550	Temperature, Deg C	143	1	142	100.00
	TOTAL	**685**	**5**	**617**	**90.01**

[1]Discharge is not measured at sites scheduled for toxicity monitoring only and is excluded I the count for samples scheduled.

[2]Dissolved oxygen was not measured at seven sites due to a recording error.

Table 15. SJCDWQC QC batch completeness: field quality, and field parameter counts and percentages.

Samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8321A CARB	Aldicarb	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Carbaryl	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Carbofuran	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Methiocarb	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Methomyl	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Oxamyl	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A CARB	Diuron	44	62	9	14.52	9	14.52	NA	NA	NA	NA
EPA 8321A CARB	Linuron	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 547M	Glyphosate	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 549.2M	Paraquat	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	DDD(p,p')	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	DDE(p,p')	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	DDT(p,p')	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	Dicofol	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	Dieldrin	45	63	9	14.29	9	14.29	NA	NA	NA	NA
EPA 8081A	Endrin	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	Methoxychlor	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8081A	HCH, alpha-	1	10	0	0.00	9	90.00	NA	NA	NA	NA
EPA 8081A	HCH, beta-	1	10	0	0.00	9	90.00	NA	NA	NA	NA
EPA 8081A	HCH, delta-	1	10	0	0.00	9	90.00	NA	NA	NA	NA
EPA 8081A	HCH, gamma-	1	10	0	0.00	9	90.00	NA	NA	NA	NA

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8141A	Azinphos methyl	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Chlorpyrifos	95	113	9	7.96	9	7.96	NA	NA	NA	NA
EPA 8141A	Diazinon	62	80	9	11.25	9	11.25	NA	NA	NA	NA
EPA 8141A	Dichlorvos	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Dimethoate	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Demeton-s	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Disulfoton	45	63	9	14.29	9	14.29	NA	NA	NA	NA
EPA 8141A	Malathion	45	63	9	14.29	9	14.29	NA	NA	NA	NA
EPA 8141A	Methidathion	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Parathion, Methyl	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Phorate	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Phosmet	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Trifluralin	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Atrazine	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Cyanazine	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8141A	Simazine	42	60	9	15.00	9	15.00	NA	NA	NA	NA
EPA 8321A	Methamidophos	42	60	9	15.00	9	15.00	NA	NA	NA	NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	51	69	9	13.04	9	13.04	NA	NA	NA	NA
SM 2540 C	Total Dissolved Solids	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 2540 D	Total Suspended Solids	60	78	9	11.54	9	11.54	NA	NA	NA	NA
EPA 180.1	Turbidity	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	60	78	9	11.54	9	11.54	NA	NA	NA	NA

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 353.2	Nitrate + Nitrite as N	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 4500-P E	OrthoPhosphate as P	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 4500-P E	Phosphorus as P	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	60	78	9	11.54	9	11.54	NA	NA	NA	NA
SM 9223B	*E. coli*	60	78	9	11.54	9	11.54	NA	NA	NA	NA
EPA 200.8	Arsenic	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Boron	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Cadmium (Total)	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Copper (Total)	51	78	9	11.54	9	11.54	NA	NA	9	11.54
EPA 200.8	Lead (Total)	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Molybdenum	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Nickel (Total)	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Selenium	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Zinc (Total)	42	69	9	13.04	9	13.04	NA	NA	9	13.04
EPA 200.8	Cadmium (Dissolved)	42	69	9	13.04	9	13.04	9	13.04	NA	NA
EPA 200.8	Copper (Dissolved)	51	78	9	11.54	9	11.54	9	11.54	NA	NA
EPA 200.8	Lead (Dissolved)	42	69	9	13.04	9	13.04	9	13.04	NA	NA
EPA 200.8	Nickel (Dissolved)	42	69	9	13.04	9	13.04	9	13.04	NA	NA
EPA 200.8	Zinc (Dissolved)	42	69	9	13.04	9	13.04	9	13.04	NA	NA
Walkley-Black	Total Organic Carbon (Sediment)	25	27	NA	NA	2	7.41	NA	NA	NA	NA
ASTM D4464M, ASTM D422	Sediment Grain Size	25	27	NA	NA	2	7.41	NA	NA	NA	NA

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8270M_NCI	Bifenthrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 8270M_NCI	Permethrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA 600/R-99-064	*Hyalella azteca*	25	27	NA	0.00	2	7.41	NA	NA	NA	NA
EPA 821/R-02-012	*Ceriodaphnia dubia*	55	65	NA	0.00	10	15.38	NA	NA	NA	NA
EPA 821/R-02-012	*Pimephales promelas*	48	58	NA	0.00	10	17.24	NA	NA	NA	NA
EPA 821/R-02-013	*Selenastrum capricornutum*	63	73	NA	0.00	10	13.70	NA	NA	NA	NA
TOTAL		**3014**	**4274**	**531**	**12.42**	**603**	**14.11**	**45**	**12.71**	**81**	**12.86**

Table 16. SJCDWQC summary of holding time evaluations for environmental, field blank, field duplicate and matrix spike samples.

Samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Samples Analyzed (Total)	Samples within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	7 days	69	69	100.00
EPA 8321A CARB	Carbaryl	7 days	69	69	100.00
EPA 8321A CARB	Carbofuran	7 days	69	69	100.00
EPA 8321A CARB	Methiocarb	7 days	69	69	100.00
EPA 8321A CARB	Methomyl	7 days	69	69	100.00
EPA 8321A CARB	Oxamyl	7 days	69	69	100.00
EPA 8321A CARB	Diuron	7 days	71	71	100.00
EPA 8321A CARB	Linuron	7 days	69	69	100.00
EPA 8141A	Atrazine	7 days	69	62	**89.86**
EPA 8141A	Cyanazine	7 days	69	62	**89.86**
EPA 8141A	Simazine	7 days	69	62	**89.86**
EPA 547M	Glyphosate	14 days	69	69	100.00
EPA 549.2M	Paraquat	7 days	69	54	**78.26**
EPA 8081A	DDD(p,p')	7 days	69	69	100.00
EPA 8081A	DDE(p,p')	7 days	69	69	100.00
EPA 8081A	DDT(p,p')	7 days	69	69	100.00
EPA 8081A	Dicofol	7 days	69	69	100.00
EPA 8081A	Dieldrin	7 days	72	72	100.00
EPA 8081A	Endrin	7 days	69	69	100.00
EPA 8081A	Methoxychlor	7 days	69	69	100.00
EPA 8081A	HCH, alpha-	7 days	2	2	100.00
EPA 8081A	HCH, beta-	7 days	2	2	100.00
EPA 8081A	HCH, delta-	7 days	2	2	100.00
EPA 8081A	HCH, gamma-	7 days	2	2	100.00
EPA 8141A	Azinphos methyl	7 days	69	62	**89.86**
EPA 8141A	Chlorpyrifos	7 days	122	114	93.44
EPA 8141A	Diazinon	7 days	89	82	92.13
EPA 8141A	Dichlorvos	7 days	69	62	**89.86**
EPA 8141A	Dimethoate	7 days	69	62	**89.86**
EPA 8141A	Demeton-s	7 days	69	62	**89.86**
EPA 8141A	Disulfoton	7 days	72	65	90.28
EPA 8141A	Malathion	7 days	72	65	90.28
EPA 8141A	Methidathion	7 days	69	62	**89.86**

Method	Analyte	Data Quality Objective	Samples Analyzed (Total)	Samples within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8141A	Parathion, Methyl	7 days	69	62	**89.86**
EPA 8141A	Phorate	7 days	69	62	**89.86**
EPA 8141A	Phosmet	7 days	69	62	**89.86**
EPA 8141A	Trifluralin	7 days	69	62	**89.86**
EPA 8321A	Methamidophos	7 days	69	69	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	6 months	78	78	100.00
SM 2540 C	Total Dissolved Solids	7 days	78	78	100.00
SM 2540 D	Total Suspended Solids	7 days	78	78	100.00
EPA 180.1	Turbidity	48 hours	78	78	100.00
SM 4500-NH3 C v20	Ammonia as N	Field acidify, 28 days	94	94	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	Field acidify, 28 days	92	92	100.00
EPA 353.2	Nitrate + Nitrite as N	Field acidify, 28 days	87	87	100.00
SM 4500-P E	OrthoPhosphate as P	48 hours	87	87	100.00
SM 4500-P E	Phosphorus as P	Field acidify, 28 days	88	88	100.00
SM 5310 B	Total Organic Carbon (Water)	28 days	93	93	100.00
SM 9223B	*E. coli*	24 hours	78	78	100.00
EPA 200.8	Arsenic	Field acidify, 6 months	80	80	100.00
EPA 200.8	Boron	Field acidify, 6 months	82	82	100.00
EPA 200.8	Cadmium (Total)	Field acidify, 6 months	80	80	100.00
EPA 200.8	Copper (Total)	Field acidify, 6 months	93	93	100.00
EPA 200.8	Lead (Total)	Field acidify, 6 months	81	81	100.00
EPA 200.8	Molybdenum	Field acidify, 6 months	80	80	100.00
EPA 200.8	Nickel (Total)	Field acidify, 6 months	80	80	100.00
EPA 200.8	Selenium	Field acidify, 6 months	80	80	100.00
EPA 200.8	Zinc (Total)	Field acidify, 6 months	87	87	100.00
EPA 200.8	Cadmium (Dissolved)	Field acidify, 6 months	79	79	100.00
EPA 200.8	Copper (Dissolved)	Field acidify, 6 months	90	90	100.00
EPA 200.8	Lead (Dissolved)	Field acidify, 6 months	79	79	100.00
EPA 200.8	Nickel (Dissolved)	Field acidify, 6 months	79	79	100.00
EPA 200.8	Zinc (Dissolved)	Field acidify, 6 months	81	81	100.00
Walkley-Black	Total Organic Carbon (Sediment)	Freeze or analyze within 28 days	27	27	100.00
ASTM D4464M,ASTM D422	Sediment Grain Size	Analyze within 28 days	27	27	100.00
EPA 8270M_NCI	Bifenthrin	Freeze within 48 hours; 12 months	NA	NA	NA

Method	Analyte	Data Quality Objective	Samples Analyzed (Total)	Samples within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8270M_NCI	Chlorpyrifos	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 8270M_NCI	Permethrin	Freeze within 48 hours; 12 months	NA	NA	NA
EPA 600/R-99-064	*Hyalella azteca*	Store at ≤6°C do not freeze, 14 days	27	27	100.00
EPA 821/R-02-012	*Ceriodaphnia dubia*	Store at ≤6°C, 36 Hours	65	65	100.00
EPA 821/R-02-012	*Pimephales promelas*	Store at ≤6°C, 36 Hours	58	58	100.00
EPA 821/R-02-012	*Selenastrum Capricornutum*	Store at ≤6°C, 36 Hours	73	73	100.00
		TOTAL	**4797**	**4669**	**97.33**

Table 17. SJCDWQC summary of field blank quality control sample evaluations.

Samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Field Blanks (Total)	Field Blanks within Control Limits (Total)	Field Blanks within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Carbaryl	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Carbofuran	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Methiocarb	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Methomyl	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Oxamyl	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Diuron	<RL or < (env sample/5)	9	9	100.00
EPA 8321A CARB	Linuron	<RL or < (env sample/5)	9	9	100.00
EPA 547M	Glyphosate	<RL or < (env sample/5)	9	9	100.00
EPA 549.2M	Paraquat	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	DDD(p,p')	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	DDE(p,p')	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	DDT(p,p')	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	Dicofol	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	Dieldrin	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	Endrin	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	Methoxychlor	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	HCH, alpha-	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	HCH, beta-	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	HCH, delta-	<RL or < (env sample/5)	9	9	100.00
EPA 8081A	HCH, gamma-	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Azinphos methyl	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Chlorpyrifos	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Diazinon	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Dichlorvos	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Dimethoate	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Demeton-s	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Disulfoton	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Malathion	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Methidathion	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Parathion, Methyl	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Phorate	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Phosmet	<RL or < (env sample/5)	9	9	100.00

Method	Analyte	Data Quality Objective	Field Blanks (Total)	Field Blanks within Control Limits (Total)	Field Blanks within Acceptable Limits (%)
EPA 8141A	Trifluralin	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Atrazine	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Cyanazine	<RL or < (env sample/5)	9	9	100.00
EPA 8141A	Simazine	<RL or < (env sample/5)	9	9	100.00
EPA 8321A	Methamidophos	<RL or < (env sample/5)	9	9	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL or < (env sample/5)	9	9	100.00
SM 2540 C	Total Dissolved Solids	<RL or < (env sample/5)	9	9	100.00
SM 2540 D	Total Suspended Solids	<RL or < (env sample/5)	9	9	100.00
EPA 180.1	Turbidity	<RL or < (env sample/5)	9	9	100.00
SM 4500-NH3 C v20	Ammonia as N	<RL or < (env sample/5)	9	9	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	<RL or < (env sample/5)	9	9	100.00
EPA 353.2	Nitrate + Nitrite as N	<RL or < (env sample/5)	9	9	100.00
SM 4500-P E	OrthoPhosphate as P	<RL or < (env sample/5)	9	9	100.00
SM 4500-P E	Phosphorus as P	<RL or < (env sample/5)	9	9	100.00
SM 5310 B	Total Organic Carbon	<RL or < (env sample/5)	9	9	100.00
SM 9223B	*E. coli*	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Arsenic	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Boron	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Cadmium (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Copper (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Lead (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Molybdenum	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Nickel (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Selenium	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Zinc (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Zinc (Dissolved)	<RL or < (env sample/5)	9	9	100.00
Walkley-Black	Total Organic Carbon (Sediment)	NA	NA	NA	NA
ASTM D4464M, ASTM D422	Sediment Grain Size	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	NA	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	NA	NA	NA	NA

Method	Analyte	Data Quality Objective	Field Blanks (Total)	Field Blanks within Control Limits (Total)	Field Blanks within Acceptable Limits (%)
EPA 8270M_NCI	Cyfluthrin	NA	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	NA	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	NA	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	NA	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	NA	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	NA	NA	NA	NA
EPA 8270M_NCI	Permethrin	NA	NA	NA	NA
TOTAL			**567**	**567**	**100.00**

NA- Not applicable

Table 18. SJCDWQC summary of travel blank (total metals) and equipment blank (dissolved metals) quality control sample evaluations.

Samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Blanks (Total)	Blanks Within Control Limits (Total)	Blanks within Acceptable Limits (%)
EPA 200.8	Arsenic	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Boron	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Cadmium (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Copper (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Lead (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Molybdenum	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Nickel (Total)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Selenium	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Zinc (Total)	<RL or < (env sample/5)	9	9	100.00
		TOTAL	**81**	**81**	**100.00**
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Zinc (Dissolved)	<RL or < (env sample/5)	9	8	**88.89**
		TOTAL	**45**	**44**	**97.78**

Table 19. SJCDWQC summary of field duplicate quality control sample evaluations.

Samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Field Duplicate Samples (Total)	Samples Within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Carbaryl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Carbofuran	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Oxamyl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Diuron	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	9	9	100.00
EPA 547M	Glyphosate	RPD ≤ 25	9	9	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	9	9	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	Dicofol	RPD ≤ 25	9	9	100.00
EPA 8081A	Dieldrin	RPD ≤ 25	9	9	100.00
EPA 8081A	Endrin	RPD ≤ 25	9	9	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	9	9	100.00
EPA 8081A	HCH, alpha-	RPD ≤ 25	9	9	100.00
EPA 8081A	HCH, beta-	RPD ≤ 25	9	9	100.00
EPA 8081A	HCH, delta-	RPD ≤ 25	9	9	100.00
EPA 8081A	HCH, gamma-	RPD ≤ 25	9	9	100.00
EPA 8141A	Azinphos methyl	RPD ≤ 25	9	9	100.00
EPA 8141A	Chlorpyrifos	RPD ≤ 25	9	9	100.00
EPA 8141A	Diazinon	RPD ≤ 25	9	9	100.00
EPA 8141A	Dichlorvos	RPD ≤ 25	9	9	100.00
EPA 8141A	Dimethoate	RPD ≤ 25	9	9	100.00
EPA 8141A	Demeton-s	RPD ≤ 25	9	9	100.00
EPA 8141A	Disulfoton	RPD ≤ 25	9	9	100.00
EPA 8141A	Malathion	RPD ≤ 25	9	9	100.00
EPA 8141A	Methidathion	RPD ≤ 25	9	9	100.00
EPA 8141A	Parathion, Methyl	RPD ≤ 25	9	9	100.00
EPA 8141A	Phorate	RPD ≤ 25	9	9	100.00
EPA 8141A	Phosmet	RPD ≤ 25	9	9	100.00

Method	Analyte	Data Quality Objective	Field Duplicate Samples (Total)	Samples Within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8141A	Trifluralin	RPD ≤ 25	9	9	100.00
EPA 8141A	Atrazine	RPD ≤ 25	9	9	100.00
EPA 8141A	Cyanazine	RPD ≤ 25	9	9	100.00
EPA 8141A	Simazine	RPD ≤ 25	9	9	100.00
EPA 8321A	Methamidophos	RPD ≤ 25	9	9	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 25	9	9	100.00
SM 2540 C	Total Dissolved Solids	RPD ≤ 20	9	8	**88.89**
SM 2540 D	Total Suspended Solids	RPD ≤ 20	9	7	**77.78**
EPA 180.1	Turbidity	RPD ≤ 20	9	9	100.00
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	9	7	**77.78**
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	RPD ≤ 20	9	9	100.00
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	9	8	**88.89**
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	9	9	100.00
SM 4500-P E	Phosphorus as P	RPD ≤ 20	9	8	**88.89**
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	9	9	100.00
SM 9223B	*E. coli*	Rlog ≤ 1.30	9	9	100.00
EPA 200.8	Arsenic	RPD ≤ 20	9	8	**88.89**
EPA 200.8	Boron	RPD ≤ 20	9	7	**77.78**
EPA 200.8	Cadmium (Total)	RPD ≤ 20	9	9	100.00
EPA 200.8	Copper (Total)	RPD ≤ 20	9	9	100.00
EPA 200.8	Lead (Total)	RPD ≤ 20	9	6	**66.67**
EPA 200.8	Molybdenum	RPD ≤ 20	9	8	**88.89**
EPA 200.8	Nickel (Total)	RPD ≤ 20	9	7	**77.78**
EPA 200.8	Selenium	RPD ≤ 20	9	9	100.00
EPA 200.8	Zinc (Total)	RPD ≤ 20	9	5	**55.56**
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	9	9	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	9	9	100.00
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	9	9	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	9	4	**44.44**
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	9	6	**66.67**
Walkley-Black	Total Organic Carbon (sediment)	RPD ≤ 20	2	2	100.00
ASTM D4464M, ASTM D422	Sediment Grain Size	RSD <20	2	1	**50.00**
EPA 8270M_NCI	Bifenthrin	RPD <25	NA	NA	NA

Method	Analyte	Data Quality Objective	Field Duplicate Samples (Total)	Samples Within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8270M_NCI	Chlorpyrifos	RPD <25	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	RPD <25	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD <25	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Permethrin	RPD <25	NA	NA	NA
TOTAL			**571**	**542**	**94.92**

NA- Not applicable

Table 20. SJCDWQC summary of method blank quality control sample evaluations.

Samples analyzed in batches with samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Number of Laboratory Blanks (Total)	Laboratory Blanks within Control Limits (Total)	Laboratory Blanks within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	<RL	9	9	100.00
EPA 8321A CARB	Carbaryl	<RL	9	9	100.00
EPA 8321A CARB	Carbofuran	<RL	9	9	100.00
EPA 8321A CARB	Methiocarb	<RL	9	9	100.00
EPA 8321A CARB	Methomyl	<RL	9	9	100.00
EPA 8321A CARB	Oxamyl	<RL	9	9	100.00
EPA 8321A CARB	Diuron	<RL	9	9	100.00
EPA 8321A CARB	Linuron	<RL	9	9	100.00
EPA 547M	Glyphosate	<RL	9	9	100.00
EPA 549.2M	Paraquat	<RL	9	9	100.00
EPA 8081A	DDD(p,p')	<RL	9	9	100.00
EPA 8081A	DDE(p,p')	<RL	9	9	100.00
EPA 8081A	DDT(p,p')	<RL	9	9	100.00
EPA 8081A	Dicofol	<RL	9	9	100.00
EPA 8081A	Dieldrin	<RL	9	9	100.00
EPA 8081A	Endrin	<RL	9	9	100.00
EPA 8081A	Methoxychlor	<RL	9	9	100.00
EPA 8081A	HCH, alpha-	<RL	1	1	100.00
EPA 8081A	HCH, beta-	<RL	1	1	100.00
EPA 8081A	HCH, delta-	<RL	1	1	100.00
EPA 8081A	HCH, gamma-	<RL	1	1	100.00
EPA 8141A	Azinphos methyl	<RL	9	9	100.00
EPA 8141A	Chlorpyrifos	<RL	9	9	100.00
EPA 8141A	Diazinon	<RL	9	9	100.00
EPA 8141A	Dichlorvos	<RL	9	9	100.00
EPA 8141A	Dimethoate	<RL	9	9	100.00
EPA 8141A	Demeton-s	<RL	9	9	100.00
EPA 8141A	Disulfoton	<RL	9	9	100.00
EPA 8141A	Malathion	<RL	9	9	100.00
EPA 8141A	Methidathion	<RL	9	9	100.00
EPA 8141A	Parathion, Methyl	<RL	9	9	100.00
EPA 8141A	Phorate	<RL	9	9	100.00
EPA 8141A	Phosmet	<RL	9	9	100.00

Method	Analyte	Data Quality Objective	Number of Laboratory Blanks (Total)	Laboratory Blanks within Control Limits (Total)	Laboratory Blanks within Acceptable Limits (%)
EPA 8141A	Trifluralin	<RL	9	9	100.00
EPA 8141A	Atrazine	<RL	9	9	100.00
EPA 8141A	Cyanazine	<RL	9	9	100.00
EPA 8141A	Simazine	<RL	9	9	100.00
EPA 8321A	Methamidophos	<RL	9	9	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL	9	9	100.00
SM 2540 C	Total Dissolved Solids	<RL	9	9	100.00
SM 2540 D	Total Suspended Solids	<RL	10	10	100.00
EPA 180.1	Turbidity	<RL	9	9	100.00
SM 4500-NH3 C v20	Ammonia as N	<RL	18	18	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	<RL	15	15	100.00
EPA 353.2	Nitrate + Nitrite as N	<RL	9	9	100.00
SM 4500-P E	OrthoPhosphate as P	<RL	9	9	100.00
SM 4500-P E	Phosphorus as P	<RL	10	10	100.00
SM 5310 B	Total Organic Carbon (Water)	<RL	14	14	100.00
SM 9223B	*E. coli*	<RL	9	9	100.00
EPA 200.8	Arsenic	<RL	10	10	100.00
EPA 200.8	Boron	<RL	11	10	90.91
EPA 200.8	Cadmium (Total)	<RL	10	10	100.00
EPA 200.8	Copper (Total)	<RL	12	11	91.67
EPA 200.8	Lead (Total)	<RL	10	10	100.00
EPA 200.8	Molybdenum	<RL	10	10	100.00
EPA 200.8	Nickel (Total)	<RL	10	9	90.00
EPA 200.8	Selenium	<RL	10	10	100.00
EPA 200.8	Zinc (Total)	<RL	14	14	100.00
EPA 200.8	Cadmium (Dissolved)	<RL	9	9	100.00
EPA 200.8	Copper (Dissolved)	<RL	10	10	100.00
EPA 200.8	Lead (Dissolved)	<RL	9	9	100.00
EPA 200.8	Nickel (Dissolved)	<RL	9	9	100.00
EPA 200.8	Zinc (Dissolved)	<RL	10	10	100.00
Walkley-Black	Total Organic Carbon (Sediment)	<RL	3	3	100.00
EPA 8270M_NCI	Bifenthrin	<RL	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	<RL	NA	NA	NA

Method	Analyte	Data Quality Objective	Number of Laboratory Blanks (Total)	Laboratory Blanks within Control Limits (Total)	Laboratory Blanks within Acceptable Limits (%)
EPA 8270M_NCI	Cyfluthrin	<RL	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	<RL	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	<RL	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	<RL	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	<RL	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	<RL	NA	NA	NA
EPA 8270M_NCI	Permethrin	<RL	NA	NA	NA
		TOTAL	**578**	**575**	**99.48**

NA- Not applicable

Table 21. SJCDWQC summary of laboratory control spike quality control sample evaluations.
Laboratory control spikes and laboratory control spike duplicates analyzed in batches with samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Laboratory Control Spikes (Total)	Laboratory Control Spikes within Control Limits (Total)	Laboratory Control Spikes within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	PR 31-133	9	9	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	9	9	100.00
EPA 8321A CARB	Carbofuran	PR 36-165	9	9	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	9	9	100.00
EPA 8321A CARB	Methomyl	PR 23-152	9	9	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	9	9	100.00
EPA 8321A CARB	Diuron	PR 52-136	9	9	100.00
EPA 8321A CARB	Linuron	PR 49-144	9	9	100.00
EPA 547M	Glyphosate	PR 84-113	18	18	100.00
EPA 549.2M	Paraquat	PR 70-130	18	17	94.44
EPA 8081A	DDD(p,p')	PR 38-135	9	9	100.00
EPA 8081A	DDE(p,p')	PR 21-134	9	9	100.00
EPA 8081A	DDT(p,p')	PR 18-145	9	9	100.00
EPA 8081A	Dicofol	PR 40-135	9	9	100.00
EPA 8081A	Dieldrin	PR 48-121	9	9	100.00
EPA 8081A	Endrin	PR 24-143	9	9	100.00
EPA 8081A	Methoxychlor	PR 30-163	9	9	100.00
EPA 8081A	HCH, alpha-	PR 33-111	1	1	100.00
EPA 8081A	HCH, beta-	PR 49-119	1	1	100.00
EPA 8081A	HCH, delta-	PR 12-97	1	1	100.00
EPA 8081A	HCH, gamma-	PR 40-114	1	1	100.00
EPA 8141A	Azinphos methyl	PR 36-189	9	9	100.00
EPA 8141A	Chlorpyrifos	PR 61-125	9	9	100.00
EPA 8141A	Diazinon	PR 57-130	9	9	100.00
EPA 8141A	Dichlorvos	PR 10-175	9	9	100.00
EPA 8141A	Dimethoate	PR 68-202	9	9	100.00
EPA 8141A	Demeton-s	PR 40-125	9	9	100.00
EPA 8141A	Disulfoton	PR 47-117	9	9	100.00
EPA 8141A	Malathion	PR 47-125	9	9	100.00
EPA 8141A	Methidathion	PR 50-150	9	9	100.00
EPA 8141A	Parathion, Methyl	PR 55-164	9	9	100.00
EPA 8141A	Phorate	PR 44-117	9	9	100.00
EPA 8141A	Phosmet	PR 50-150	9	8	**88.89**

Method	Analyte	Data Quality Objective	Laboratory Control Spikes (Total)	Laboratory Control Spikes within Control Limits (Total)	Laboratory Control Spikes within Acceptable Limits (%)
EPA 8141A	Trifluralin	PR 40-148	9	8	**88.89**
EPA 8141A	Atrazine	PR 39-156	9	9	100.00
EPA 8141A	Cyanazine	PR 22-172	9	9	100.00
EPA 8141A	Simazine	PR 21-179	9	9	100.00
EPA 8321A	Methamidophos	PR 25-136	9	9	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	9	9	100.00
SM 2540 C	Total Dissolved Solids	PR 80-120	9	9	100.00
SM 2540 D	Total Suspended Solids	PR 80-120	10	10	100.00
EPA 180.1	Turbidity	PR 90-110	9	9	100.00
SM 4500-NH3 C v20	Ammonia as N	PR 90-110	34	34	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	PR 90-110	30	30	100.00
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	9	9	100.00
SM 4500-P E	OrthoPhosphate as P	PR 90-110	9	9	100.00
SM 4500-P E	Phosphorus as P	PR 90-110	10	10	100.00
SM 5310 B	Total Organic Carbon (Water)	PR 80-120	15	15	100.00
SM 9223	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	PR 85-115	10	10	100.00
EPA 200.8	Boron	PR 85-115	11	11	100.00
EPA 200.8	Cadmium (Total)	PR 85-115	10	10	100.00
EPA 200.8	Copper (Total)	PR 85-115	13	13	100.00
EPA 200.8	Lead (Total)	PR 85-115	11	11	100.00
EPA 200.8	Molybdenum	PR 85-115	10	10	100.00
EPA 200.8	Nickel (Total)	PR 85-115	10	10	100.00
EPA 200.8	Selenium	PR 85-115	10	10	100.00
EPA 200.8	Zinc (Total)	PR 85-115	14	14	100.00
EPA 200.8	Cadmium (Dissolved)	PR 85-115	9	9	100.00
EPA 200.8	Copper (Dissolved)	PR 85-115	10	10	100.00
EPA 200.8	Lead (Dissolved)	PR 85-115	9	9	100.00
EPA 200.8	Nickel (Dissolved)	PR 85-115	9	9	100.00
EPA 200.8	Zinc (Dissolved)	PR 85-115	10	10	100.00
Walkley-Black	Total Organic Carbon (Sediment)	PR 75-125	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	PR 10-160	NA	NA	NA

Method	Analyte	Data Quality Objective	Laboratory Control Spikes (Total)	Laboratory Control Spikes within Control Limits (Total)	Laboratory Control Spikes within Acceptable Limits (%)
EPA 8270M_NCI	Cyhalothrin, lambda	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Permethrin	PR 10-160	NA	NA	NA
EPA 8270	Piperonyl butoxide	PR 10-160	NA	NA	NA
		TOTAL	**618**	**615**	**99.51**

NA- Not applicable

Table 22. SJCDWQC summary of lab control spike duplicate quality control sample evaluations.
Laboratory control spikes duplicates analyzed in batches with samples collected from January through September 2014, sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	LCS/D Pairs (Total)	LCS/D Within Control Limits (Total)	LCS/D pairs within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methomyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Diuron	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Linuron	RPD ≤ 25	NA	NA	NA
EPA 547M	Glyphosate	RPD ≤ 25	9	9	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	9	9	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDE(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDT(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dicofol	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dieldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Methoxychlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, alpha-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, beta-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, delta-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, gamma-	RPD ≤ 25	NA	NA	NA
EPA 8141A	Azinphos methyl	RPD ≤ 25	NA	NA	NA
EPA 8141A	Chlorpyrifos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Diazinon	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dichlorvos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dimethoate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Demeton-s	RPD ≤ 25	NA	NA	NA
EPA 8141A	Disulfoton	RPD ≤ 25	NA	NA	NA
EPA 8141A	Malathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Methidathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Parathion, Methyl	RPD ≤ 25	NA	NA	NA
EPA 8141A	Phorate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Phosmet	RPD ≤ 25	NA	NA	NA

Method	Analyte	Data Quality Objective	LCS/D Pairs (Total)	LCS/D Within Control Limits (Total)	LCS/D pairs within Acceptable Limits (%)
EPA 8141A	Trifluralin	RPD ≤ 25	NA	NA	NA
EPA 8141A	Atrazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Cyanazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Simazine	RPD ≤ 25	NA	NA	NA
EPA 8321A	Methamidophos	RPD ≤ 25	NA	NA	NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	NA	NA	NA
SM 2540 C	Total Dissolved Solids	RPD ≤ 25	NA	NA	NA
SM 2540 D	Total Suspended Solids	RPD ≤ 20	NA	NA	NA
EPA 180.1	Turbidity	RPD ≤ 20	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	16	16	NA
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	RPD ≤ 20	15	15	NA
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	NA	NA	NA
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 25	NA	NA	NA
SM 4500-P E	Phosphorus as P	RPD ≤ 20	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	1	1	100.00
SM 9223B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	RPD ≤ 20	NA	NA	NA
EPA 200.8	Boron	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Molybdenum	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Selenium	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	NA	NA	NA
Walkley-Black	Total Organic Carbon (Sediment)	RPD ≤ 20	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	RSD ≤ 25	0	0	NA
EPA 8270M_NCI	Chlorpyrifos	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Cyfluthrin	RPD ≤ 25	0	0	NA

Method	Analyte	Data Quality Objective	LCS/D Pairs (Total)	LCS/D Within Control Limits (Total)	LCS/D pairs within Acceptable Limits (%)
EPA 8270M_NCI	Cyhalothrin, lambda	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Cypermethrin	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Fenpropathrin	RPD ≤ 25	0	0	NA
EPA 8270M_NCI	Permethrin	RPD ≤ 25	0	0	NA
EPA 8270	Piperonyl Butoxide	RPD <25	0	0	NA
		TOTAL	**50**	**50**	**100.00**

NA- Not applicable

Table 23. SJCDWQC summary of matrix spike quality control sample evaluations.

Matrix spikes and matrix spike duplicates collected from January through September 2014. Non-project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Matrix Spikes (Total)	Matrix Spike Samples Within Control Limits (Total)	Matrix Spike Samples Within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	PR 31-133	18	18	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	18	18	100.00
EPA 8321A CARB	Carbofuran	PR 36-165	18	18	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	18	18	100.00
EPA 8321A CARB	Methomyl	PR 23-152	18	18	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	18	18	100.00
EPA 8321A CARB	Diuron	PR 52-136	18	18	100.00
EPA 8321A CARB	Linuron	PR 49-144	18	18	100.00
EPA 547M	Glyphosate	PR 84-113	18	17	94.44
EPA 549.2M	Paraquat	PR 70-130	18	13	**72.22**
EPA 8081A	DDD(p,p')	PR 38-135	18	18	100.00
EPA 8081A	DDE(p,p')	PR 21-134	18	18	100.00
EPA 8081A	DDT(p,p')	PR 18-145	18	18	100.00
EPA 8081A	Dicofol	PR 40-135	18	18	100.00
EPA 8081A	Dieldrin	PR 48-121	18	18	100.00
EPA 8081A	Endrin	PR 24-143	18	18	100.00
EPA 8081A	Methoxychlor	PR 30-163	18	18	100.00
EPA 8081A	HCH, alpha-	PR 33-111	2	2	100.00
EPA 8081A	HCH, beta-	PR 49-119	2	2	100.00
EPA 8081A	HCH, delta-	PR 12-97	2	1	**50.00**
EPA 8081A	HCH, gamma-	PR 40-114	2	2	100.00
EPA 8141A	Azinphos methyl	PR 36-189	18	18	100.00
EPA 8141A	Chlorpyrifos	PR 61-125	18	15	**83.33**
EPA 8141A	Diazinon	PR 57-130	18	16	**88.89**
EPA 8141A	Dichlorvos	PR 10-175	18	18	100.00
EPA 8141A	Dimethoate	PR 68-202	18	16	**88.89**
EPA 8141A	Demeton-s	PR 40-125	18	16	**88.89**
EPA 8141A	Disulfoton	PR 47-117	18	15	**83.33**
EPA 8141A	Malathion	PR 47-125	18	12	**66.67**
EPA 8141A	Methidathion	PR 50-150	18	18	100.00
EPA 8141A	Parathion, Methyl	PR 55-164	18	18	100.00
EPA 8141A	Phorate	PR 44-117	18	13	**72.22**

Method	Analyte	Data Quality Objective	Matrix Spikes (Total)	Matrix Spike Samples Within Control Limits (Total)	Matrix Spike Samples Within Acceptable Limits (%)
EPA 8141A	Phosmet	PR 50-150	18	16	**88.89**
EPA 8141A	Trifluralin	PR 40-148	18	18	100.00
EPA 8141A	Atrazine	PR 39-156	18	18	100.00
EPA 8141A	Cyanazine	PR 22-172	18	18	100.00
EPA 8141A	Simazine	PR 21-179	18	18	100.00
EPA 8321A	Methamidophos	PR 25-136	18	18	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	18	18	100.00
SM 2540 C	Total Dissolved Solids	PR 80-120	NA	NA	NA
SM 2540 D	Total Suspended Solids	PR 80-120	NA	NA	NA
EPA 180.1	Turbidity	PR 90-110	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	PR 90-110	34	33	97.06
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	PR 90-110	28	27	96.43
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	18	17	94.44
SM 4500-P E	OrthoPhosphate as P	PR 90-110	18	18	100.00
SM 4500-P E	Phosphorus as P	PR 90-110	20	14	**70.00**
SM 5310 B	Total Organic Carbon (Water)	PR 80-120	30	28	93.33
SM 9223B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	PR 85-115	22	20	90.91
EPA 200.8	Boron	PR 85-115	26	25	96.15
EPA 200.8	Cadmium (Total)	PR 85-115	22	22	100.00
EPA 200.8	Copper (Total)	PR 85-115	30	28	93.33
EPA 200.8	Lead (Total)	PR 85-115	24	24	100.00
EPA 200.8	Molybdenum	PR 85-115	22	22	100.00
EPA 200.8	Nickel (Total)	PR 85-115	22	22	100.00
EPA 200.8	Selenium	PR 85-115	22	22	100.00
EPA 200.8	Zinc (Total)	PR 85-115	36	26	**72.22**
EPA 200.8	Cadmium (Dissolved)	PR 85-115	20	20	100.00
EPA 200.8	Copper (Dissolved)	PR 85-115	24	24	100.00
EPA 200.8	Lead (Dissolved)	PR 85-115	20	20	100.00
EPA 200.8	Nickel (Dissolved)	PR 85-115	20	20	100.00
EPA 200.8	Zinc (Dissolved)	PR 85-115	24	19	**79.17**
Walkley-Black	Total Organic Carbon (sediment)	PR 75-125	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	PR 10-160	NA	NA	NA

Method	Analyte	Data Quality Objective	Matrix Spikes (Total)	Matrix Spike Samples Within Control Limits (Total)	Matrix Spike Samples Within Acceptable Limits (%)
EPA 8270M_NCI	Chlorpyrifos	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	PR 10-160	NA	NA	NA
EPA 8270M_NCI	Permethrin	PR 10-160	NA	NA	NA
EPA 8270	Piperonyl Butoxide	PR 10-160	NA	NA	NA
		TOTAL	**1120**	**1057**	**94.38**

NA- Not applicable

Table 24. SJCDWQC summary of matrix spike duplicate quality control sample evaluations.
Matrix spike duplicates collected from January through September 2014. Non project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	MS/D pairs (Total)	MS/D Within Control Limits (Total)	MS/D within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Carbaryl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Carbofuran	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Oxamyl	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Diuron	RPD ≤ 25	9	9	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	9	9	100.00
EPA 547M	Glyphosate	RPD ≤ 25	9	9	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	9	7	**77.78**
EPA 8081A	DDD(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	9	9	100.00
EPA 8081A	Dicofol	RPD ≤ 25	9	8	**88.89**
EPA 8081A	Dieldrin	RPD ≤ 25	9	9	100.00
EPA 8081A	Endrin	RPD ≤ 25	9	9	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	9	9	100.00
EPA 8081A	HCH, alpha-	RPD ≤ 25	1	1	100.00
EPA 8081A	HCH, beta-	RPD ≤ 25	1	1	100.00
EPA 8081A	HCH, delta-	RPD ≤ 25	1	1	100.00
EPA 8081A	HCH, gamma-	RPD ≤ 25	1	1	100.00
EPA 8141A	Azinphos methyl	RPD ≤ 25	9	9	100.00
EPA 8141A	Chlorpyrifos	RPD ≤ 25	9	9	100.00
EPA 8141A	Diazinon	RPD ≤ 25	9	9	100.00
EPA 8141A	Dichlorvos	RPD ≤ 25	9	9	100.00
EPA 8141A	Dimethoate	RPD ≤ 25	9	9	100.00
EPA 8141A	Demeton-s	RPD ≤ 25	9	8	**88.89**
EPA 8141A	Disulfoton	RPD ≤ 25	9	8	**88.89**
EPA 8141A	Malathion	RPD ≤ 25	9	9	100.00
EPA 8141A	Methidathion	RPD ≤ 25	9	9	100.00
EPA 8141A	Parathion, Methyl	RPD ≤ 25	9	9	100.00
EPA 8141A	Phorate	RPD ≤ 25	9	9	100.00
EPA 8141A	Phosmet	RPD ≤ 25	9	8	**88.89**

Method	Analyte	Data Quality Objective	MS/D pairs (Total)	MS/D Within Control Limits (Total)	MS/D within Acceptable Limits (%)
EPA 8141A	Trifluralin	RPD ≤ 25	9	9	100.00
EPA 8141A	Atrazine	RPD ≤ 25	9	9	100.00
EPA 8141A	Cyanazine	RPD ≤ 25	9	9	100.00
EPA 8141A	Simazine	RPD ≤ 25	9	9	100.00
EPA 8321A	Methamidophos	RPD ≤ 25	9	8	**88.89**
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	9	9	100.00
SM 2540 C	Total Dissolved Solids	NA	NA	NA	NA
SM 2540 D	Total Suspended Solids	NA	NA	NA	NA
EPA 180.1	Turbidity	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	17	17	100.00
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	RPD ≤ 20	14	14	100.00
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	9	9	100.00
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	9	9	100.00
SM 4500-P E	Phosphorus as P	RPD ≤ 20	10	10	100.00
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	15	15	100.00
SM 9223B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	RPD ≤ 20	11	11	100.00
EPA 200.8	Boron	RPD ≤ 20	13	13	100.00
EPA 200.8	Cadmium (Total)	RPD ≤ 20	11	11	100.00
EPA 200.8	Copper (Total)	RPD ≤ 20	15	15	100.00
EPA 200.8	Lead (Total)	RPD ≤ 20	12	12	100.00
EPA 200.8	Molybdenum	RPD ≤ 20	11	11	100.00
EPA 200.8	Nickel (Total)	RPD ≤ 20	11	11	100.00
EPA 200.8	Selenium	RPD ≤ 20	11	11	100.00
EPA 200.8	Zinc (Total)	RPD ≤ 20	18	18	100.00
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	10	10	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	12	12	100.00
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	10	10	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	10	10	100.00
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	12	12	100.00
Walkley-Black	Total Organic Carbon (sediment)	RPD ≤ 20	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	RSD <25	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	RPD <25	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	RPD <25	NA	NA	NA

Method	Analyte	Data Quality Objective	MS/D pairs (Total)	MS/D Within Control Limits (Total)	MS/D within Acceptable Limits (%)
EPA 8270M_NCI	Cyhalothrin, lambda	RPD <25	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD <25	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	RPD <25	NA	NA	NA
EPA 8270M_NCI	Permethrin	RPD <25	NA	NA	NA
EPA 8270	Piperonyl Butoxide	PR 30-150	NA	NA	NA
		TOTAL	**560**	**553**	**98.75**

NA- Not applicable

Table 25. SJCDWQC summary of lab duplicate quality control sample evaluations.

Lab duplicates were analyzed in batches with samples collected January through September 2014. Non project samples are included for batch Quality Assurance completeness purposes. Evaluations sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Laboratory duplicates (Total)	Laboratory Duplicates within Control Limits (Total)	Laboratory Control limits within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methomyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Diuron	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Linuron	RPD ≤ 25	NA	NA	NA
EPA 547M	Glyphosate	RPD ≤ 25	NA	NA	NA
EPA 549.2M	Paraquat	RPD ≤ 30	NA	NA	NA
EPA 8081A	DDD(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDE(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDT(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dicofol	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dieldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Methoxychlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, alpha-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, beta-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, delta-	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, gamma-	RPD ≤ 25	NA	NA	NA
EPA 8141A	Azinphos methyl	RPD ≤ 25	NA	NA	NA
EPA 8141A	Chlorpyrifos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Diazinon	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dichlorvos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dimethoate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Demeton-s	RPD ≤ 25	NA	NA	NA
EPA 8141A	Disulfoton	RPD ≤ 25	NA	NA	NA
EPA 8141A	Malathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Methidathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Parathion, Methyl	RPD ≤ 25	NA	NA	NA

Method	Analyte	Data Quality Objective	Laboratory duplicates (Total)	Laboratory Duplicates within Control Limits (Total)	Laboratory Control limits within Acceptable Limits (%)
EPA 8141A	Phorate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Phosmet	RPD ≤ 25	NA	NA	NA
EPA 8141A	Trifluralin	RPD ≤ 25	NA	NA	NA
EPA 8141A	Atrazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Cyanazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Simazine	RPD ≤ 25	NA	NA	NA
EPA 8321A	Methamidophos	RPD ≤ 25	NA	NA	NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	NA	NA	NA
SM 2540 C	Total Dissolved Solids	RPD ≤ 20	10	10	100.00
SM 2540 D	Total Suspended Solids	RPD ≤ 20	10	10	100.00
EPA 180.1	Turbidity	RPD ≤ 20	9	9	100.00
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	NA	NA	NA
SM 4500-NH3 C v20	Nitrogen, Total Kjeldahl	RPD ≤ 20	NA	NA	NA
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	NA	NA	NA
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	NA	NA	NA
SM 4500-P E	Phosphorus as P	RPD ≤ 20	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	NA	NA	NA
SM 9223B	*E. coli*	Rlog ≤ 1.3	9	9	100.00
EPA 200.8	Arsenic	RPD ≤ 20	NA	NA	NA
EPA 200.8	Boron	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Molybdenum	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Selenium	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	NA	NA	NA
Walkley-Black	Total Organic Carbon (Sediment)	RPD ≤ 20	3	3	100.00
ASTM D4464M, ASTM D422	Sediment Grain Size	RSD ≤ 20	3	3	100.00

Method	Analyte	Data Quality Objective	Laboratory duplicates (Total)	Laboratory Duplicates within Control Limits (Total)	Laboratory Control limits within Acceptable Limits (%)
EPA 8270M_NCI	Bifenthrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Deltamethrin: Tralomethrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Permethrin	RPD ≤ 25	NA	NA	NA
EPA 8270	Piperonyl Butoxide	PR 30-150	NA	NA	NA
		Total	**44**	**44**	**100.00**

NA- Not applicable

Table 26. SJCDWQC summary of surrogate recovery quality control sample evaluations.
Surrogates were run with samples collected and Laboratory Quality Assurance (LABQA) analyzed from January through September 2014 for all organics except paraquat and glyphosate and for sediment analysis. Evaluations are sorted by method and analyte. Analyte DQOs that are below 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Surrogates Analyzed (Total)	Surrogates with Control Limits (Total)	Surrogates within Acceptable Limits (%)
EPA 8321A CARB	Tributylphosphate	RPD ≤ 25; PR 36-140	98	98	100.00
EPA 8321A	Diphenamid	RPD ≤ 25; PR 52-122	96	87	90.63
EPA 8081A	PCB 209	RPD ≤ 25; PR 27-110	104	104	100.00
EPA 8081A	Tetrachloro-m-xylene	RPD ≤ 25; PR 24-114	104	104	100.00
EPA 8141A	Tributylphosphate	RPD ≤ 25; PR 60-150	153	143	93.46
EPA 8141A	Triphenyl phosphate	RPD ≤ 25; PR 56-129	153	125	**81.70**
EPA 8270M_NCI	Esfenvalerate-d6-1	RPD ≤ 25; PR 70-130	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate-d6-2	RPD ≤ 25; PR 70-130	NA	NA	NA
		TOTAL	**708**	**661**	**93.36**

Table 27. SJCDWQC summary of toxicity field duplicate sample evaluations.
Samples collected from January through September 2014; sorted by method and species. Analyte DQOs that are below 90% acceptability are bolded.

Method	Toxicity Species	Data Quality Objective	Field Duplicate Samples (Total)	Field Duplicate Samples Within Control Limits (Total)	Samples Within Acceptable Limits (%)
EPA 821/R-02-012	*Ceriodaphnia dubia*	RPD ≤ 25	10	10	100.00
EPA 821/R-02-012	*Pimephales promelas*	RPD ≤ 25	10	10	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	RPD ≤ 25	10	9	90.00
EPA 600/R-99-064	*Hyalella azteca*	RPD ≤ 25	2	2	100.00

Table 28. SJCDWQC summary of toxicity lab control sample evaluations.
Samples collected from January through September 2014; sorted by method and species. Analyte DQOs that are below 90% acceptability are bolded.

Method	Toxicity Species	Data Quality Objective	Lab Control Samples (Total)	Total Lab Controls within Control Limits (Total)	Samples Within Acceptable Limits (%)
EPA 821/R-02-012	*Ceriodaphnia dubia*	Survival in control samples ≥90%	10	10	100.00
EPA 821/R-02-012	*Pimephales promelas*	Survival in control samples ≥80%	10	10	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	> 200,000 cells/mL, variability of controls <20%	10	10	100.00
EPA 600/R-99-064	*Hyalella azteca*	Survival in control samples >80%	4	4	100.00

Table 29. SJCDWQC summary of calculated sediment grain size RSD results.

Batches are distinguished calculations based on sample dates.

Sample Type	Sample Date	Φ5	Φ16	Φ84	Φ95	SD	RSD (%)
Environmental Sample	March 5, 2014	0.09	0.98	5.18	7.15	2.12	NA
Field Duplicate	March 5, 2014	0.23	0.91	4.04	6.38	1.71	21.15
Lab Duplicate	March 5, 2014	0.16	1.01	4.96	6.81	1.10	15.14
Environmental Sample	March 5, 2014	-2.78	-1.75	1.40	3.08	1.68	NA
Lab Duplicate	March 5, 2014	-2.48	-1.75	1.38	3.05	1.62	3.34
Environmental Sample	September 16, 2014	-0.07	0.77	2.95	5.24	1.35	NA
Field Duplicate	September 16, 2014	0.21	0.94	2.86	4.72	1.16	14.82
Lab Duplicate	September 16, 2014	0.32	1.01	2.91	4.84	1.16	0.300

Φ_{84} = phi value of the 84th percentile sediment grain size category
Φ_{16} = phi value of the 16th percentile sediment grain size category
Φ_{5} = phi value of the 5th percentile sediment grain size category
Φ_{95} = phi value of the 95th percentile sediment grain size category

IX. DISCUSSION OF RESULTS

IX. A. INTRODUCTION

Coalition monitoring from January through September 2014 resulted in exceedances of WQTLs for DO, pH, SC, *E. coli*, TDS, arsenic, molybdenum, ammonia as N, dichlorvos, diuron, and simazine. Water column toxicity to *C. dubia*, *S. capricornutum,* and *P. promelas* also occurred during 2014 monitoring; there were no toxic sediment samples. The following section includes a summary of all exceedances.

Exceedances of WQTLs were reported to Regional Board staff within five business days upon receipt of lab results; two exceedance reports required amendments. A list of all WQTLs used to evaluate results is included in Table 30. The total number of exceedances that occurred from January through September 2014 is listed by site and zone in Appendix III, Table III-2A.

The Coalition used Pesticide Use Report (PUR) data to if applied pesticides may be associated with pesticides detected above WQTLs and/or toxicity. The Coalition also used Toxic Identification Evaluations (TIEs) to determine the group of chemical(s) that are contributing to water column toxicity (no TIEs are performed on toxic sediment samples).

Table 30. Water Quality Trigger Limits (WQTLs).

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
pH	6.5 - 8.5 units	Numeric		Sacramento/San Joaquin Rivers Basin Plan (Page III.6.00)	1
Electrical Conductivity (maximum)	700 µmhos/cm	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcott)	3
Dissolved Oxygen (minimum)	7 mg/L	Numeric	Cold Freshwater Habitat, Spawning	Sacramento/San Joaquin Rivers Basin Plan. Water Quality Control Plan for the Tulare Lake Basin.	1
	5 mg/L		Warm Freshwater Habitat	Basin Plan Objective, Page III-5.00: for waters designated WARM (aquatic life). Tulare Lake Basin Plan	
Turbidity	variable	Numeric	Municipal and Domestic Supply	Basin Plan Objective - increase varies based on natural turbidity	1
Total Dissolved Solids	450 mg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcott)	3
Total Suspended Solids	NA				
Temperature	variable	Numeric		Basin Plan Objective (see objectives for COLD, WARM, and Enclosed Bays and Estuaries)	1
E. coli	235 MPN/100 ml	Narrative	Water Contact Recreation	EPA ambient water quality criteria, single-sample maximum	3
Fecal coliform	200 MPN/100 ml 400 MPN/100 ml	Numeric	Water Contact Recreation	Sacramento/San Joaquin Rivers Basin Plan (Page III.3.00) Geometric mean of not less than five samples for any 30- day period, nor shall more than 10% of the total number of samples taken during a 30 -day period.	1
TOC	NA				
Pesticides – Carbamates					
Aldicarb	3 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: United States Environmental Protection Agency (USEPA) Primary MCL (MUN, human health)	1
Carbaryl	2.53 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average	3
Carbofuran	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Methiocarb	0.5 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates	3
Methomyl	0.52 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average (California Department of Fish and Game) (aquatic life)	3
Oxamyl	50 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Drinking Water Standards - MCLS. California Dept of Health Services. Primary MCL	3
Pesticides – Organochlorines					
DDD(p,p')	0.00083 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR, Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
DDE(p,p')	0.00059 µg/L				
DDT(p,p')	0.00059 µg/L				
Dicofol	NA				

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Dieldrin	0.00014 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.056 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) / Continuous Concentration 4-day average (total)	1
Endrin	0.036 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-Day Average	1
	0.76 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
Methoxychlor	0.03 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - Freshwater Aquatic Life Protection - instantaneous maximum	3
	30 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Pesticides - Organophosphates					
Azinphos methyl	0.01 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - instantaneous maximum	3
Chlorpyrifos	0.015 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Rivers Basin Plan: Page III-6.01; San Joaquin River & Delta, Sacramento & Feather Rivers; more stringent 4-day average.	1
Diazinon	0.1 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan: San Joaquin River & Delta numeric standard. Sacramento & Feather Rivers numeric standard	1
Dichlorvos	0.085 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water. Cal/EPA Cancer Potency Factor as a drinking water level	3
Dimethoate	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Notification Level – DHS (MUN, human health). California Notification Levels. (Department of Health Services)	3
Demeton-s	NA				
Disulfoton	0.05 µg/L	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA National Ambient Water Quality Criteria - Freshwater Aquatic Life Protection - instantaneous maximum	3
Malathion	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Methamidophos	0.35 µg/L	Narrative	Municipal and Domestic Supply	Basin Plan Toxicity Objective, Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose (RfD) as a drinking water level.	3
Methidathion	0.7 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose (MUN, human health)	3
Parathion, Methyl	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Prohibition	2
Phorate	0.7 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose (RfD) as a drinking water level.	3
Phosmet	140 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Drinking Water Health Advisories or Suggested No-Adverse-Response Levels for non-cancer health effects. USEPA IRIS Reference Dose (RfD) as a drinking water level.	3
Group A Pesticides					

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Aldrin	0.00013 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	3 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Instantaneous maximum	
Chlordane	0.00057 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0043 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Heptachlor	0.00021µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0038 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Heptachlor Epoxide	0.0001 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0038 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Total Hexachlorocyclohexane (including lindane)	0.0039 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.95 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Maximum Concentration (1-hour Average)	
Endosulfan	110 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.056 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: NTR (USEPA) - Continuous Concentration 4-day average (total)	
Toxaphene	0.00073 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
Toxaphene	0.0002 µg/L		Cold Freshwater Habitat, Spawning	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	1
Pesticides - Herbicides					
Atrazine	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Cyanazine	1.0 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA Health Advisory (human health)	3
Diuron	2 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water. USEPA Health Advisory. Likely to be carcinogenic to humans (U.S. Environmental Protection Agency, 2005 Guidelines for Carcinogen Risk Assessment).	3

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Glyphosate	700 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Linuron	1.4 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level	3
Molinate	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Discharge Prohibition	2
Paraquat	3.2 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level	3
Simazine	4.0 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Thiobencarb	ND	Numeric		Sacramento/San Joaquin Basin Plan - Basin Plan Discharge Prohibition	2
Trifluralin	5 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Cancer Risk Level. One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water	3
Metals (c)					
Arsenic	10 µg/L	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: USEPA Primary MCL (MUN, human health)	1
Boron	700 µg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
Cadmium	For aquatic life; variable (see cadmium worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - Varies with water hardness	1
	5 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Copper	For aquatic life; variable (see copper worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - Varies with water hardness/	1
	1,300 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Lead	For aquatic life; variable (see lead worksheet).	Numeric	Freshwater Habitat	CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
	15 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Molybdenum	15 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan - San Joaquin River, Mouth of the Merced River to Vernalis	1
	50 µg/L			Sacramento/San Joaquin Basin Plan - Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River	
	10 µg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
	35 µg/L		Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level.	
Nickel	For aquatic life variable (see Nickel worksheet).	Numeric	Freshwater Habitat	CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
	100 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Selenium	50 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
	5 µg/L (4-day average)	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: NTR Freshwater Aquatic Life Protection - Continuous Concentration - 4-Day Average	
Zinc	For aquatic life variable (see Zinc worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
Nutrients					
Nitrate as NO_3 Nitrate as N	45,000 µg/L as NO_3 10,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Nitrite as Nitrogen	1,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Ammonia	For aquatic life variable (see ammonia worksheet).	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA Freshwater Aquatic Life Criteria, Continuous Concentration	3
	1.5 mg/L (regardless of pH and Temperature values)	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Taste and Odor Threshold (Ammore and Hautala)	3
Hardness	NA				
Phosphorus, total	NA				
Orthophosphate, soluble	NA				
TKN	NA				

Category 1: Constituents that have numeric water quality objectives in the Sac-SJR Basin Plan or other WQO listed by reference such as MCLs (Page III-3.0)* , CTRs (Page III-10.1)*,
Category 2: Pesticides with discharge prohibitions. Prohibitions apply to any discharges not subject to board-approved management practices (Page IV-25.0)*.
Category 3: Constituent does not have numeric WQO, and does not have a primary MCL. WQTL exceedance is based on implementation of narrative objective. All detections should be tracked. None are default exceedances.
MCL- Maximum Contaminant Level
MPN- Most Probable Number
MUN-Municipal and Domestic Supply
NA-Not applicable
ND-Not Detected
USEPA- United States Environmental Protection Agency
(*) -Water Quality Control Plan for the Sacramento and San Joaquin River Basins. Revised October 2007.
Narrative WQTLs are based on Water Quality Goals Database. Updated by Jon Marshack on July 16, 2008

IX. B. EXCEEDANCE REPORTS

Exceedances of WQTLs were reported to Regional Board staff via email within five business days upon receipt of laboratory results. If any errors were communicated incorrectly in the original Exceedance Report, an amended report was emailed to the Regional Board; two Exceedance Reports required amendments. An amendment to the June 19, 2014 Pesticide Exceedance Report was made on June 26, 2014 to include an exceedance of the WQTL for a TMDL site that was originally listed as a concentration in exceedance of the WQTL, but later changed by the laboratory. The August 29, 2014 Pesticide Exceedance Report was amended on September 3, 2014 to update the sample date in the attached table.

IX. C. METHODS FOR SOURCING

IX. C. i. Pesticide Use Report Data

Available PUR data are provided to the Coalition from each of the County Agricultural Commissioner's offices. Registered products recorded in the database are evaluated for applications relevant to exceedances of WQTLs. To assess possible sources of toxicity, applications of pesticides known for toxicity to the test species are identified based on a variety of factors: organic carbon partitioning coefficient (K_{oc}), chemical type, mode of action and solubility. If sediment toxicity occurs, pesticides with a relatively high K_{oc} (1600 or greater) are considered potential causes. If water column toxicity occurs, pesticides with a relatively low K_{oc} (below 1900) are evaluated. The PUR database is queried for pesticides applied within 30 days prior to sampling. Due to the long half-life of pyrethroids, the PUR database is queried for applications within 180 days prior to the date of toxicity. The database is queried for applications of metals within 90 days prior to exceedances (Table 31). If there were no applications within the specified time period, the PUR database was queried to cover an additional 30 days to determine which pesticides were applied within 60 days of the sample date. Appendix IV includes tables and maps of all pesticide applications that are relevant to WQTL exceedances or toxicity. When PUR data for any county are unattainable, the Coalition makes a note in Appendix IV; any outstanding PUR data are submitted in an Addendum to the AMR. Information regarding available and outstanding PURs is included in Table 32.

If exceedances of WQTLs for aldrin, dieldrin, endrin, hexachlorocyclohexane (HCH), DDD, DDE, DDT, arsenic or molybdenum occur, these constituents cannot be queried for associated applications since there are no longer any registered products containing these chemicals. In 2014, this applied to arsenic and molybdenum.

Table 31. Pesticide Use Data collected for reported exceedances.

Exceedance Type	Pesticide Use Data Collected
Pesticides	30 days
Metals	90 days
Sediment Toxicity	90 days with 180 days for pyrethroids
Water Column Toxicity	30 days with 180 days for pyrethroids and 90 days for metals

Preliminary PUR data may include zero values or blank cells in the pounds Active Ingredient (AI) per acre column of the PUR appendix (Appendix IV). Preliminary data do not include the pounds AI per acre and therefore must be calculated based on the amount applied and area reported. Accurate calculations require proper units of the amount of AI applied and area treated; if there are errors in the data these calculations cannot be performed and will result in a blank cell for AI per acre column. Zero values in the pounds AI per acre column are due to rounding down of values less than 0.0001 to zero; this occurs when the amount applied to an acre is very minimal. The original data are not rounded; only the pounds AI per acre derived from calculations are rounded.

Table 32. Obtained PUR data for January through September 2014 exceedances.

County	2014 PUR Data Obtained	2014 PUR Data Outstanding
Contra Costa	January through October	November through December
San Joaquin	January through July	August through December
Stanislaus	January through September	October through December

Exceedances in 2014 are tabulated by zone in Tables 35 through 40. A discussion of exceedances (by zone) and subsequent assessments of agricultural pesticide applications are included in the following pages. All PUR data relevant to pesticide exceedances and toxicity are based on pounds (lbs) of AI applied upstream of the relevant monitoring site. Measures taken to address these exceedances are described in the Actions Taken to Address Exceedances of Water Quality Objectives section of this report.

IX. C. ii. Toxic Identification Evaluations

A TIE was conducted on toxic water column samples when survival or growth of the respective target organisms was 50% or less compared to the control. For sediment samples, if survival of *H. azteca* was less than 80% compared to the control, the sample was tested for chlorpyrifos and select pyrethroids. A TIE report which includes an evaluation of the results of all TIEs performed in 2014 and any available chemistry results is located Appendix IV. During 2014, there were four TIEs performed for samples collected from Grant Line Canal near Calpack Rd (1/28/2014 and 2/11/2014), French Camp Slough at Airport Way (2/11/2014) for toxicity to *S. capricornutum*, and Roberts Island @ Whiskey Slough Pump (7/15/2014, Table 33).

Table 33.Water column and sediment toxicity summary.

If a field duplicate and an environmental sample were both toxic, only the environmental sample was included in this table. If the field duplicate sample was toxic and not the environmental sample, the field duplicate result was included and noted by (FD) by the station name. RED BOLDED values represent MPM samples that were toxic.

Station Name	Sample Date	Season & Monitoring Type[1]	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Grant Line Canal near Calpack Rd	1/28/2014	Winter1, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	14596	**6**	SL	The TIE indicated non-polar organics caused the toxicity.
French Camp Slough @ Airport Way	2/11/2014	Storm 1, Assessment, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	1570	**0**	SL	The TIE indicated non-polar organics caused the toxicity.
Grant Line Canal near Calpack Rd	2/11/2014	Storm 1, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	465445	**23**	SL	The TIE indicated non-polar organics caused the toxicity.
Roberts Island @ Whiskey Slough Pump	2/11/2014	Storm 1, Assessment, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	1334930	**67**	SL	No TIE conducted.
Bacon Island Pump @ Old River	3/3/2014	Storm 2, Assessment	*P. promelas*	Survival (%)	80	**80**	SG	Diuron detected. Particulate accumulation in gills may have caused toxicity.
Empire Tract @ 8 Mile Rd	3/3/2014	Storm 2, Assessment	*P. promelas*	Survival (%)	83	**83**	SG	Particulate accumulation in gills may have caused toxicity.
Roberts Island @ Whiskey Slough Pump	3/3/2014	Storm 2, Assessment	*P. promelas*	Survival (%)	78	**78**	SL	Particulate accumulation in gills may have caused toxicity.
Roberts Island @ Whiskey Slough Pump	4/15/2014	Irrigation 1, Assessment, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	846455	**50**	SL	No TIE conducted.
Empire Tract @ 8 Mile Rd	4/15/2014	Irrigation 1, Assessment	*S. capricornutum*	Total Cell Count (cells/ml)	963689	**57**	SL	No TIE conducted.
Grant Line Canal near Calpack Rd	4/15/2014	Irrigation 1, MPM	*S. capricornutum*	Total Cell Count (cells/ml)	888790	**53**	SL	No TIE conducted.
Mokelumne River @ Bruella Rd	5/20/2014	Irrigation 2, Assessment	*S. capricornutum*	Total Cell Count (cells/ml)	439393	**58**	SL	No TIE conducted.
Roberts Island @ Whiskey Slough Pump	7/15/2014	Irrigation 4, Assessment, MPM	*C. dubia*	Survival (%)	0	**0**	SL	The TIE indicated non-polar organics caused the toxicity.

MPM – Management Plan Monitoring
SED – Sediment monitoring
SG-Statistically significantly different from control; greater than 80% threshold
SL-Statistically significantly different from control; less than 80% threshold
[1]Season and Monitoring Type column includes the type of monitoring the toxic species was undergoing during the month of monitoring.

Table 34. Summary of water column phase III TIE results and conclusions.

Phase III analysis results are calculated and provided by Aqua-Science Laboratory. The table includes Phase III analyses on toxic samples that have chemical results for the same sample date to calculate toxic units (TUs). Baseline TUs were calculated using the formula: 100/baseline toxicity EC_{50}. Phase III TUs were calculated using the formula: concentration of analyte detected in the sample/Phase III EC_{50}. All Phase III EC_{50} results are taken from the USEPA ECOTOCX database.

Station Name	Sample Date	Species	Baseline Toxicity Result		Phase III TIE Result			Phase III conclusions
			EC_{50}(%)	TU	Chemical	EC_{50} (µg/L)	TU	
French Camp Slough @ Airport Way	2/11/2014	*S. capricornutum*	25.2	4.0	Diuron, 38 µg/L	2	19	The TU calculated from the diuron concentration detected in the sample is enough to account for all of the observed toxicity.
Grant Line Canal near Calpack Rd	2/11/2014	*S. capricornutum*	84.1	1.2	Diuron, 1.6 µg/L	2	0.8	The TU calculated from the diuron concentration detected in the sample is enough to account for the majority of the observed toxicity.
Roberts Island @ Whiskey Slough Pump	7/15/2014	*C. dubia*	17.7	5.6	Dichlorvos, 0.53 µg/L	0.14[1]	3.8	The TU calculated from the dichlorvos concentration detected in the sample is enough to account for all of the observed toxicity.

EC_{50} = The effective concentration of the sample that inhibits 50% of test population.
TU = toxic unit
[1]This value is the mean of two values for dichlorvos in the USEPA ECOTOX database (0.13 ug/L and 0.15 ug/L).

IX. D. SUMMARY OF EXCEEDANCES

From January through September 2014, there were exceedances of the WQTLs for DO, pH, TDS, *E. coli*, ammonia, arsenic, molybdenum, dichlorvos, diuron, and simazine that occurred in certain site subwatersheds within the Coalition boundary. Water column toxicity to *C. dubia, P. promelas, and S. capricornutum* also occurred. The exceedances and toxicity from January through September 2014 are tabulated by zone in Tables 35 through 40. The Coalition also included an analysis of each exceedance in each zone. This analysis includes a discussion of the exceedance and an assessment of agricultural pesticide applications that were potential sources of the exceedance.

A tally of all exceedances compared to the total number of samples collected at each site is included in Appendix III, Table III-2A. Measures taken to address these exceedances are described in the Member Actions Taken to Address Water Quality Exceedances section of this report.

IX. D. i. Zone 1 (Bear Creek @ North Alpine Rd and Mokelumne River @ Bruella Rd)

IX. D. i. a. *Field Parameters*

In Zone1, exceedances of the WQTLs for DO (2) and pH (1) occurred from January through September 2014 (Table 35). The Coalition conducted MPM at both sites during months of past exceedances and, additionally, Assessment Monitoring at Mokelumne River @ Bruella Rd.

Exceedances of water quality objectives for field parameters such as DO, SC, and pH are difficult to track and source. These parameters are non-conserved, meaning they may fluctuate as water moves downstream. The concentrations of these parameters are the result of processes, which can vary diurnally and seasonally, occurring in the water column and in the sediment. Photosynthesis and decomposition are the greatest natural causes for daily and seasonal variation in pH. Furthermore, the bioavailability of some constituents (e.g. copper) are affected by changes in pH. There was one detection of pH lower than the WQTL of 6.5 at Mokelumne River @ Bruella Rd in March (6.26) during 2014 monitoring (Table 35). Two exceedances below the WQTL of 7 mg/L for DO occurred on at Bear Creek @ North Alpine Rd during May (3.66 mg/L) and September (1.70 mg/L, Table 35). There was no flow in May or September which likely contributed to the DO impairment.

IX. D. i. b. *Toxicity*

Samples collected on May 20, 2014 during Assessment Monitoring at Mokelumne River @ Bruella Rd were toxic to *S. capricornutum* (58% growth compared to the control; Table 35). The field duplicate was also toxic (66% compared to the control). Algal growth was greater than 50% compared to the control, therefore no TIE was initiated. The PUR data associated with this toxicity included 239 applications of herbicides and fungicides ranging from 0.0068 to 2,574 lbs AI. There were a total of 18,475 lbs AI of herbicides and fungicides applied across 8,285 acres of various crops including cherries, corn, grapes, onions, and walnuts. However, the Coalition monitored for a suite of herbicides (including diuron and

simazine) on May 20, 2014 and resulted in no detections for herbicides; there was a detection of copper (0.49 µg/L) in the sample, but did not exceed the WQTL. Toxicity to *S. capricornutum* was removed from the Mokelumne River @ Bruella Rd management plan in 2013, but will be reinstated in 2015 WY due to the exceedance.

Table 35. Zone 1 (Bear Creek @ North Alpine Rd and Mokelumne River @ Bruella Rd) exceedances.

Zone 1 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7mg/L	pH, <6.5 and >8.5 units	*S. capricornutum*, % Control
Bear Creek @ North Alpine Rd	Assessment	MPM	5/20/2014	3.66		
Bear Creek @ North Alpine Rd	Assessment	MPM	9/16/2014	1.70		
Mokelumne River @ Bruella Rd	Core	NM	5/20/2014			58
Mokelumne River @ Bruella Rd (FD)	Core	NM	5/20/2014			66
Mokelumne River @ Bruella Rd	Core	MPM, NM	7/15/2014		6.26	

MPM-Management Plan Monitoring
NM-Normal Monitoring

IX. D. ii. Zone 2 (Duck Creek @ Hwy 4, French Camp Slough @ Airport Way, Littlejohns Creek @ Jack Tone Rd, Lone Tree Creek @ Jack Tone Rd, Mormon Slough @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd)

IX. D. ii. a. *Field Parameters and E. coli*

In Zone 2, exceedances of the WQTLs for DO (14), pH (5), and *E. coli* (1) occurred from January through September 2014 (Table 36). All sites in Zone 2 were monitored for MPM constituents during months of past exceedances. Assessment Monitoring was also conducted at French Camp Slough @ Airport Way. In Zone 2, samples were collected from three non-contiguous waterbodies: February and April at Lone Tree Creek @ Jack Tone Rd, and April at Mormon Slough @ Jack Tone Rd. Duck Creek @ Hwy 4 was dry in April.

Exceedances of DO in Zone 2 ranged from 2.38 to 6.70 mg/L (Table 36). Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, as well as excessive nutrients. All exceedances of the WQTL for DO in Zone 2 occurred during the irrigation season when temperatures were elevated (between 20-25°C/68-77°F) and possibly contributed to the lower DO. Littlejohns Creek @ Jack Tone Rd and Mormon Slough @ Jack Tone Rd were both non-contiguous waterbodies on April 15, 2014. The exceedance of the WQTL for DO at Littlejohns Creek @ Jack Tone Rd could be attributed to stagnant water resulting from oxygen only entering the top layer of the water surface and/or biological activity.

There were five exceedances of the WQTL for pH at sites in Zone 2 (Table 36); all five exceedances were above the 8.5 trigger limit. The exceedances of the WQTL for pH , particularly at Littlejohns Creek @ Jack Tone Rd on February 11, 2014 and at Mormon Slough @ Jack Tone Rd on April 15, 2014 (both non-contiguous waterbodies), can be attributed to photosynthesis, a natural process known to raise pH levels.

One exceedance of the WQTL for *E. coli* occurred at French Camp Slough @ Airport Way in March (770.1 MPN/100mL). From January through September 2014, none of the tributaries to French Camp Slough were monitored for *E. coli* (Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek). Elevated levels of *E. coli* in the waterways could be due to 1) storm runoff carrying bacteria from dairy facilities in the subwatershed (past instances of direct dairy discharges have been noted in the Coalition region), 2) manure from dairies is sold to adjacent farms and if improperly composted and stored can contribute to elevated levels of bacteria in the waterway, and 3) naturally occurring *E. coli* bacteria in the waterways. There are numerous dairies in the subwatersheds upstream of French Camp Slough @ Airport Way. Dairy discharge or manure applications upstream of French Camp Slough @ Airport Way possibly contributed to the elevated levels of *E. coli* detected in March (Table 36). Naturally occurring *E. coli* are always present and could also have contributed.

IX. D. ii. b. *Diuron*

Diuron is a broad-spectrum herbicide used for weed control on agriculture, highway rights of way, railroads, industrial sites, and by homeowners. Diuron inhibits photosynthesis and also affects seed germination. Diuron has a half-life (in soil) of about 90 days and is very mobile. Diuron inhibits growth of *S. capricornutum* with an Effective Concentration of 50% of the measured endpoint (EC_{50}) of 2.4 µg/L. The WQTL for diuron is 2 µg/L (Table 30). From January through September 2014, there was one exceedance of the WQTL for diuron at French Camp Slough during storm MPM and NM.

The exceedance of the WQTL for diuron occurred at French Camp Slough @ Airport Way on February 11, 2014 (38 µg/L, Table 36). The Coalition used PUR data to identify applications that occurred within 30 days of the sample collection. The most recent application of diuron prior to the sampling event was about 350 lbs AI (876 total pounds, Parrot 4L) on December 5, 2013; which was approximately 70 days before the exceedance occurred. As discussed above, the relevant time period for diuron in soil is about 90 days. Therefore, it's possible that applications of diuron in the French Camp Slough site subwatershed in December 2013 resulted in the exceedance in the February sample. There was also rainfall (up to 0.29 inches, Figure 10) throughout the week (2/6/14 through 2/10/14) before the sampling event. Although not substantial (storm sample trigger is categorized as >0.5 inches), the weeklong rain possibly resulted in runoff that mobilized diuron. The exceedance of the WQTL for diuron was also associated with samples toxic to *S. capricornutum*. Diuron was removed from the French Camp Slough @ Airport Way management plan in February 2013; however, due to the most recent exceedance in 2014, the Coalition will reinstate diuron into a management plan and MPM will begin in the 2015 WY.

IX. D. ii. c. *Simazine*

Simazine is a triazine herbicide with high solubility and a short hydrolysis half-life (10 days according to the Pesticide Actions Network database). Reported persistence of simazine in soil varies from a half-life of <1 month to 3.5 months (according to EPA). The WQTL for simazine is 4.0 µg/L (Table 30). Simazine is a product that is commonly used on orchards as a pre-emergent herbicide during the dormant season.

Its major use is on corn where it is often combined with AAtrex. If released to water, simazine is not expected to adsorb to sediment and suspended particulate matter, or to volatilize. Persistence depends on many factors including degree of algae and weed infestation. From January through September 2014, there was one exceedance of the WQTL for simazine at French Camp Slough during MPM and NM.

The exceedance of the WQTL for simazine occurred at French Camp Slough during the first storm monitoring event on March 3, 2014 (6.4 µg/L). The Coalition analyzed PUR data and determined that there were 11 applications of simazine in the French Camp Slough @ Airport Way site subwatershed within the last two weeks of February. There were 514 lbs AI (1226 total pounds) of simazine (Princep 4L, SIM-TROL 4L, and Drexel Simazine 4L) applied across 322 acres of almonds, grapes, and walnuts; there was also an application to highway rights of way. There was a storm event (1.42 inches, Figure 10) on February 28, 2014 just three days before the sampling event which may have resulted in simazine runoff into the French Camp Slough. This is the first exceedance of the WQTL for simazine at French Camp Slough @ Airport Way; therefore, simazine will not be added to a management plan for this site subwatershed.

IX. D. ii. d. *Toxicity*

In Zone 2, there was one water sample from French Camp Slough @ Airport Way that was toxic to *S. capricornutum* (0% growth compared to the control; Table 36) during February 11, 2014 storm (NM and MPM) monitoring. Since the algal growth was below 50% compared to the control, a TIE was conducted on the toxic sample. The TIE was conducted on February 29, 2014 and concluded that non-polar organics were the cause of the toxicity. This coincides with the exceedance of the WQTL for diuron, a non-polar organic compound. Therefore, the Coalition attributes the toxicity to *S. capricornutum* at French Camp Slough @ Airport Way to the diuron found at the site at concentrations above the WQTL. The Coalition performed a phase III TIE in order to determine the toxic units (TUs) accounted for the toxicity; the phase III TIE indicated that the TU calculated from the concentration of diuron (19) was enough to account for all the observed toxicity (Table 34).

Table 36. Zone 2 (Duck Creek @ Hwy 4, French Camp Slough @ Airport Way, Littlejohns Creek @ Jack Tone Rd, Lone Tree Creek @ Jack Tone Rd, Mormon Slough @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd) exceedances.

Zone 2 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7mg/L	pH, <6.5 and>8.5	*E. coli*, >235 MPN/ 100 mL	Diuron, 2 µg/L	Simazine, 4 µg/L	*S. capricornutum*, % control
Duck Creek @ Hwy 4	Assessment	MPM	3/5/2014	3.28					
Duck Creek @ Hwy 4	Assessment	MPM	6/17/2014	3.10					
Duck Creek @ Hwy 4	Assessment	MPM	8/19/2014	3.07					
Duck Creek @ Hwy 4	Assessment	MPM	9/16/2014	3.24					
French Camp Slough @ Airport Way	Core	MPM, NM	2/11/2014	5.81			38		0
French Camp Slough @ Airport Way	Core	MPM, NM	3/3/2014	6.70		770.1		6.4	
Littlejohns Creek @ Jack Tone Rd	Assessment	MPM, Non-Contiguous	2/11/2014		8.62				
Littlejohns Creek @ Jack Tone Rd	Assessment	MPM, Non-Contiguous	4/15/2014	6.25					
Littlejohns Creek @ Jack Tone Rd	Assessment	MPM	5/20/2014	5.31					
Littlejohns Creek @ Jack Tone Rd	Assessment	MPM	6/17/2014	4.90					
Littlejohns Creek @ Jack Tone Rd	Assessment	MPM	9/16/2014	2.38					
Lone Tree Creek @ Jack Tone Rd	Assessment	MPM	2/11/2014		9.07				
Lone Tree Creek @ Jack Tone Rd	Assessment	MPM	8/19/2014	6.61					
Mormon Slough @ Jack Tone Rd	Assessment	MPM, Non-contiguous	4/15/2014		9.12				
Mormon Slough @ Jack Tone Rd	Assessment	MPM	5/20/2014		8.79				
Mormon Slough @ Jack Tone Rd	Assessment	MPM	7/15/2014		8.84				
Mormon Slough @ Jack Tone Rd	Assessment	MPM	8/19/2014	5.02					
Mormon Slough @ Jack Tone Rd	Assessment	MPM	9/16/2014	5.71					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Assessment	MPM	4/15/2014	4.91					

MPM-Management Plan Monitoring
NM-Normal Monitoring

IX. D. iii. Zone 3 (Drain @ Woodbridge Rd, Empire Tract @ 8 Mile Rd, and Terminous Tract Drain @ Hwy 12)

IX. D. iii. a. *Field Parameters, TDS, and E. coli*

In Zone 3, exceedances of the WQTL for DO (14), SC (9), TDS (9), and *E. coli* (3) occurred in 2014. During 2014, MPM occurred during months of past exceedances at Drain @ Woodbridge Rd and Terminous Tract Drain @ Hwy 12. Also, Assessment Monitoring occurred at Empire Tract @ 8 Mile Rd through July and Core Monitoring occurred at Terminous Tract Drain @ Hwy 12.

In Zone 3, 14 exceedances of the WQTL of 7 mg/L for DO occurred, one at Drain @ Woodbridge, five at Empire Tract Drain @ 8 Mile Rd and eight at Terminous Tract Drain @ Hwy 12 (Table 37). Exceedances of the WQTL for DO occurred during every month in Zone 3 with concentrations ranging from 3.02 to 6.65 mg/L (Table 37). Exceedances of DO are usually attributed to low flow conditions, which occurred at Empire Tract @ 8 Mile Rd (when the pump is not running); however, the average flow at Terminous Tract Drain @ Hwy 12 was constantly around 50 cfs. Three exceedances of the WQTL for *E. coli* occurred, one at Empire Tract @ 8 Mile Rd in May (488.4 MPN/100 mL), and at Terminous Tract Drain @ Hwy 12 in June (1413.6 MPN/100 mL) and August (410.6 MPN/100mL).

High salinity levels resulting in exceedances of the WQTLs for SC and TDS are common in the Delta islands due to 1) tidal influence in the area, and 2) hydrostatic pressure moving Delta water to the interior of the islands and/or the use of Delta water for irrigation. The WQTL for SC in the Delta is broken into two periods, 1000 µS/cm from September to March, and 700 µS/cm from April through August. Levels of SC were above 1000 µS/cm from February through June in 2014. Exceedances of the WQTL for SC in Zone 3 coincided in large part with elevated levels of TDS.

IX. D. iii. b. *Arsenic*

In Zone 3, four exceedances of the WQTL for arsenic occurred in 2014 (Table 37). Products containing arsenic for agricultural purposes have been phased out since the 1980s. However, arsenic acid, arsenic acid anhydride, arsenic trioxide, and chromate copper arsenate are currently registered for nonagricultural uses including wood protectants, household ant killer, weed killer around ditches, nonagricultural areas, buildings, driveways, sidewalks, and fencerows. Moreover, the geology of the coalition region is also known to have naturally occurring sources of arsenic and it is likely that exceedances of the arsenic WQTL are due to naturally occurring instances.

Exceedances of the WQTL for arsenic occurred in samples collected from four sampling events Empire Tract @ 8 Mile Rd in 2014 (Table 37). Elevated levels of arsenic are common in Zone 3; sites in Zone 3 naturally contain higher levels of arsenic in the soil (Burrow et al., 2004; Moran et al., 2009; Westcot et al., 1990). There are no registered products containing arsenic; therefore, the PUR database could not be queried for these exceedances.

IX. D. iii. c. *Toxicity*

In Zone 3, one sample was toxic to *P. promelas* during March 3, 2014 storm monitoring and another sample was toxic to *S. capricornutum* during April 15, 2014 NM (Table 37).

Samples collected from Empire Tract @ 8 Mile Rd during storm monitoring on March 3, 2014 were toxic to *P. promelas* with 83% survival compared to the control. Since the survival was greater than 50%, no TIE was conducted. There was, however, accumulation of particulate material in the gills of *P. promelas* during toxicity testing. The corresponding water sample also contained a high level of suspended particles, which likely resulted from storm runoff; there was continuous rainfall (up to 1.42 inches, Figure 10) throughout the week prior to the sampling event.

According to PUR data, it is also possible that fungicides contributed to the toxicity to fathead minnows at Empire Tract @ 8 Mile Rd. There were nine application of fungicides totaling 281 lbs AI applied across 1274 acres of blueberries from February 5 through 7 and again on February 25, 2014.

Samples collected from Empire Tract @ 8 Mile Rd on April 15, 2014 were toxic to *S. capricornutum* with 57% growth compared to the control. Since the percent growth was greater than 50%, no TIE was conducted. According to associated PUR data, there were 15 applications of herbicides that were potentially toxic to algae. The applications ranged from 0.1291 to 686 lbs AI applied over 2,004 acres of processing tomatoes, blueberries, and non-agricultural land.

Table 37. Zone 3 (Drain @ Woodbridge Rd, , Empire Tract Drain @ 8 Mile Rd, and Terminous Tract Drain @ Hwy 12) exceedances.

Zone 3 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm	TDS, >450 mg/L	*E. coli*, >235 MPN/100 mL	Arsenic, >10 µg/L	*P. promelas*, % control	*S. capricornutum*, % control
Drain @ Woodbridge Rd	Assessment	MPM	4/15/2014	5.29	753					
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	1/28/2014	6.65		490				
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	2/11/2014	3.32	1046	800				
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	3/3/2014		1440	1000		12	83	
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	3/5/2014	3.02	1363					
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	4/15/2014			1500		18		57
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	5/20/2014	4.29	1814	1300	488.4	44		
Empire Tract Drain @ 8 Mile Rd	Assessment	NM	6/17/2014	3.26	1042	630		47		
Terminous Tract Drain @ Hwy 12	Core	NM	1/28/2014			530				
Terminous Tract Drain @ Hwy 12	Core	NM	2/11/2014	6.46	1409	1000				
Terminous Tract Drain @ Hwy 12	Core	NM	3/3/2014		1542	960				
Terminous Tract Drain @ Hwy 12	Core	MPM	3/5/2014	6.14						
Terminous Tract Drain @ Hwy 12	Core	NM	4/15/2014	6.43						
Terminous Tract Drain @ Hwy 12	Core	NM	5/20/2014	6.54						
Terminous Tract Drain @ Hwy 12	Core	NM	6/17/2014	5.12	709		1413.6			
Terminous Tract Drain @ Hwy 12	Core	NM	7/15/2014	3.85						
Terminous Tract Drain @ Hwy 12	Core	NM, MPM	8/19/2014	3.86			410.6			
Terminous Tract Drain @ Hwy 12	Core	NM, MPM	9/16/2014	4.56						

MPM- Management Plan Monitoring
NM-Normal Monitoring

IX. D. iv. Zone 4 (Bacon Island Pump @ Old River, Grant Line Canal near Calpack Rd, Grant Line Canal @ Clifton Court Rd, Kellogg Creek along Hoffman Ln, and Roberts Island @ Whiskey Slough Pump)

IX. D. iv. a. *Field Parameters, TDS, and E. coli*

In Zone 4, exceedances of the WQTLs for DO (29), pH (3), SC (28), TDS (11), and *E. coli* (4) occurred from January through September 2014 (Table 38). All sites in Zone 4 were monitored for MPM constituents during months of past exceedances. The Coalition also conducted Assessment Monitoring at Roberts Island @ Whiskey Slough Pump.

The site subwatersheds in Zone 4 are agricultural drains within the Delta islands and pumping is required to remove water from the drains. In most cases there is no flow in the drains unless the pumps are activated. Furthermore, algal production and decay along with stagnant, warm water at these sites can contribute to low DO detections. Therefore, exceedances of the WQTL for DO and salts (SC and TDS) are common in Zone 4 due to a lack of flow. Exceedances of the WQTL for DO occurred at every site in Zone 4 with concentrations ranging from 0.12 to 6.90 mg/L (Table 38). There were three exceedances of the WQTL for pH: at Bacon Island Pump @ Old River (6.41), Kellogg Creek along Hoffman Ln (8.76), and at Grant Line Canal near Calpack Rd (6.33). Detections above the 1000 µS/cm (September through March) and 700 µS/cm (April through August) WQTL for SC occurred at all sites in Zone 4; the detections of SC ranged from 735 to 2707 µS/cm. All exceedances of the WQTL for SC coincided with exceedances of the WQTL for TDS at Bacon Island Pump @ Old River and Robert Island @ Whiskey Slough Pump. Bacon Island Pump @ Old River and Roberts Island @ Whiskey Slough Pump were the only sites with elevated levels of TDS. There were four exceedances above the 235 MPN/100 mL WQTL for *E. coli*: three occurred at Bacon Island Pump @ Old River and one occurred at Roberts Island @ Whiskey Slough Pump (Table 38).

IX. D. iv. b. *Ammonia*

Ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers (anhydrous ammonia), 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. In soils, ammonium from fertilizers is typically converted to nitrite and then to nitrate over a short period of time. Therefore, ammonium from fertilizers would require a direct discharge to surface waters to detect ammonia in the receiving waterbody. The method of anhydrous ammonium application to fields is injection into soil which argues against direct discharge to a receiving waterbody. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen. In 2014, there was one exceedance of the WQTL for ammonia as N during Assessment Monitoring at Bacon Island Pump @ Old River. The exceedance of the 1.5 mg/L WQTL for ammonia as N (2.50) occurred during Assessment Monitoring on the July 15, 2014 sampling event (Table 38). This is the first exceedance of the WQTL for ammonia as N at this site; therefore, the Coalition will not place ammonia as N into the Bacon Island Pump @ Old River active management plan.

IX. D. iv. c. *Arsenic*

In Zone 4, samples collected during Assessment Monitoring on July 15, 2014 and August 19, 2014 from Bacon Island Pump @ Old River contained levels of arsenic above the WQTL(27 µg/L and 15 µg/L, respectively) (Table 38). Elevated levels of arsenic are common in Zone 4 and sites in Zone 4 naturally contain higher levels of arsenic in the soil (Burrow et al., 2004; Moran et al., 2009; Westcot et al., 1990). Since there are no registered products containing arsenic, the Coalition cannot query the PUR database to identify potential applications.

IX. D. iv. d. *Dichlorvos*

Dichlorvos is an organophosphate used as an agricultural insecticide on crops, stored products, and animals. Primarily used as an insecticide for slow release on pest-strips for pest control in homes, dichlorvos is also used as an anthelmintic (worming agent) for dogs, swine, and horses, as a botacide (agent that kills fly larvae) for horses, and in flea collars for dogs. The compound has been commercially available since 1961 and has become controversial because of its prevalence in urban waterways and the fact that its toxicity extends well beyond insects. Dichlorvos occurs as an oily colorless to amber liquid that is slightly soluble in water. In 2014, there was one exceedance of the WQTL for dichlorvos during Assessment Monitoring at Roberts Island @ Whiskey Slough Pump.

The exceedance of the WQTL for dichlorvos (0.53 µg/L; Table 38) occurred during Assessment Monitoring on July 15, 2014. There was no reported agricultural use of products containing dichlorvos on Roberts Island since January 2012. Dichlorvos is also registered as an insecticide for urban pest control. Such pests include mosquitos, which are abundant during the summer season. The exceedance of the WQTL for dichlorvos could be a result of mosquito control or another form of urban pest control.

IX. D. iv. e. *Diuron*

There was one exceedance of the WQTL for diuron (6.3 mg/L) at Bacon Island Pump @ Old River during the May 20, 2014 sampling event. According to PUR data, the last application of diuron in this site subwatershed occurred on December 14, 2013. As stated above, the half-life of diuron is 90 days; therefore, it is unlikely that applications of diuron in December 2013 were responsible for the exceedance in May 2014.

IX. D. iv. f. *Molybdenum*

Although it is possible for molybdenum to be applied by agricultural, there are no registered products containing this constituent currently in use in the Coalition area. Molybdenum can be a byproduct in copper and tungsten mining and is used in alloys due to its ability to withstand high temperatures, resistance to corrosion, and its weldability. Nearly all the San Joaquin Valley and Coastal counties south of Contra Costa are naturally elevated in molybdenum and it can be flushed into surface waters during periods of high rainfall (Meyer et al., 1999). In living organisms, molybdenum acts as a metal heteroatom and is present in various enzymes including aldehyde oxidase, sulfite oxidase and xanthine

oxidase. Molybdenum can also be found in alfalfa and other legumes commonly grown in the Coalition region. In 2014, there was one exceedance of the WQTL for molybdenum in Zone 4.

The exceedance of the WQTL for molybdenum (11 µg/L; Table 38) occurred at Bacon Island Pump @ Old River during the April 15, 2014 sampling event. Of the nine sampling events that occurred at Bacon Island Pump @ Old River, there were two detections (4.7 and 7.7 µg/L) as well as the exceedance. Molybdenum is naturally occurring within this subwatershed and there are no registered products currently in use in the SJCDWQC region associated with molybdenum; therefore the Coalition did not query the PUR database to identify potential applications.

IX. D. iv. g. *Toxicity*

In Zone 4, water column toxicity occurred once to *C. dubia*, twice to *P. promelas*, and five times to *S. capricornutum* (Table 38). From January through September 2014, sampling for toxicity in Zone 4 occurred as Assessment Monitoring at Bacon Island Pump @ Old River, as MPM at both of the Grant Line sites, and as both Assessment Monitoring and MPM at Roberts Island @ Whiskey Slough Pump.

Samples collected during NM on March 3, 2014 from Bacon Island Pump @ Old River and Roberts Island @ Whiskey Slough Pump were toxic to *P. promelas* (80% and 78% survival compared to the control, respectively). Since the percent survival in both samples was greater than 50%, no TIE was conducted. There was accumulation of particulate material in the gills of *P. promelas* during toxicity testing. The corresponding water sample also contained a high level of suspended particles, which could be attributed to increased flow from storm runoff; there was continuous rainfall (up to 1.42 inches, Figure 10) throughout the week prior to the sampling event.

It is also possible that insecticides contributed to the toxicity to fathead minnow at Roberts Island @ Whiskey Slough Pump. Although there were no exceedances of the WQTLs for pesticides or metals, there were detections of diuron (0.69 µg/L) and copper (1.1 µg/L dissolved and 2.6 µg/L total). According to PUR data, there were 29 applications of insecticides ranging from 0.281 to 21.289 lbs AI that are associated with toxicity to fathead minnow. A total of about 166 lbs AI of pyriproxyfen, dimethoate, cypermethrin, cyhalothrin, and methomyl were applied across 769 acres of alfalfa on February 24, 2014, one week prior to the sampling event.

Samples collected during MPM on January 28, February 11, and April 15, 2014 at Grant Line Canal near Calpack Rd were toxic to *S. capricornutum* (6%, 23%, and 53% growth compared to the control, respectively). Since the percent growth was less than 50% in the samples collected in January and February, TIEs were conducted on February 4 and 19, respectively. The TIEs indicated that non-polar organics were responsible for both toxic events. The PUR data indicates that there were three applications of herbicides ranging from eight to 51 lbs AI. A total of 73 lbs AI of dimethylamine salt, flumioxazin, and paraquat dichloride were applied across 267 acres of alfalfa and oats on January 21 and 25, 2014. There was also a detection of diuron (1.6 µg/L) in the sample that was toxic to algae on February 11. Although it was not an exceedance of the WQTL for diuron, the Coalition conducted a

phase III TIE which indicated that the TUs calculated from the concentration of diuron was enough to account for the majority of the toxicity (Table 34).

Algae growth in the April 2014 sample from Grant Line Canal near Calpack Rd was greater than 50% compared to the control, and therefore no TIE was conducted. There were 20 applications of herbicides in the site subwatershed that could have contributed to the toxicity. There was a total of 855 lbs of AI applied over 899 acres of safflower, asparagus, and wheat. The PUR data also indicated that most of the herbicides were non-aerial applications; therefore, the toxicity was potentially caused by irrigation runoff of herbicides into the waterbody.

Samples collected during MPM on July 15, 2014 at Roberts Island @ Whiskey Slough Pump were toxic to *C. dubia* (0% survival compared to the control). Since the survival was less than 50%, a TIE was conducted on July 17, 2014 and indicated non-polar organics as the cause of toxicity; the TIE also included a PBO (piperonyl butoxide) treatment that ruled out organophosphate pesticides and pyrethroids as the cause of toxicity. There was an exceedance of the WQTL for dichlorvos associated with the toxicity. The Coalition performed a phase III TIE which indicated that the TUs calculated from the concentration of dichlorvos (3.8) was enough to account for most of the observed toxicity (Table 34).

Table 38. Zone 4 (Bacon Island Pump @ Old River, Grant Line Canal @ Clifton Court Rd, Grant Line Canal near Calpack Rd, Kellogg Creek along Hoffman Ln, and Roberts Island @ Whiskey Slough Pump) exceedances.

Zone 4 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and >8.5	SC, >700 µS/cm	TDS, mg/L, >450 mg/L	*E. coli, >235 MPN/100mL*	*Ammonia, 1.5 mg/L*	*Arsenic, 10 µg/L*	*Dichlorvos, 0.085 µg/L*	*Diuron, >2 µg/L*	*Molybdenum, Total, 10 µg/L*	*C. Dubia, % Control*	*P. promelas, % Control*	*S. capricornutum, % control*
Bacon Island Pump @ Old River Rd	Assessment	NM	2/11/2014	5.42			470									
Bacon Island Pump @ Old River Rd	Assessment	NM	3/3/2014			735	470								80	
Bacon Island Pump @ Old River Rd	Assessment	NM	3/5/2014	5.04												
Bacon Island Pump @ Old River Rd	Assessment	NM	4/15/2014	2.06									11			
Bacon Island Pump @ Old River Rd	Assessment	NM	5/20/2014	0.94				1046.2				6.3				
Bacon Island Pump @ Old River Rd	Assessment	NM	6/17/2014	2.82		926	520	290.9								
Bacon Island Pump @ Old River Rd	Assessment	NM	7/15/2014	0.12	6.41			920.8	2.50	27						
Bacon Island Pump @ Old River Rd	Assessment	NM	8/19/2014	6.30						15						
Bacon Island Pump @ Old River Rd	Assessment	NM	9/16/2014	4.63												
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	1/28/2014			1557										
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	2/11/2014	3.10		1819										
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	3/3/2014	1.94		1916										
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	3/5/2014	4.03		1958										
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	5/20/2014	1.61		2707										
Grant Line Canal @ Clifton Court Rd	Assessment	MPM	9/16/2014	1.03		2523										
Grant Line Canal near Calpack Rd	Assessment	MPM	1/28/2014	2.29		1309										6
Grant Line Canal near Calpack Rd	Assessment	MPM	2/11/2014	4.50		1810										23
Grant Line Canal near Calpack Rd	Assessment	MPM	3/3/2014			1064										
Grant Line Canal near Calpack Rd	Assessment	MPM	3/5/2014			1069										
Grant Line Canal near Calpack Rd	Assessment	MPM	4/15/2014			1873										53
Grant Line Canal near Calpack Rd	Assessment	MPM	5/20/2014	5.61		1215										
Grant Line Canal near Calpack Rd	Assessment	MPM	7/15/2014	5.28	6.33	1590										
Grant Line Canal near Calpack Rd	Assessment	MPM	8/19/2014	3.46		999										
Grant Line Canal near Calpack Rd	Assessment	MPM	9/16/2014	6.42		975										
Kellogg Creek along Hoffman Ln	Assessment	MPM	3/5/2014			804										
Kellogg Creek along Hoffman Ln	Assessment	MPM	8/19/2014		8.67											
Kellogg Creek along Hoffman Ln	Assessment	MPM	9/16/2014	6.71												
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	1/28/2014	6.39		912	730									
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	2/11/2014	4.84		1322	980									67
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	3/3/2014			1364	870								78	
Roberts Island @ Whiskey Slough Pump	Core	MPM	3/5/2014	6.89		1387										
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	4/15/2014	6.90		1389	900									50
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	5/20/2014	2.60		1074	670									
Roberts Island @ Whiskey Slough Pump	Core	NM	6/17/2014	4.53		1074	690									
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	7/15/2014	3.43		902	590				0.53			0		
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	8/19/2014	3.73		1160	670	365.4								
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	9/16/2014	6.09		1219										

MPM- Management Plan Monitoring NM-Normal Monitoring

IX. D. v. Zone 5 (Walthall Slough @ Woodward Ave)

IX. D. v. a. *Field Parameters and E. coli*

In Zone 5, exceedances of the WQTLs for DO (9), SC (3), and TDS (2) occurred (Table 39). Walthall Slough @ Woodward Ave is the Core Monitoring location in Zone 5 and the only sampling location suitable for Coalition monitoring within the zone. The Coalition conducted Core Monitoring at Walthall Slough @ Woodward Ave all 12 months and MPM constituents during months of past exceedances.

Exceedances of the WQTL for DO occurred in all months in the monitoring year (January through September) except in July. Exceedances of the WQTL for DO are usually attributed to low flow conditions; from January through September 2014, the average flow measured at the site through all monitoring events was greater than 6 cfs. Three exceedances of the WQTL for SC occurred during the January, February, and April monitoring events. Exceedances of TDS occurred in January and February (Table 39).

Table 39. Zone 5 (Walthall Slough @ Woodward Ave) exceedances.

Zone 5 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm	TDS, >450 mg/L	*E. coli*, >235 MPN/100 mL
Walthall Slough @ Woodward Ave	Core	MPM, NM	1/28/2014	3.68	830	560	
Walthall Slough @ Woodward Ave	Core	NM	2/11/2014	1.12	824	550	
Walthall Slough @ Woodward Ave	Core	NM	3/3/2014	0.15			920.8
Walthall Slough @ Woodward Ave	Core	MPM	3/5/2014	0.81			
Walthall Slough @ Woodward Ave	Core	NM	4/15/2014	0.19	713		
Walthall Slough @ Woodward Ave	Core	NM	5/20/2014	1.11			
Walthall Slough @ Woodward Ave	Core	NM	6/17/2014	4.08			
Walthall Slough @ Woodward Ave	Core	NM	8/19/2014	3.73			
Walthall Slough @ Woodward Ave	Core	NM, MPM	9/16/2014	2.93			

NM-Normal Monitoring
MPM-Management Plan Monitoring

IX. D. vi. Zone 6 (Sand Creek @ Hwy 4 Bypass)

IX. D. vi. a. *Field Parameters*

In Zone 6, exceedances of the WQTLs for DO (6) and SC (6) occurred. During 2014, monitoring in Zone 6 was scheduled at a single MPM location, Sand Creek @ Hwy 4 Bypass.

From January through September 2014, six exceedances of the WQTL for DO occurred with concentrations ranging from 4.55 to 6.44 mg/L (Table 40). Discharge at Sand Creek @ Hwy 4 Bypass was less than 1 cfs during all months it was recorded; these low flow conditions most likely contributed to the low DO detected during most monitoring events. Exceedances of the WQTL for SC occurred during every MPM event. It's common for SC to be above 1400 µS/cm at Sand Creek @ Hwy 4 Bypass; concentrations of SC ranged from 1190 to 2041 µS/cm. Sand Creek @ Hwy 4 Bypass is located in a growing urban community. Water for municipal and industrial use within the subwatershed area is supplied by Los Vaqueros Reservoir, and a large portion of the water used to irrigate suburban lawns

and gardens is returned to the creek upstream of the Sand Creek @ Hwy 4 Bypass sample location. The high levels of SC that are typical in the site subwatershed could be a result of recycling salty water from the Delta to the reservoir and back to the creek.

Table 40. Zone 6 (Sand Creek @ Hwy 4 Bypass) exceedances.

Zone 6 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	3/5/2014	6.11	1190
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	4/15/2014	6.14	2010
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	5/20/2014	6.44	1808
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	6/17/2014	6.17	1903
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	8/19/2014	5.15	1978
Sand Creek @ Hwy 4 Bypass	Assessment	MPM	9/16/2014	4.55	2041

MPM-Management Plan Monitoring

X. COALITION ACTIONS TAKEN TO ADDRESS EXCEEDANCES OF WATER QUALITY OBJECTIVES

The Coalition monitors ambient surface waters to characterize discharge from irrigated agriculture. Monitoring results are analyzed to identify constituents, agricultural lands, crops, and/or specific pesticides that require management. Actions taken to determine the potential sources of chemicals causing exceedances include 1) the use of PUR data to identify relevant applications that occurred upstream of the sample site and within a specified time period prior to the sampling event, 2) an analysis of monitoring data and toxicity results to better understand the potential sources and toxicity of detected constituents, and 3) special studies, when appropriate and cost effective.

The Coalition notified the Regional Board of all exceedances within five business days upon receipt of laboratory results. Any discrepancies or omissions were described in the Discussion of Results section of this report.

The Coalition also notifies members in site subwatersheds where exceedances of WQTLs occurred and works with growers to address water quality impairments. Monitoring results are disseminated to Coalition members via grower mailings, outreach meetings, and, in some cases, personal communication. Appendix VI includes copies of mailings, meeting agendas and handouts; the Coalition provides all documents associated with outreach upon request. The Coalition encourages awareness of water quality concerns amongst members, and when applicable, implementation of management practices designed to improve water quality.

X. A. SUMMARY OF OUTREACH, EDUCATION, AND COLLABORATION ACTIVITIES

Outreach and education activities are integral to the Coalition monitoring program. During 2014 grower meetings, the Coalition presented information to members concerning progress in achieving water quality goals, site subwatershed specific monitoring results, and management practices effective at reducing discharge of pesticides to waterbodies. All outreach and education activities from January through September 2014 are documented in Table 41.

The Coalition distributes a newsletter, annually, that is designed to keep growers informed of relevant Coalition news. In 2014, the newsletter was distributed in May and covered new waste discharge requirements for agriculture, chlorpyrifos and herbicide detections, and nitrogen management plans and reports.

Coalition representatives conducted or participated in five meetings or mailings from January through September 2014. Meeting discussions often included topics on irrigation water quality, storm water

quality, and sediment runoff. One meeting discussed specific site subwatershed management plans and management practices.

The Coalition coordinates with other entities to expand grower audiences, including growers who are not Coalition members. On February 18, 2014, the Coalition participated in the Stockton area Spray Safe Sponsored Grower Meeting, which discussed applicable laws and regulations, management practices, and new technologies used to promote safe pesticide use. Over 300 growers attended the Spray Safe Meeting.

The Coalition manages a website which serves as a clearing house for information on Coalition activities and outreach on management practices (http://www.sjdeltawatershed.org/). Information provided through the website is useful to supplement regular grower contacts and meetings. Interested entities can find information on past exceedances, management plans, management practices, upcoming grower meeting dates, and the long term ILRP.

X. A. i. Pest Control Advisors, Agricultural Commissioners, and Registrants

The Coalition collaborates with County Agricultural Commissioners, Pesticide Control Advisors (PCAs), and pesticide registrants to provide growers with information on effective management practices. As mentioned above, the Coalition participated in the February 18, 2014 meeting hosted by Spray Safe, distributed Coalition Newsletters, and conducted a BMP Outreach and Education meeting.

Table 41. SJCDWQC 2014 outreach and education activities.

All grower notifications, management practice tracking and management practice outreach and education activities covered all agricultural constituents.

Area	Date	Category	Details	Who
Drain @ Woodbridge Rd	1/27/2014	Grower Notification/ Management Practice Tracking	6th Priority Initial Contact Grower Meeting Announcement Mailing: sent to 4 Drain @ Woodbridge members, and additional information sent to all 7 members on chlorpyrifos issues and BMPs. Packet contained a cover letter and letter from the Regional Board explaining the management plan process and grower responsibilities, meeting details and agenda, and grower survey.	Mike Wackman
Drain @ Woodbridge Rd	2/5/2014	BMP Outreach and Education / Management Practice Tracking	6th Priority Initial Contact Grower Meeting: 1 of the 4 targeted members attended the meeting. Past exceedances of Chlorpyrifos (Lorsban) were discussed. Growers that used these products in the past couple of years were required to attend the grower meeting. Survey questions were also addressed at the meeting.	Terry Prichard, Mike Wackman
Bear Creek, Roberts Island, and Walthall Slough subwatersheds (5th P)	2/18/2014	Grower Notification/ Management Practice Tracking	5th Priority Follow Up Mailing: sent to 6 Bear Creek members, 6 Roberts Island members, and 5 Walthall Slough members. Mailing included follow up survey with instructions to complete and return the survey to the Coalition.	Mike Wackman
Stockton	2/18/2014	BMP Outreach and Education	Spray Safe Grower Meeting: about 300 growers attended. Meeting topics included grower perspective and responsibility, pesticide transportation, best management practices and water quality, laws and regulations, and labor relations.	Terry Prichard
Entire Coalition Region	May 2014	BMP Outreach and Education	Yearly Coalition Newsletter: New "waste discharge requirements" for agriculture, Chlorpyrifos and herbicide detections, Nitrogen management plans and reports,	Mike Wackman

MP – Management Practice
MVP – Mid Valley Pesticide
P – Priority
UCCE – University of California County Extension

X. B. MAGNAMENT PLAN ACTIVITIES

X. B. i. Management Plan Performance Goals and Schedules

The Coalition Strategic Plan is outlined in Table 18, Page 72 of the original Management Plan (approved on January 23, 2009) and is designed to meet the following management goal:
"To continue to monitor and analyze the water and sediment quality of SJCDWQC site subwatersheds and to facilitate the implementation of management practices by providing outreach and support to growers in order to effectively enhance water quality in the Coalition region."

The Coalition developed High Priority Site Subwatershed Performance Goals (hereafter referred to as Performance Goals) for its first seven sets of high priority site subwatersheds: first priority (2008-2010), second priority (2010-2012), third priority (2011-2013), fourth priority (2012-2014), fifth priority (2013-2015), sixth priority (2014-2016), and seventh priority (2015-2017). Performance goals are submitted for approval each time a new set of site subwatersheds rotates into high priority status. Performance Goals are built on the following actions essential to the Management Plan strategy:

1. Determine number/type of management practices currently in place, based on APN (Assessor Parcel Number) associated with baseline survey responses
2. Grower Group Contacts / Individual Contacts to recommend additional practices
3. Implementation of new management practices by growers
4. Assess number/type of new management practices implemented
5. Evaluate effectiveness of new management practices using MPM data

Performance Goals were approved for each group of priority site subwatersheds by the Regional Board as amendments to the SJCDWQC Management Plan on December 29, 2009 (first priority), December 29, 2009 (second priority), January 10, 2011 (third priority), November 14, 2011 (fourth priority), November 6, 2012 (fifth priority), November 15, 2013 (six priority), and October 10, 2014 (seventh priority). Performance Goals 1-5 are complete and each goal was discussed in detail for the first priority (2013 MPUR, Pages 30-32), second priority (2013 MPUR, Pages 33-34), third priority (2013 MPUR, Pages 35-37), and fourth priority (2014 MPUR, Pages 43-55). The following sections describe Coalition actions to meet the approved Performance Goals and the status of each of the Performance Goals and associate measure/outputs for the fifth, sixth, and seventh high priority site subwatersheds. A site subwatershed analysis has been included in Appendix I and II for all high priority site subwatersheds.

X. B. i. a. *Fifth Priority Subwatersheds (2013 – 2015)*

The fifth high priority site subwatersheds include Bear Creek @ North Alpine Rd, Roberts Island @ Whiskey Slough Pump and Walthall Slough @ Woodward Ave. Performance Goals for this set of site subwatersheds are similar to those for the second, third, and fourth priority site subwatersheds and were approved November 6, 2012 (Table 42).

Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.

As reported in the 2014 MPUR, the Coalition conducted grower group meetings in January 2013 at which time targeted members completed surveys and Coalition representatives discussed water quality impairments and management practices that could be implemented. All initial contacts were complete before March 30, 2013 (Table 42).

A total of 22 growers were contacted representing 3,763 acres or 13% of the acreage with the potential for direct drainage in the fifth priority subwatersheds. Of the three subwatersheds, Walthall Slough @ Woodward Ave had the highest percentage of acreage with direct drainage represented by contacted growers (61%), followed by Roberts Island @ Whiskey Slough Pump (12%), and Bear Creek @ North Alpine Rd (5%, the Coalition only contacts growers if there were applications in the past two years).

Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.

The Coalition received 100% of the completed surveys from the fifth priority site subwatershed members that participated in outreach. Responses were recorded and are stored in an Access database. A complete summary of currently implemented management practices ('current') in 2012, management practices to be implemented ('planned') in 2013/2014, and newly implemented practices ('new') in 2014 is included in the Fifth Priority Subwatershed Summary of Management Practices section of this report.

Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.

The Coalition mailed follow-up postcards to growers in the fifth priority site subwatersheds on February 14, 2014 requesting them to document newly implemented management practices. One hundred percent of the management practices growers implemented in 2013/2014 were recorded in an Access database (Table 42). A summary of implemented management practices are included in the Fifth Priority Subwatershed Summary of Management Practices section of this report.

Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.

The Coalition conducted Year 2 MPM in 2014 for the fifth priority site subwatersheds. MPM in the fifth priority subwatersheds will continue through 2015 to assess water quality. The Evaluation of Management Practice Effectiveness section of this report includes the water quality results from 2014 monitoring.

Performance Goal 5: Consult with the CVRWQCB at least to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.
Coalition representatives communicated with Regional Board staff via emails and phone calls throughout 2014 to discuss the development of the Waste Discharge Requirements General Order for growers in the San Joaquin County and Delta Watershed Region (WDR) and other ILRP related details. Due to the amount of effort and time required to develop the WDR, the quarterly meetings were postponed. All Coalition activities related to outreach in 2014 including mailings, grower meetings, and individual meetings for the fifth priority site subwatersheds are listed in Table 42.

Table 42. High Priority Performance Goals status for 2013 - 2015 high priority subwatersheds (Bear Creek @ North Alpine Rd, Roberts Island @ Whiskey Slough Pump and Walthall Slough @ Woodward Ave) approved on November 6, 2012.

Performance Goal/Performance Measure	Outputs	Who	Status as of May 1, 2015		
			Bear Creek @ North Alpine Rd	Roberts Island @ Whiskey Slough Pump	Walthall Slough @ Woodward Ave
Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.					
Performance Measure 1.1 – 100% of identified growers contacted to fill out surveys.	Report ratio of individual initial contacts made versus total growers identified to contact.	Mike Wackman	**7 of 7** (100%) March 30, 2013	**7 of 7** (100%) March 30, 2013	**8 of 8** (100%) March 30, 2013
Performance Measure 1.2 – Contact owners/operators in the site subwatershed with direct drainage membership acreage.	Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage.	MLJ-LLC	**655 of 13,448**[1] (5%)	**1,618 of 13,711**[1] (12%)	**1,490 of 2,436**[1] (61%)
Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.					
Performance Measure 2.1 – Document current management practices of 100% of identified growers during individual contacts and encourage the adoption of new practices not currently implemented.	Record current management practices used that may reduce agricultural impact on water quality.	Mike Wackman	**7 of 7** (100%)	**7 of 7** (100%)	**8 of 8** (100%)
Performance Measure 2.2 – Document management practices that the identified growers were encouraged to implement.	Summary of management practice evaluations on a site subwatershed level in the Management Plan update.	MLJ-LLC	**Complete**	**Complete**	**Complete**
Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.					
Performance Measure 3.1 –Document (e.g. assess number/type) new management practices implemented by identified growers.	Record implemented management practices based on survey information in an Access database.	MLJ-LLC	**Complete**	**Complete**	**Complete**
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**Complete**	**Complete**	**Complete**
Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.					
Performance Measure 4.1 Update – Assess water quality results from Coalition monitoring location within the priority site subwatershed.	Summary of water quality data from Management Plan Monitoring.	MLJ-LLC	**Complete** May 1, 2015	**Complete** May 1, 2015	**Complete** May 1, 2015
Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.					

[1]Overall irrigated direct drainage acreage for fifth priority site subwatersheds comes from 2011 parcel data layers

X. B. i. b. *Sixth Priority Subwatersheds (2014 – 2016)*

The sixth high priority site subwatershed is Drain @ Woodbridge Rd. Performance Goals for this site subwatershed are similar to those for the second, third, fourth, and fifth sets of high priority site subwatersheds and were approved November 15, 2013 (Table 43).

Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.

The Coalition contacted 100% of targeted members within the Drain @ Woodbridge site subwatershed. Members were mailed survey packets and notification regarding grower meetings to discuss the Coalition's Management Plan strategy, water quality results and management practices. Growers were asked to attend a meeting held on January 22, 2014 and bring the survey with them to complete. Members who did not attend the meeting were advised to mail in the completed survey. All initial contacts were complete before March 30, 2014 (Table 43).

A total of four growers were contacted representing 1553.11 acres or 32% (low percentage due to not enough direct drainage members had applications within the last 2 years) of the acreage with the potential for direct drainage in the Drain @ Woodbridge Rd site subwatershed.

Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.

The Coalition received 100% of the completed surveys from the from the sixth priority site subwatershed members who were unable to attend the meeting held on February 5, 2014. Responses were recorded and are stored in an Access database. A summary of currently implemented management practices ('current') and management practices to be implemented ('planned') in 2014/2015 is included in the Sixth Priority Subwatershed Summary of Management Practices section of this report.

Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.

During the January 2014 meeting, the Coalition discussed management practices that could be used to help reduce the impact of agriculture on downstream waterbodies. The meetings focused on watershed-specific water quality impairments, crops of targeted growers, and reviewing efficacy of the various practices. In addition to the meeting in January, the Coalition sent informational letters to the remaining members within the subwatershed with a summary of the chlorpyrifos exceedances at this location and information on management practices effective in reducing chlorpyrifos movement from fields to waterways.

The Coalition reviewed the responses provided in surveys regarding the management practices growers intended to implement in 2014 and 2015. The Coalition mailed follow-up postcards to growers in the

Drain @ Woodbridge Rd site subwatershed on February 27, 2015 requesting them to document newly implemented management practices. The Coalition will receive follow-up surveys in 2015 and document newly implemented management practices in the 2016 Annual Report (Table 43).

Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.

The Coalition conducted Year 1 MPM in 2014 at Drain @ Woodbridge Rd. The Coalition will also conduct MPM in Drain @ Woodbridge Rd in 2015 and through 2016 to assess water quality. The Coalition will evaluate effectiveness of new management practices implemented in 2014 and 2015 with water quality data obtained from MPM. An interim evaluation of effectiveness of new management practices is included in this report and a final evaluation will be included in the 2016 Annual Report.

Performance Goal 5: Consult with the CVRWQCB at least to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.

All Coalition activities related to outreach including mailings, grower meetings, and individual meetings for the Drain @ Woodbridge Rd site subwatershed are listed in Table 43.

Table 43. High Priority Performance Goals status for 2014 - 2016 high priority subwatershed (Drain @ Woodbridge Rd) approved on November 15, 2013.

Performance Goal/Performance Measure	Outputs	Who	Status as of May 1, 2015 Drain @ Woodbridge Rd
Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.			
Performance Measure 1.1 – 100% of identified growers contacted to fill out surveys.	Report ratio of individual initial contacts made versus total growers identified to contact.	Mike Wackman	**4 of 4** (100%) March 30, 2014
Performance Measure 1.2 – Contact owners/operators in the site subwatershed with direct drainage membership acreage.	Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage.	MLJ-LLC	**1553 of 4785** (100%)
Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.			
Performance Measure 2.1 – Document current management practices of 100% of identified growers during individual contacts and encourage the adoption of new practices not currently implemented.	Record current management practices used that may reduce agricultural impact on water quality.	Mike Wackman	**4 of 4** (100%)
Performance Measure 2.2 – Document management practices that the identified growers were encouraged to implement.	Summary of management practice evaluations on a site subwatershed level in the Management Plan update.	MLJ-LLC	**Complete**
Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.			
Performance Measure 3.1 –Document (e.g. assess number/type) new management practices implemented by identified growers.	Record implemented management practices based on survey information in an Access database.	MLJ-LLC	**In Progress:** November 30, 2015
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**In Progress:** May 1, 2015/2016
Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.			
Performance Measure 4.1 – Assess water quality results from Coalition monitoring location within the priority site subwatershed.	Summary of water quality data from Management Plan Monitoring.	MLJ-LLC	**In Progress:** May 1, 2015/2016
Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.			

X. B. i. c. *Seventh Priority Subwatersheds (2015 – 2017)*

The constituents in management plans in the seventh priority site subwatersheds are not applied chemicals. The Coalition is proposing studies to identify potential sources of these constituents in its May 1, 2015 SQMP. Therefore, it was determined that focused outreach is not necessary in these seventh priority site subwatersheds. General outreach will occur as scheduled in these site subwatersheds and the constituents in management plans will be discussed with growers at that time.

Growers in priority site subwatersheds are targeted for outreach based on applications of constituents in management plans. A targeted grower list cannot be identified when constituents are not applied. The constituents in management plans in these site subwatersheds are constituents that require further source identification studies or work plans since they are not applied nor easily sourced. Furthermore, MPM is not scheduled for constituents that cannot be sourced.

The seventh high priority site subwatersheds and management plan constituents are: Drain to Bishop Cut @ North Alpine Rd (DO, SC/TDS, and arsenic) and Empire Tract @ 8 Mile Rd (DO, and SC/TDS). In many instances, the sources of the constituents responsible for the exceedances are not known (e.g. nitrate, arsenic, and copper), and the cause of exceedances of WQTLs of parameters such as DO are not well understood. As required in the WDR, a revised Surface Water Quality Management Plan, including an updated management plan compliance timetable for constituents requiring source identification studies or work plans, will be submitted on May 1, 2015. For constituents such as nitrate, arsenic, and copper, a preliminary analysis or source identification work plan will be developed prior to establishing a compliance schedule, engaging in individual grower outreach, and monitoring for compliance.

Therefore, growers in the seventh priority site subwatersheds will not be targeted for focused outreach because 1) the constituents in management plans are not constituents that can be easily sourced and a targeted grower list cannot be developed, 2) farm evaluation surveys documenting existing management practices will be completed by June 2015 for all members within these subwatersheds, and 3) with the submission of the revised Surface Water Quality Management Plan, preliminary analyses and source identification work plans will be developed for constituents in management plans that cannot be sourced. The Coalition discusses all constituents and different management practices that could be effective in reducing and eliminating exceedances during general and focused outreach.

Empire Tract @ 8 Mile Rd is scheduled for Represented site monitoring in the Terminous Tract Drain @ Hwy 12 Zone (Zone 3) for the 2015 WY. During Represented site monitoring, field parameters such as DO and SC will be monitored during each sampling event. Due to site access issues, Drain to Bishop Cut @ North Rio Blanco Rd will be represented by monitoring at Empire Tract @ 8 Mile Rd. Growers within both of these subwatersheds will be required to fill out Farm Evaluation surveys which will document management practices implemented by members in 2014. The May 1, 2015 Revised Surface Water Quality Management Plan will include a revised compliance schedule for management plan constituents and updated Management Plan Strategy and Performance Goals and Measures to reflect the updated timelines and proposed work plans.

XI. MEMBER ACTIONS TAKEN TO ADDRESS EXCEEDANCES

XI. A. MANAGEMENT PRACTICES

The Coalition documents current and newly implemented practices based on survey results obtained from each grower per high priority site subwatershed. Table 44 includes a list of the management practices documented by the Coalition and grouped by either pesticide application or runoff management practices.

Table 44. Management practice categories and associated management practices recommended to growers.

MANAGEMENT PRACTICE CATEGORY	MANAGEMENT PRACTICE
Pesticide Application Management Practices	Reduction in application rates
	Alternative material application
	Spot treating
Runoff Management Practices	Sprinkler or microspray irrigation
	Retention pond/holding basin
	Grass waterways or grass filter strips
	Reduce water volumes using irrigation management
	Treat runoff waters with PAM or other materials

Coalition members with direct drainage and past applications of pesticides found in exceedances were contacted to attend grower meetings and complete surveys. Growers recorded their current management practices and whether they planned to implement additional management practices in the following year. Growers that indicated they would implement one or more new management practices were contacted again and asked 1) if they implemented the practice(s) in the last year, 2) if they did not implement the practice(s) in the last year, they were asked why not, and 3) if they implemented other/additional practices not listed.

XI. A. i. First through Fourth Priority Subwatershed Summary of Management Practices

In 2014, the Coalition completed focused outreach for all site subwatersheds within the first through fourth priorities. Focused outreach to document current management practices and tracking implementation of additional management practices occurred for site subwatersheds in the first priority set from 2008 through 2010, in the second priority set from 2010 through 2012, in the third priority set from 2011 through 2013, and in the fourth priority from 2012 through 2014 (Table 5).

The Coalition completed initial and follow-up surveys with 100% of targeted growers in all site subwatersheds in the first through fourth priority sets. Due to continued water quality impairments in the first and second priority site subwatersheds, particularly exceedances of the WQTL for chlorpyrifos, the Coalition initiated additional outreach in 2012 (complete summary in the 2013 MPUR). Follow-up surveys were sent to all targeted growers who indicated that they were going to implement new

management practices in 2009 for first priority, 2010 for second priority, 2012 for third priority, and 2013 for fourth priority site subwatersheds. The analyses of implemented management practices can be found in the 2011 MPUR (Pages 43-71) for first and second priority site subwatersheds, in the 2013 MPUR (Pages 56-65) for third priority site subwatersheds, and in the 2014 MPUR (Pages 43-55) for fourth priority site subwatersheds.

XI. B. SUMMARY OF NEWLY IMPLEMENTED MANAGEMENT PRACTICES

The Coalition provides growers with information through mailings and meetings concerning various management practices that are designed to 1) reduce stormwater runoff, 2) manage discharge of irrigation tailwater, 3) manage spray applications, and 4) avoid mobilization of sediments to receiving waters. Applicable management practices include use of alternative products, structural or procedural changes to manage irrigation tailwater and stormwater, and utilizing pesticide application practices that minimize spray drift.

During 2014, the Coalition continued focused outreach and management practice tracking in the fifth set of high priority subwatersheds (2013-2015): Bear Creek @ North Alpine Rd, Roberts Island @ Whiskey Slough Pump, and Walthall Slough @ Woodward Ave. The Coalition completed initial contact meetings in 2013. All follow-up surveys were completed with 100% of target growers in 2014; a complete analysis of results is presented in the following section.

The Coalition began focused outreach in the sixth set of high priority subwatershed Drain @ Woodbridge Rd (2014-2016). The Coalition mailed letters on January 27, 2014 to four targeted growers in the Drain @ Woodbridge. The initial contact meeting was held on February 5, 2014; one of four targeted growers was in attendance. Follow-up mailings were sent on February 27, 2014 to four growers in the Drain @ Woodbridge site subwatershed. The Coalition will report on the results of the sixth priority initial follow-up mailings in the 2016 Annual Report.

The Coalition will not conduct focused outreach in the seventh high priority subwatershed Empire Tract @ 8 Mile Rd. The site subwatershed is currently in management plans for only priority E constituents: DO, SC, TDS, *E. coli*, and arsenic.

XI. C. FIFTH PRIORITY SUBWATERSHED SUMMARY OF MANAGEMENT PRACTICES (2013-2015)

Focused outreach in fifth priority site subwatersheds began in 2013 and is scheduled to continue through 2015. The fifth priority site subwatersheds are: Bear Creek @ North Alpine Rd, Roberts Island @ Whiskey Slough Pump, and Walthall Slough @ Woodward Ave. The Coalition initiated outreach with targeted growers in the Bear Creek @ North Alpine Rd (8 growers), Roberts Island @ Whiskey Slough Pump (7 growers) and Walthall Slough @ Woodward Ave (9 growers) site subwatersheds by way of grower meetings held in January 2013 (Table 45).

In February 2014, follow-up survey postcards were sent to 14 growers who indicated on their initial surveys that they would be implementing additional management practices by the end of 2013. Growers recorded newly implemented management practices on the surveys and returned them to the Coalition. The Coalition received all follow-up surveys by October 2014.

Table 45. Tally of members who participated in focused outreach in the fifth set of high priority site subwatersheds (2013-2015).

	Bear Creek @ North Alpine Rd	Roberts Island @ Whiskey Slough Pump	Walthall Slough @ Woodward Ave
Targeted Growers	7	7	8
Completed Individual Meeting	5	5	4
Follow-up Contacts Required (new management practices planned to be implemented)	6	6	5
Completed Follow-up Contact	6	6	5
Growers with Newly Implemented Practices	6	6	5
Percent Complete (Initial Contact)	**100%**	**100%**	**100%**
Percent Complete (Follow-up Contact)	**100%**	**100%**	**100%**

XI. C. i. Bear Creek @ North Alpine Rd

In 2013, the Coalition contacted 7 targeted growers representing 655 acres in the Bear Creek @ North Alpine Rd site subwatershed (Table 45). Management practices were documented for 8% of the acreage identified as having direct drainage (Figure 13). Grower meetings were conducted in 2013 and 100% of targeted members returned surveys with their management practice information. A full summary of their management practices (2012) and management practices they planned to implement (2013) can be found in the 2014 MPUR (Pages 56-60). Follow-up surveys were sent in February 2014 and 100% of follow-up surveys were returned. The following section contains a final summary of 2013 newly implemented management practices.

XI. C. i. a. *Summary of Implemented Management Practices (2013)*

Table 46 includes the number of targeted growers and member acreage associated with planned practices (documented in initial surveys) compared to the number of growers and member acreage with newly implemented practices (documented in follow-up surveys). Not all planned practices were implemented such as installing a retention pond (1 member); treating runoff waters with PAM or other materials was neither planned nor implemented (Table 46). Many times, lack of funding and/or a change in other practices that serve the same purpose can cause delay or change of implementation. For example, one member indicated that they planned to install a retention pond however in their follow-up survey they instead reduced the volume of water used in irrigation.

A final analysis of the follow-up surveys indicated that the two most implemented practices were: 1) reducing use of pesticide types found in exceedances (43% of the acreage with new practices), and 2) reducing runoff water volumes using irrigation management (36% of the acreage with new practices, Figure 14). When comparing the acreage associated with planned management practices and the

acreage associated with the implemented management practices, these two practices had the highest percentage of implementation (98% and 81%respectively, Table 46). The other management practices implemented in 2013 included use of center grass rows, grass waterways, or grass filter strips and installation of sprinkler or micro irrigation (Figure 14) systems. The continued and newly implemented management practices were successful in improving the water quality in the Bear Creek @ North Alpine Rd site subwatershed; in 2014, there were no exceedances of the WQTL for any high priority management plan constituents (chlorpyrifos and malathion) at the site. The most recent exceedances of the WQTL for a high priority management plan constituent were in 2011. If there are no exceedances of the respective WQTLs for chlorpyrifos and/or malathion during the 2015 WY, the Coalition will petition to remove the constituents from the site's management plan.

Table 46. Growers and acreage of 2013 planned and newly implemented practices in the Bear Creek @ North Alpine site subwatershed.

Results are based on initial surveys and follow-up surveys.

Management Practice	Growers: Planned practices in 2013[1]	Acreage: Planned practices in 2013	Growers: Implemented Practice in 2013[1]	Acreage: Newly Implemented Practice in 2013	Percent Acreage with Implemented Practices Compared to Planned	Percent Implemented Compared to Direct Drainage Acreage[2]
Installation of retention pond / holding basin / return systems	1	279	0	0	0%	0%
Installation of sprinkler or micro irrigation when an option	3	381	1	61	16%	9%
Reduce runoff water volumes using irrigation management	5	588	4	531	90%	81%
Reduce use of the pesticide types found in exceedance	5	643	5	643	100%	98%
Use of center grass rows, grass waterways, or grass filter strips	3	525	2	246	47%	38%
Treat runoff waters with PAM or other materials	0	0	0	0	0%	0%

[1]Growers can select multiple management practice categories.
[2]Based on 655 member acres targeted within direct drainage.

Figure 13. Bear Creek @ North Alpine Rd member parcels with direct drainage potential.

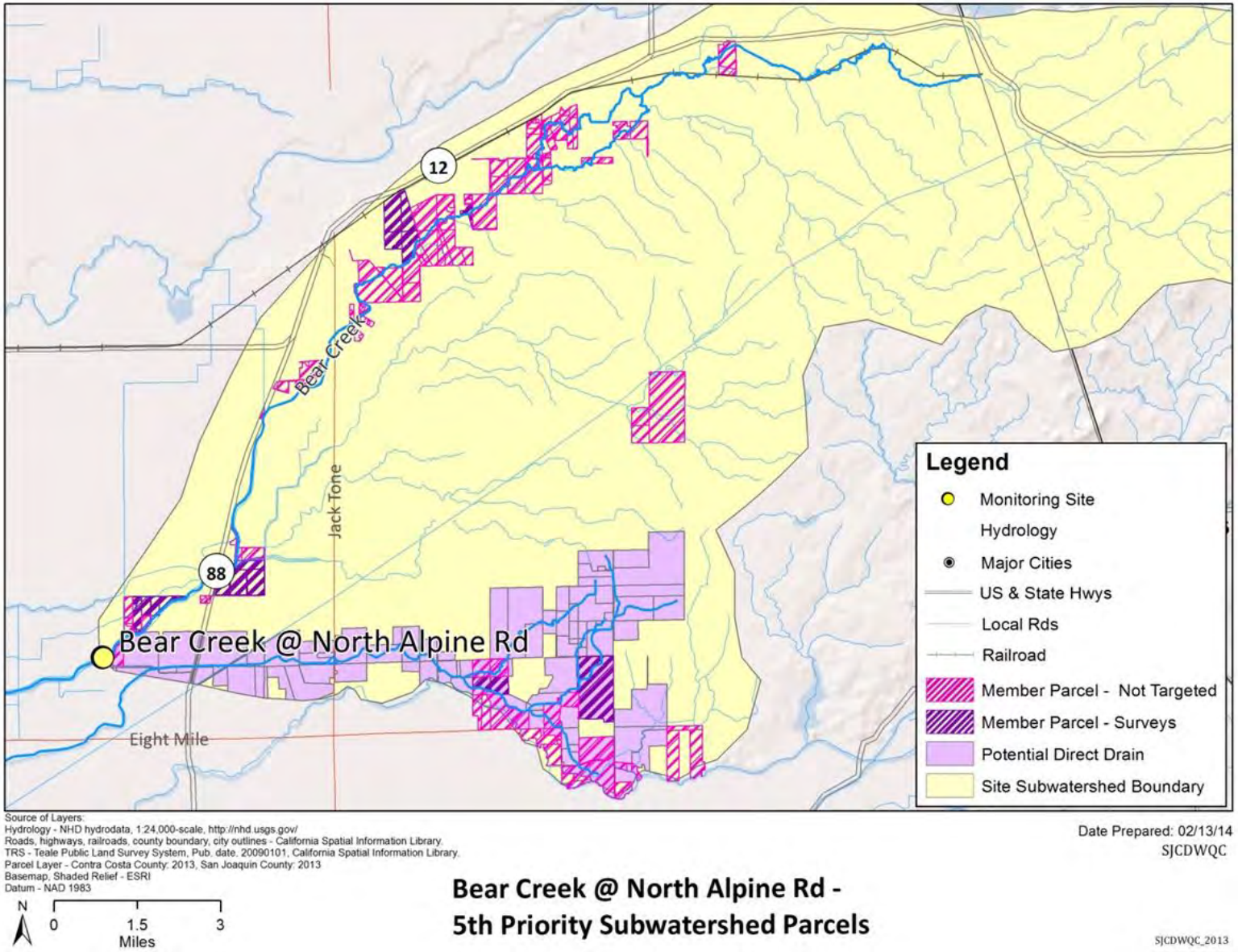
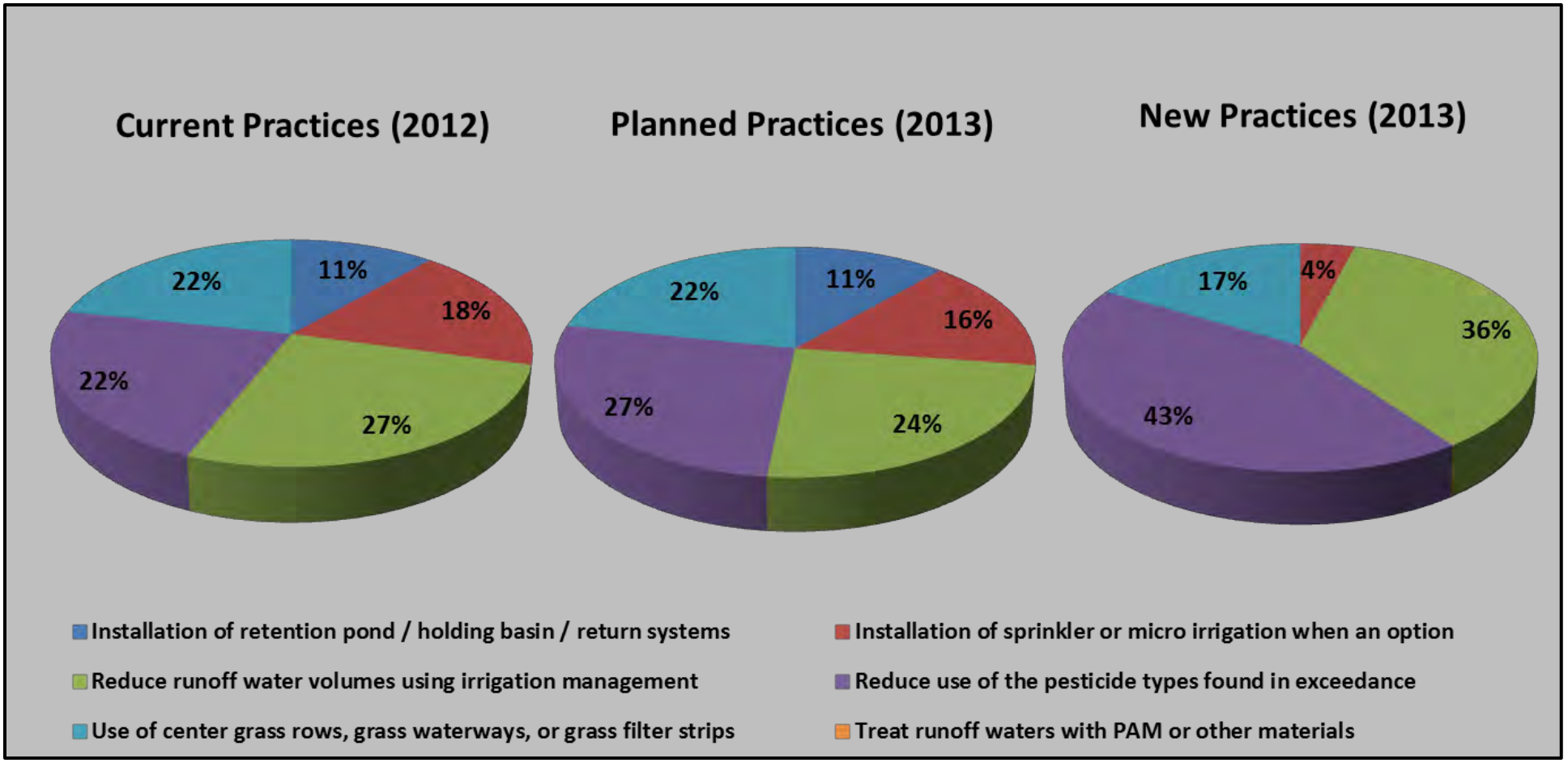


Figure 14. Bear Creek @ North Alpine summary of management practices.

Percentage based on acreage associated with a specific practice compared to the summed acreage associated with all practices for each survey response.



XI. C. ii. Roberts Island @ Whiskey Slough Pump

In 2013 the Coalition contacted seven targeted growers farming 1,618 acres in the Roberts Island @ Whiskey Slough Pump site subwatershed (Table 45). Management practices were documented for 12% of the acreage identified as having direct drainage (Figure 15). One hundred percent of the contacted growers returned an initial survey, and all but one grower indicated they were going to implement new practices in 2013 (Table 45). Growers in the Roberts Island @ Whiskey Slough Pump site subwatershed were sent a follow-up survey on February 14, 2014. The Coalition received 100% of the follow-up surveys as of and growers indicated management practices were implemented in 2013. The following section contains a final summary of 2013 newly implemented management practices.

XI. C. ii. a. *Summary of Implemented Management Practices (2013)*

Table 47 includes the number of targeted growers and member acreage associated with planned practices (documented in initial surveys) compared to the number of growers and member acreage with newly implemented practices (documented in follow-up surveys). Not all planned practices were implemented such as reducing runoff water volumes using irrigation management (1 member) and using center grass rows, grass waters, or grass filter strips (1 member); installation of retention pond/holding basin/return systems and treating runoff waters with PAM or other materials were neither planned nor implemented (Table 47).

A final analysis of the follow-up surveys indicated that the two most implemented practices were: 1) reducing use of pesticide types found in exceedances (47% of the acreage with new practices), and 2) reducing runoff water volumes using irrigation management (41% of the acreage with new practices, Figure 16). When comparing the acreage associated with planned management practices and the acreage associated with the implemented management practices, these two practices had the highest percentage of implementation (63% and 55%, respectively, Table 47). The other management practices implemented in 2013 were use of center grass rows, grass waterways, or grass filter strips and installation of sprinkler or micro irrigation systems (Figure 16). The continued and newly implemented management practices were successful in improving the water quality in the Roberts Island @ Whiskey Slough Pump site subwatershed; in 2014, there were no exceedances of the WQTL for any high priority management plan constituents (chlorpyrifos and diuron) at the site. The most recent exceedances of the WQTL for a high priority management plan constituent occurred at the upstream Roberts Island (Roberts Island @ Holt Rd and Roberts Island along House Rd) sites prior to 2012. If there are no exceedances of the respective WQTLs for chlorpyrifos and/or diuron during the 2015 WY, the Coalition will petition to remove the constituents from the site's management plan.

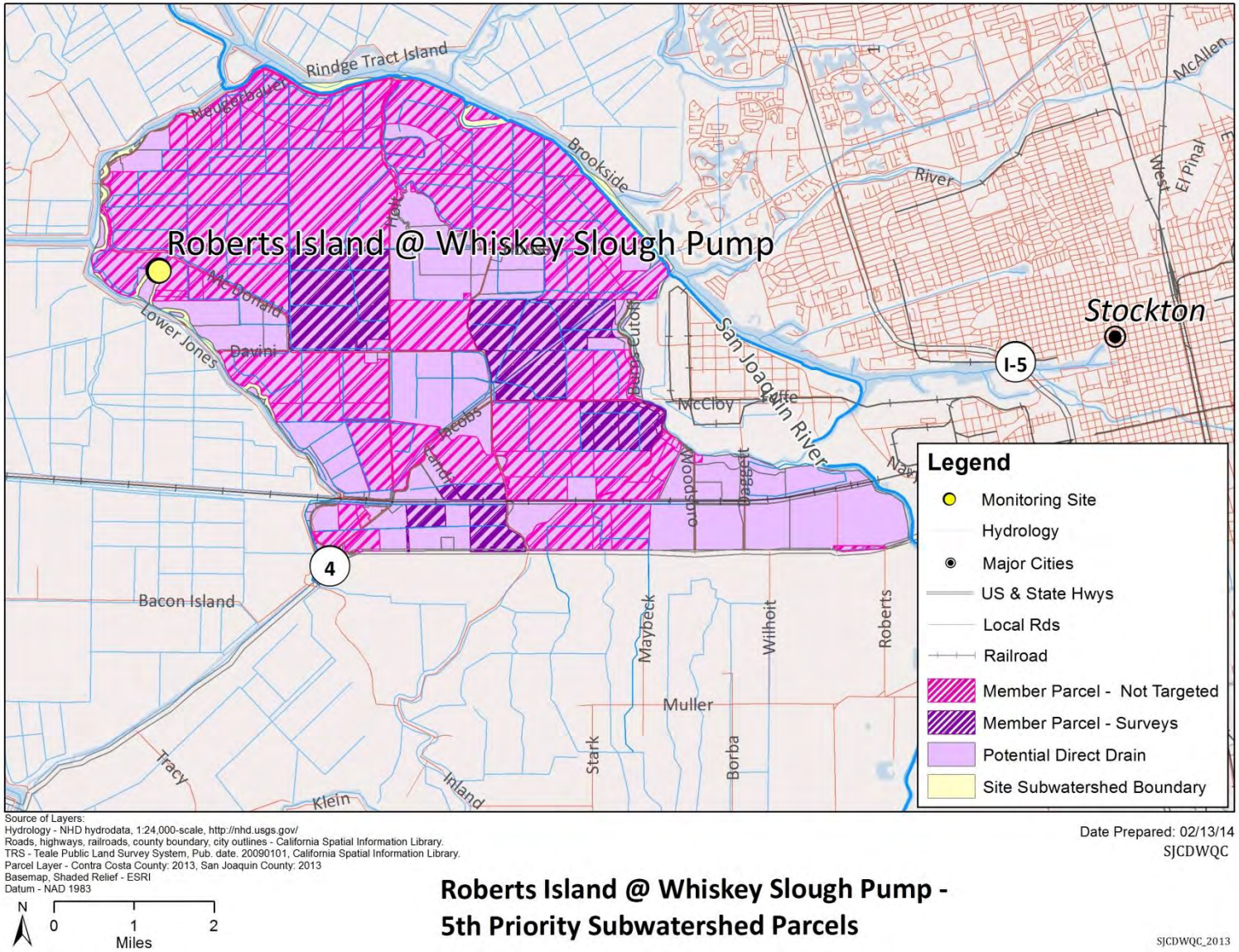
Table 47. Growers and acreage of 2013 planned and newly implemented practices in the Roberts Island @ Whiskey Slough Pump site subwatershed.

Results are based on initial surveys and follow-up surveys.

Management Practice	Growers: Planned practices in 2013[1]	Acreage: Planned practices in 2013	Growers: Newly Implemented Practice in 2013[1]	Acreage: Newly Implemented Practice in 2013[1]	Percent Acreage with Implemented Practices Compared to Planned	Percent Implemented Compared to Direct Drainage Acreage[2]
Installation of retention pond / holding basin / return systems	0	0	0	0	0%	0%
Installation of sprinkler or micro irrigation when an option	1	128	1	128	100%	8%
Reduce runoff water volumes using irrigation management	6	1016	5	896	88%	55%
Reduce use of the pesticide types found in exceedance	6	1016	6	1016	100%	63%
Use of center grass rows, grass waterways, or grass filter strips	2	638	1	120	19%	7%
Treat runoff waters with PAM or other materials`	0	0	0	0	0%	0%

[1]Growers can select multiple management practice categories.
[2]Based on 1618 member acres targeted within direct drainage.

Figure 15. Roberts Island @ Whiskey Slough Pump member parcels with direct drainage potential.



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.
TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.
Parcel Layer - Contra Costa County: 2013, San Joaquin County: 2013
Basemap, Shaded Relief - ESRI
Datum - NAD 1983

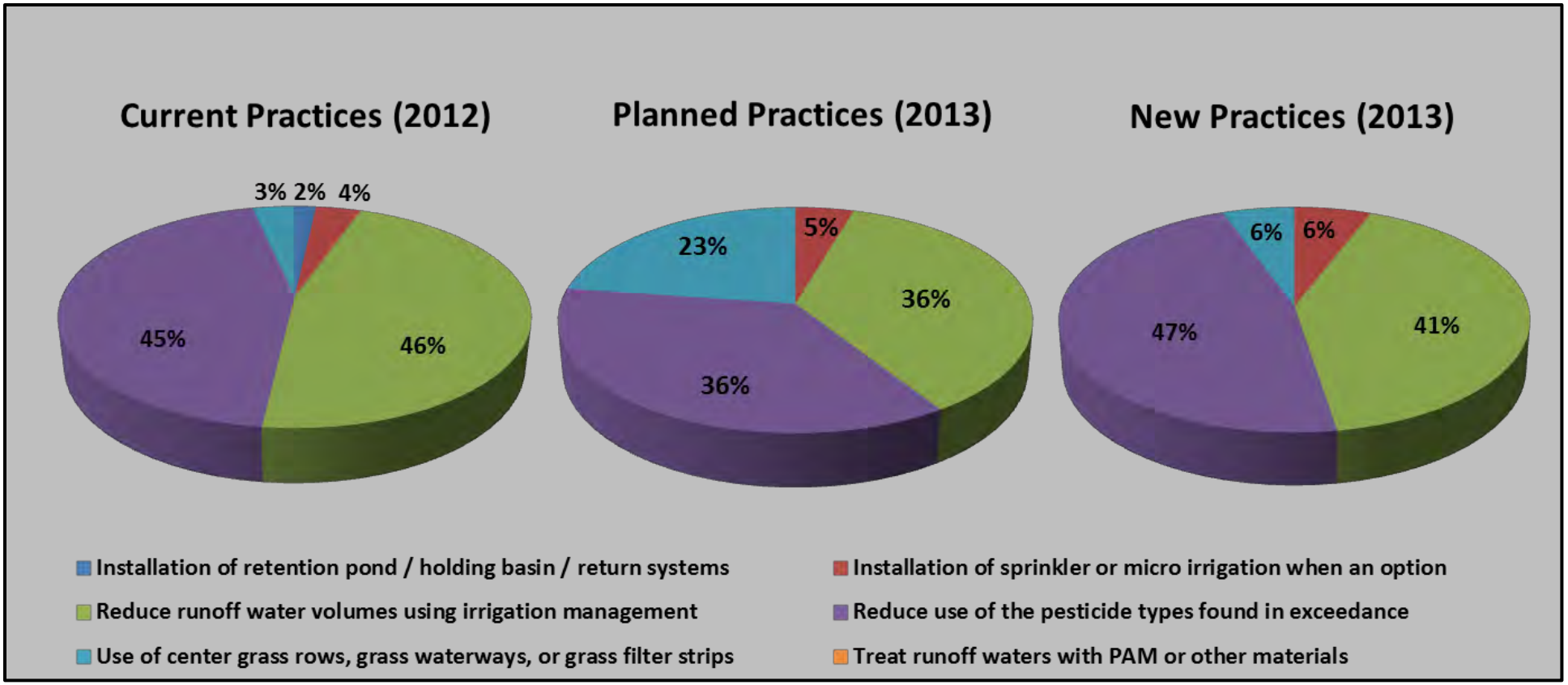
Date Prepared: 02/13/14
SJCDWQC

Roberts Island @ Whiskey Slough Pump - 5th Priority Subwatershed Parcels

SJCDWQC_2013

Figure 16. Roberts Island @ Whiskey Slough Pump summary of management practices.

Percentage based on acreage associated with a specific practice compared to the summed acreage associated with all practices for each survey response.



XI. C. iii. Walthall Slough @ Woodward Ave

In 2013, the Coalition contacted eight growers farming 1,490 acres in the Walthall Slough @ Woodward Ave site subwatershed (Table 48). Management practices were documented for 61% of the acreage identified as having direct drainage (Figure 17). All contacted growers returned an initial survey, and five growers indicated they were going to implement new practices in 2013 (Table 45). Five growers in the Walthall Slough @ Woodward Ave site subwatershed were sent a follow-up survey on February 14, 2014; 100% of growers returned their surveys. The following section contains a final summary of 2013 newly implemented management practices.

XI. C. iii. a. *Summary of Implemented Management Practices (2013)*

Table 48 includes the number of targeted growers and member acreage associated with planned practices (documented in initial surveys) compared to the number of growers and member acreage with newly implemented practices (documented in follow-up surveys). Growers initially planned to implement all six recommended management practices; however, only four management practices resulted in implementation. The four implemented management practices included (in order to greatest acreages): reduce runoff water volumes using irrigation management, reduce use of pesticide types found in exceedance, treat runoff with PAM or other materials, and installation of sprinkler or micro irrigation systems when an option (Table 48).

A final analysis of the follow-up surveys indicates that the three most implemented practices were: 1) reducing runoff water volumes using irrigation management (40% of the acreage with new practices), 2) reducing use of pesticide types found in exceedances (26% of the acreage with new practices), and 3) treating runoff waters with PAM or other materials (24%, Figure 17). When comparing the acreages associated with planned management practices to the acreages associated with the implemented management practices, these three practices had the highest percentage of implementation (62%, 41%, and 37%, respectively, Table 48). The other management practice implemented in 2013 was the installation of sprinkler or micro irrigation systems (Figure 17). The continued and newly implemented management practices were successful in improving the water quality in the Walthall Slough @ Woodward Ave site subwatershed; in 2014, there were no exceedances of the WQTL for the high priority management plan constituent chlorpyrifos. The most recent and only exceedances of the WQTL for chlorpyrifos occurred in September and October 2011. If there are no exceedances of the WQTL for chlorpyrifos during the 2015 WY, the Coalition will petition to remove the constituent from the site's management plan.

Table 48. Growers and acreage of 2013 planned and newly implemented practices in the Walthall Slough @ Woodward Ave site subwatershed.

Results are based on initial surveys and follow-up surveys.

Management Practice	Growers: Planned practices in 2013[1]	Acreage: Planned practices in 2013	Growers: Newly Implemented Practice in 2013[1]	Acreage: Newly Implemented Practice in 2013[†]	Percent Acreage with Implemented Practices Compared to Planned	Percent Implemented Compared to Direct Drainage Acreage[2]
Installation of retention pond / holding basin / return systems	1	235	0	0	0%	0%
Installation of sprinkler or micro irrigation when an option	4	794	1	238	30%	16%
Reduce runoff water volumes using irrigation management	5	918	5	918	100%	62%
Reduce use of the pesticide types found in exceedance	4	843	3	605	72%	41%
Use of center grass rows, grass waterways, or grass filter strips	1	238	0	0	0%	0%
Treat runoff waters with PAM or other materials	3	556	3	556	100%	37%

[1]Growers can select multiple management practice categories.
[2]Based on 1490 member acres targeted within direct drainage.

Figure 17. Walthall Slough @ Woodward Ave member parcels with direct drainage potential.

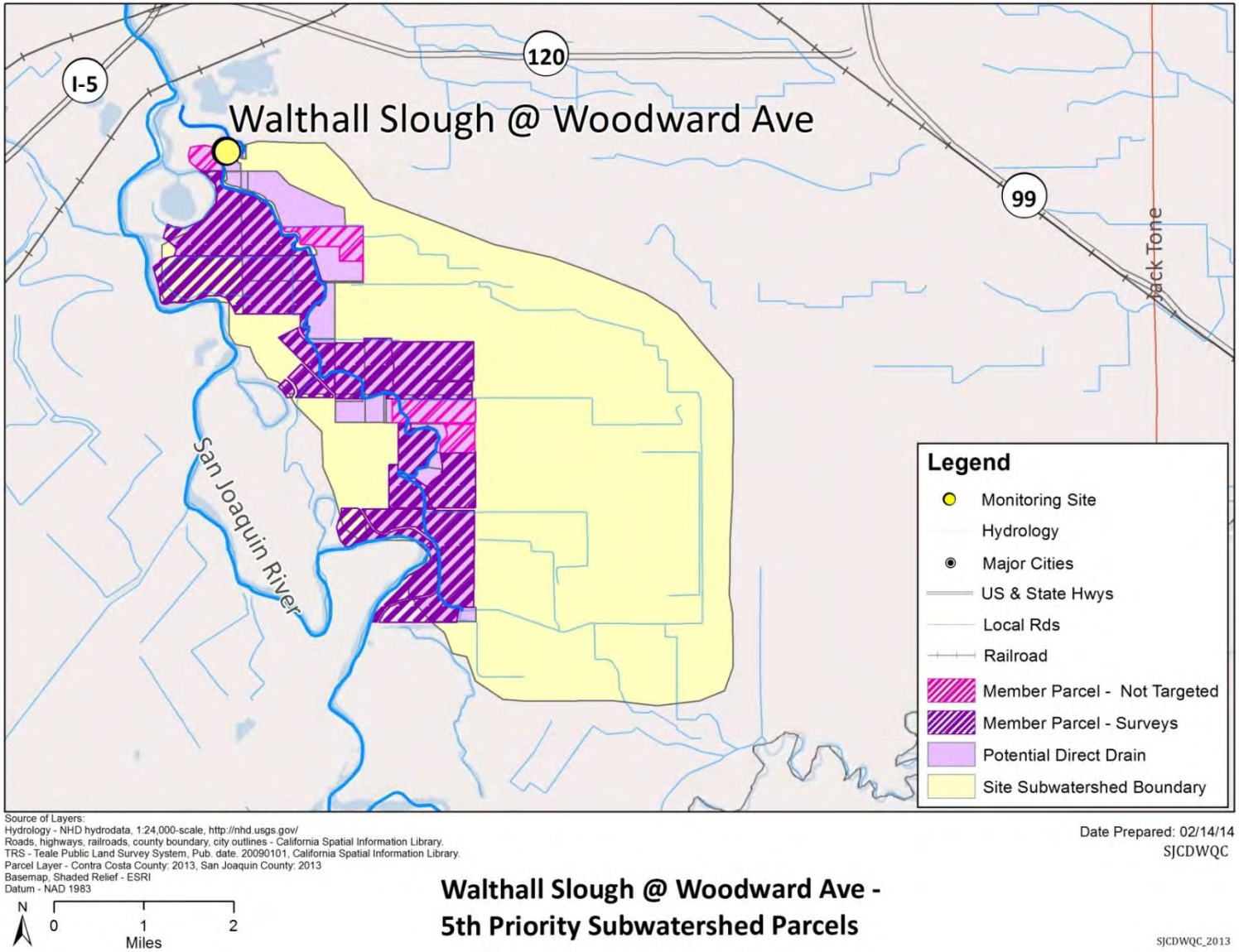
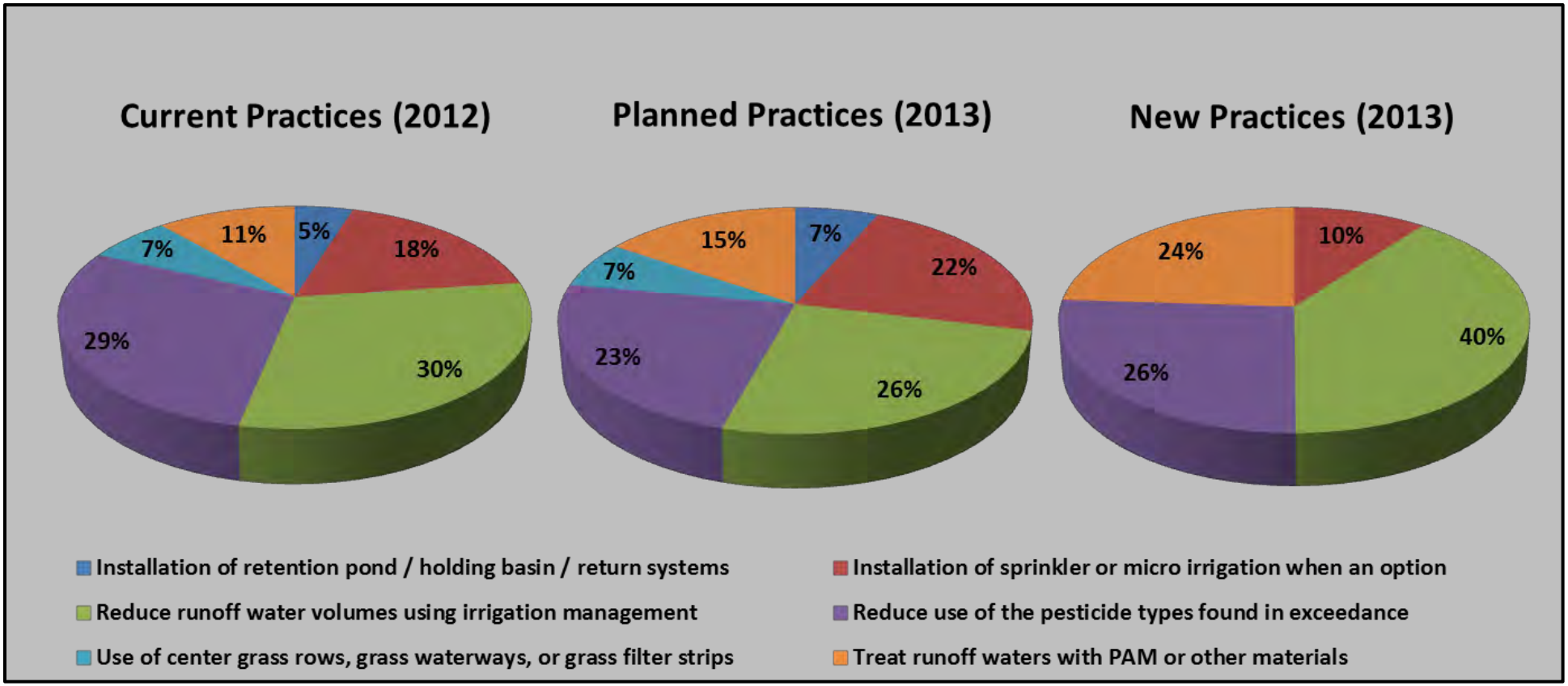


Figure 18. Walthall Slough @ Woodward Ave summary of management practices.

Percentage based on acreage associated with a specific practice compared to the summed acreage associated with all practices for each survey response.



XI. D. SIXTH PRIORITY SUBWATERSHED SUMMARY OF MANAGEMENT PRACTICES (2014-2016)

Focused outreach to document current management practices and tracking implementation of additional management practices in sixth priority site subwatersheds began in 2014 and is scheduled to continue through 2016. The Coalition initiated outreach with targeted growers in the Drain @ Woodbridge Ave site subwatershed (4 growers) and conducted a grower meeting on February 5, 2014. Management practices were documented for the acreage identified as having direct drainage in the Drain @ Woodbridge Ave site subwatershed (32%, Table 49). Current management practices (2013) and planned practices (2014) are summarized in this section.

In 2014, growers recorded their current management practices and the practices that they planned to implement in that year and returned the surveys to the Coalition; all initial surveys were returned to the Coalition by August 20, 2014. On February 27, 2015, follow-up survey postcards were sent to growers who indicated on their initial surveys that they would be implementing additional management practices by the end of 2014. The results from follow-up contacts will be reported during the quarterly meetings, and a complete analysis of newly implemented management practices will be included in the 2016 Annual Report.

Table 49. Tally of growers who participated in focused outreach in the sixth set of high priority site subwatersheds (2014-2016).

	DRAIN @ WOODBRIDGE
Targeted Operations[1]	4
Completed Individual Meeting	4
Follow-up Contacts Required (new management practices planned to be implemented)	2
PERCENT COMPLETE (INITIAL CONTACT)	**100%**

[1] A single farming entity accounts for three of the four targeted growers. The single entity was contacted and practices on all of their operations were addressed.

XI. D. i. Drain @ Woodbridge Ave

In 2014, the Coalition contacted four targeted growers farming 1553 acres in the Drain @ Woodbridge Ave site subwatershed (Table 49). Management practices were documented for 32% of the acreage identified as having direct drainage (Figure 19). All contacted growers returned an initial survey, and two growers indicated they were going to implement new practices in 2014. The two growers in the Drain @ Woodbridge Ave site subwatershed were sent a follow-up survey on February 27, 2014; all follow-up results will be reported in the 2016 AMR. The following section contains a summary of 2013 current management practices and 2014 planned management practices.

XI. D. i. a. *Current (2013), Planned (2014) Management Practices*

Survey responses by members in the Drain @ Woodbridge Ave site subwatershed indicated that in 2013, 732 acres have irrigation runoff leaving the fields, 570 acres have stormwater runoff leaving the fields; one member farming 251 acres indicated that they use a self-contained system that recycles all water

and therefore they do not have any runoff. The most common management practices that members were implementing in 2013 were reducing runoff water volumes, reducing the use of the pesticide types found in exceedances, and installation of retention pond/holding basin/return systems (Table 50). In 2013, all targeted members in the Drain @ Woodbridge Ave site subwatershed had one or more management practice currently in place that were specific to runoff management or pesticide application management.

Returned initial surveys indicate that growers planned to implement four of the six management practices listed on the survey in 2013 (Table 50). The management practices planned for implementation in 2014 were: reducing runoff water volume, reducing the use of the pesticide types found in exceedances, use of center grass rows/grass waterways/grass filter strips, and installation of retention pond/holding basin/return systems (Figure 20).

Table 50. Growers and acreage of 2013 current and planned practices in the Drain @ Woodbridge Ave site subwatershed.

Results are based on initial surveys.

Management Practice	Growers: Current Practices in 2013	Acreage: Current Practices in 2013	Growers: Planned Practices in 2014[1]	Acreage: Planned Practices in 2014
Installation of retention pond / holding basin / return systems	3	820	2	569
Installation of sprinkler or micro irrigation when an option	0	0	0	0
Reduce runoff water volumes using irrigation management	4	1552	3	1301
Reduce use of the pesticide types found in exceedance	3	820	3	820
Use of center grass rows, grass waterways, or grass filter strips	2	569	2	569
Treat runoff waters with PAM or other materials	0	0	0	0

[1]Growers can select multiple management practice categories.

Figure 19. Drain @ Woodbridge Ave member parcels with direct drainage potential.

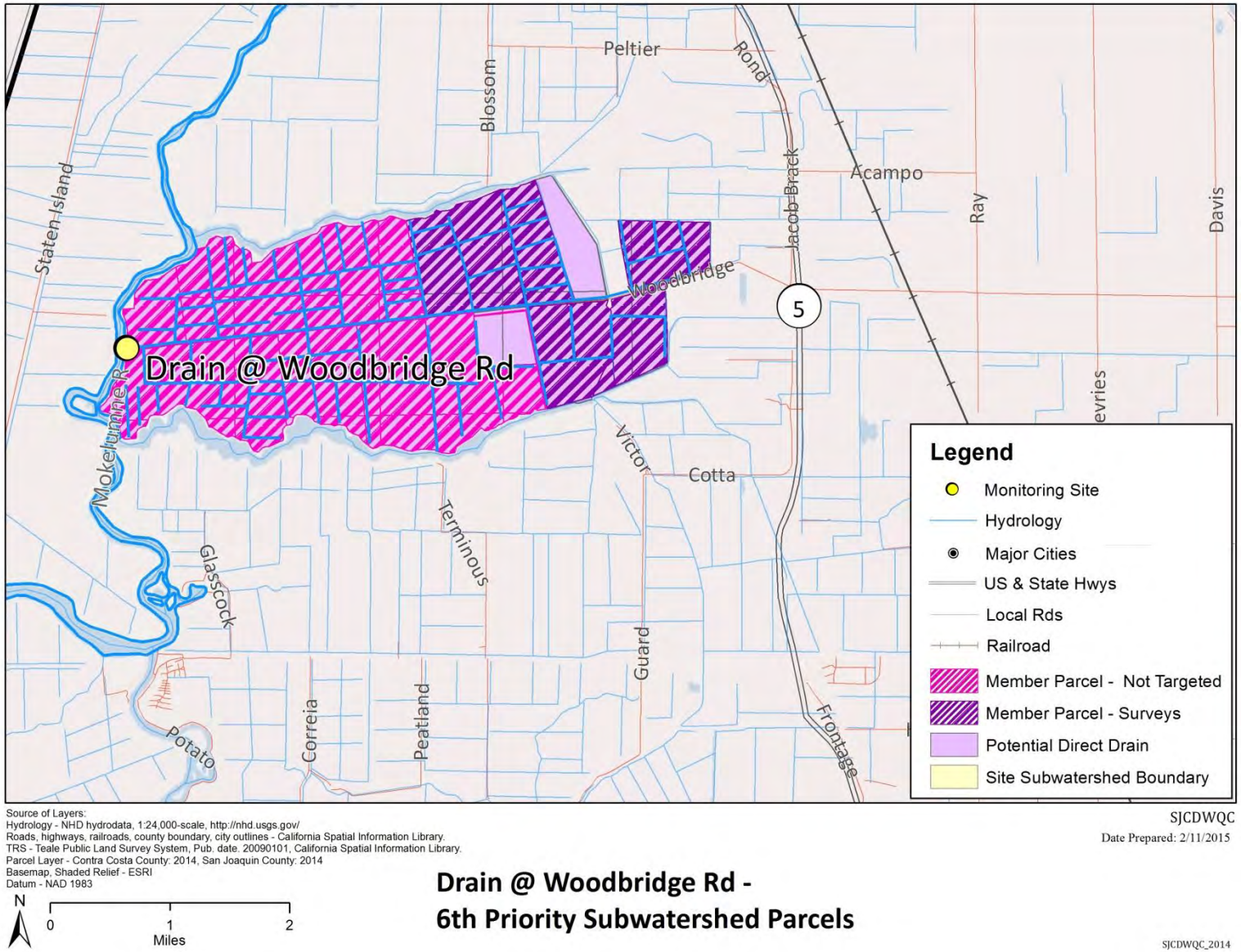
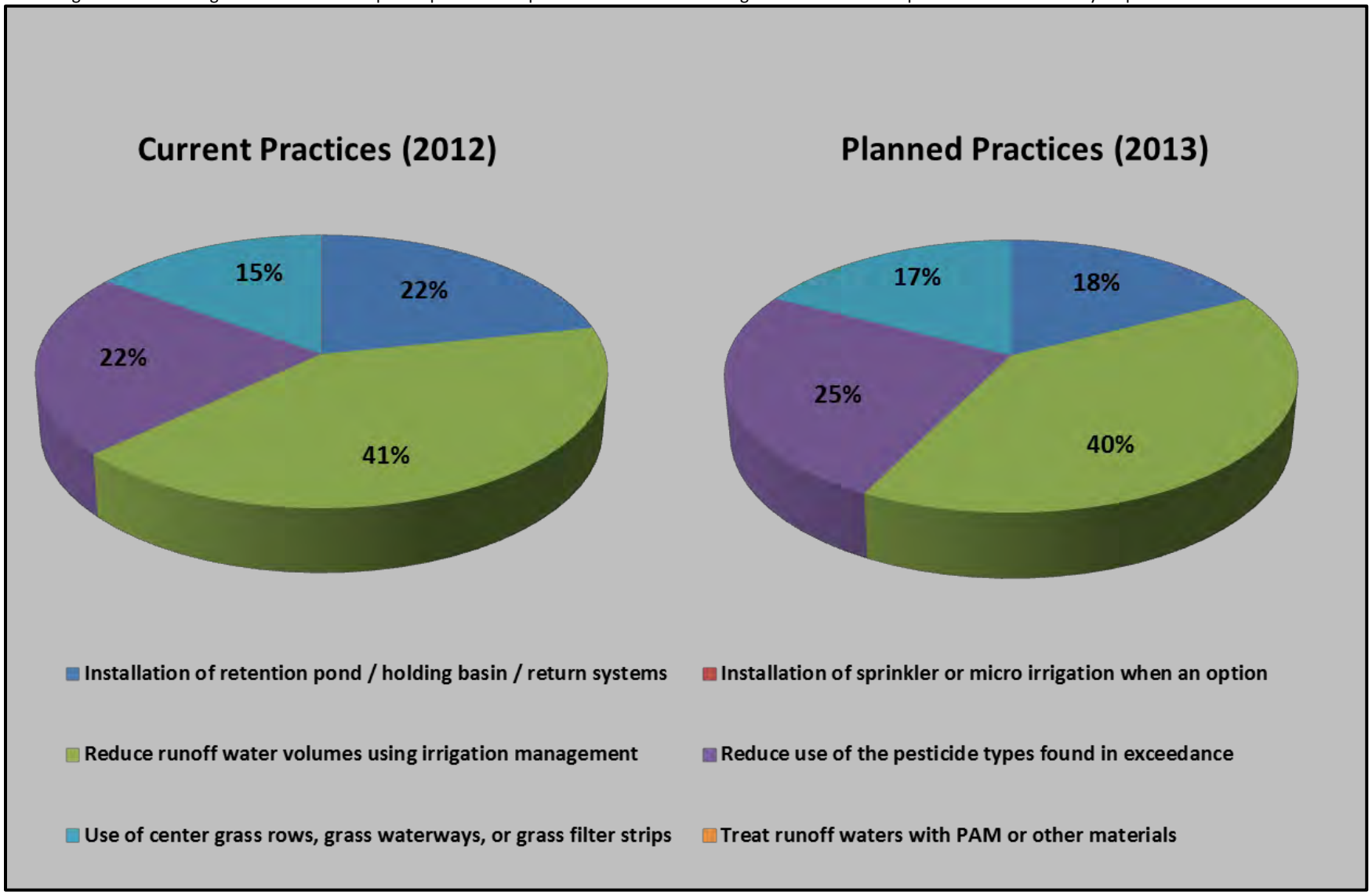


Figure 20. Drain @ Woodbridge Ave summary of management practices.

Percentage based on acreage associated with a specific practice compared to the summed acreage associated with all practices for each survey response.



XI. E. SEVENTH PRIORITY SUBWATERSHED SUMMARY OF MANAGEMENT PRACTICES (2015-2017)

The Coalition will not conduct focused outreach in the seventh priority site subwatershed, Empire Tract @ 8 Mile Rd. Management plan constituents at Empire Tract @ 8 Mile Rd site subwatershed are DO, SC, TDS, *E. coli*, and arsenic and MPM is not scheduled for these constituents. The Coalition has prepared and submitted a revised Surface Water Quality Management Plan (SQMP) on May 1, 2015. The SQMP includes a proposed schedule for implementing source identification studies and workplans for these constituents. Once the SJCDWQC SQMP is approved, the Coalition will begin the source identification studies and workplans for these constituents according to the timeline proposed in the SQMP.

XII. STATUS OF SPECIAL PROJECTS

Special projects include MPM and TMDL compliance monitoring. From January through September 2014, the Coalition monitored in accordance with the Basin Plan for the Sacramento and San Joaquin River Basins, the ILRP MRP for Coalition Groups (Order No. R5-2008-0005), and the Coalition's 2008 Management Plan.

The Basin Plan includes TMDL monitoring and reporting requirements, and states that dischargers must comply with the monitoring and management criteria specified for each TMDL. If a single exceedance of the WQTL for a constituent under an EPA approved TMDL occurs (chlorpyrifos, diazinon, DO, salinity/boron, and methyl mercury) a management plan is required for that constituent at the site subwatershed. In addition, if there is no TMDL for a constituent, a management plan is required for more than one exceedance of the WQTL at a given location within a three year period.

XII. A. MANAGEMENT PLANS

When a management plan is developed for a site subwatershed, additional focused effort within the subwatershed is required including but not limited to:

1. Continued monitoring as outlined in the Coalition's approved WDR.
2. Analysis of PUR data.
3. MPM.
4. Conducting site subwatershed grower meetings.
5. Encouraging and evaluating implementation of management practices.
6. Compliance with approved TMDLs.

A narrative concerning each monitoring constituent was provided in the Coalition's Management Plan approved on January 23, 2009 (Pages 23-36) as well as an explanation of how the Coalition prioritizes exceedances to meet the TMDL requirements (Pages 38-43).

After three years of monitoring with no exceedances of the WQTL for a specific management plan constituent at a site, the Coalition may petition to the Regional Board for management plan completion. Three years of monitoring with no exceedances indicates improved water quality due to growers implementing management practices effective in reducing/eliminating offsite movement of agricultural constituents.

Table 51 includes number of management plans petitioned for removal/ approved for completion as well as submittal and approval dates. The Coalition received approval to remove specific constituents from management plans on March 22, April 17, and May 21, 2012, February 27, 2013, and August 22, 2014. Table 52 lists management plans per site as well as the constituents approved for management plan completion.

Table 51. Number of complete management plans and submittal/approval dates.

Petition Date	Number Management Plans Petitioned for Completion	Number of Management Plans Approved for Completion	Approval Date
1/6/2012	20	19	3/22, 4/17, and 5/21/2012
11/13/2012	27	20	2/22/2013
6/9/2014	13	5	8/22/2014

Table 52. Status of SJCDWQC management plan constituents per site subwatershed.

Active – X, Re-instated—light grey cell; and removed – dark grey cell.

Site Subwatershed	Most Recent Assessment Monitoring	DO*	pH*	SC*	TDS	Ammonia	Nitrate/Nitrite	*E. coli*	Arsenic	Copper (Total & Dissolved)	Lead (Total & Dissolved)	Chlorpyrifos	DDE	DDT	Diazinon	Dieldrin	Diuron	Disulfoton	HCH, delta	Malathion	Simazine	*C. dubia* toxicity	*P. promelas toxicity*	*S. capricornutum* toxicity	*H. azteca toxicity*	Total Removed Per Site
Bacon Island Pump @ Old River	2014	X		X				X	X																	0
Bear Creek @ North Alpine Rd	2011	X	X					X				X								X						0
Drain @ Woodbridge Rd	2010	X		X	X			X	X			X														0
Drain to Bishop Cut @ North Rio Blanco Rd	2013	X		X	X				X																	0
Duck Creek @ Hwy 4	2012	X						X				X										X			X	3
Empire Tract @ 8 Mile Rd	2014	X		X	X			X	X																	0
French Camp Slough @ Airport Way	2014	X	X					X				X					X							X	X	5
Grant Line Canal @ Clifton Court	2008†	X		X	X			X	X				X											X	X	4
Grant Line Canal near Calpack Rd	2008†	X		X	X			X	X													X		X	X	1
Kellogg Creek along Hoffman Ln	2008†	X	X	X	X			X					X	X									X		X	4
Littlejohns Creek @ Jack Tone Rd	2008†	X						X		X		X														2
Lone Tree Creek @ Jack Tone Rd	2008†		X		X	X		X				X											X			7
Mokelumne River @ Bruella Rd	2014		X					X																X		3
Mormon Slough @ Jack Tone Rd	2008†	X	X									X										X				1
Roberts Island @ Whiskey Slough Pump	2014	X	X	X	X			X				X	X				X					X		X	X	0
Sand Creek @ Hwy 4 Bypass	2008†	X		X	X			X					X	X		X									X	5
South Webb Tract Drain	2009	X		X	X			X	X																	0
Terminous Tract Drain @ Hwy 12	2013	X		X	X			X	X			X													X	2
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2008†	X		X	X			X		X	X	X					X								X	3
Walthall Slough @ Woodward Ave	2013	X		X	X		X	X				X							X						X	0
Total Approved Management Plan Completion (Grey Cells)		**2**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**5**	**2**	**4**	**0**	**0**	**5**	**1**	**1**	**1**	**0**	**0**	**1**	**5**	**1**	**8**	**1**	**40**
Total Reinstated Management Plans (Light Grey Cells)		**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	
Total Management Plan Constituents Remaining (X)		**18**	**7**	**13**	**13**	**1**	**1**	**18**	**8**	**2**	**1**	**11**	**4**	**2**	**0**	**1**	**3**	**0**	**1**	**1**	**0**	**4**	**2**	**5**	**10**	

*Field parameters will continue to be monitored during Assessment, Core and Management Plan Monitoring events.

†Site was monitored for Assessment Monitoring constituents under the 2006 MRPP where monitoring was not defined as Core or Assessment Monitoring.

Each high priority subwatershed is discussed in more detail including water quality exceedances, sourcing of exceedances, outreach, and evaluation of management practice effectiveness in the High Priority Site Subwatershed Analysis in Appendix I and II.

XII. A. i. Management Plans Implemented Since 2004

The Coalition has received approval to remove 44 constituents from 12 site subwatershed management plans (approvals March 22, April 17, May 21, 2012, February 27, 2013, and August 22, 2014; Tables 51 and 52). Of those 44 constituents approved for management plan completion, four management plans have been reinstated due to exceedances of WQTLs during recent monitoring (Table 52).

A reevaluation of the WQTL for DO was submitted in the Coalition's July 1, 2014 petition to amend the Management Plan (approval pending) based on criteria outlined in the Fourth Edition of the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins (Page III-5). The Basin Plan indicates the lower DO trigger limit of 5 mg/L should be utilized for waterways that are 'warm' and/or not considered a resource for fisheries. Information on the past reported exceedances and justification for reevaluation based on the Basin Plan criteria can be referenced in the July 1, 2014 Management Plan Amendment and Appendix I (Table I-A).

The Coalition reevaluated the WQTLs for SC based on the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Basin Plan (Table 2, Page 13). The Basin Plan indicates the WQTL for SC should be based on the seasonal criteria of 700 µmhos/cm from April through August, and 1,000 µmhos/cm from September through March. All previously reported exceedances of SC were reevaluated based on the criteria outlined in the Basin Plan and submitted in the July 1, 2014 Management Plan Amendment and Appendix I (Table II-A). Sites where active management plan status was affected by new WQTL criteria were addressed in the June 9, 2014 letter to the Regional Board petitioning to remove DO and SC from management plans.

Table 53 is a tally of exceedances of WQTLs that occurred from 2004 through September 2014. Table 54 is a tally of exceedances that occurred during January through September 2014 monitoring. In both Tables 53 and 54, cells with blue highlights indicate constituents that are currently in management plans. In Table 53, dark grey cells indicate sites/constituents that have been removed from active management plans and light grey cells indicate sites/ constituents previously removed from management plans but were reinstated due to recent exceedances. In Table 54, green highlights indicate new sites/constituents that have been added to a management plans and light green highlights indicate sites/ constituents previously removed from management plans but were reinstated due to exceedances in January through September 2014.

Table 53. SJCDWQC exceedance tally based on all results through September 2014.

Sites are listed alphabetically by site name and constituents are listed alphabetically within each of the following groups: field parameters (F), inorganics (I), bacteria (B), metals (M), pesticides (P) and toxicity (T). Constituents under a management plan are highlighted blue, constituents removed from management plan are highlighted grey, and constituents reinstated into a management plan are highlighted light grey. The tally only includes field duplicate exceedances if no exceedances occurred in the environmental sample.

Site Name	F			I				B	M							P																								T			
	Oxygen, Dissolved	pH	Specific Conductivity	Total Dissolved Solids	Ammonia	Nitrate as N	Nitrate + Nitrite as N	*E. coli*	Arsenic	Boron	Copper Dissolved†	Copper Total†	Lead	Molybdenum	Nickel	Azinphos methyl	Carbofuran	Chlorpyrifos	Cypermethrin	DDD (p,p')	DDE (p,p')	DDT (p,p')	Diazinon	Dichlorvos	Dieldrin	Dimethoate	Disulfoton	Diuron	Endrin	HCH, delta	Linuron	Malathion	Methidathion	Methomyl	Methyl Parathion	Paraquat Dichloride	Permethrin, total	Thiobencarb	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Bacon Island Pump @ Old River	8	1	2	3	1			3	2					1														1													1		
Bear Creek @ North Alpine Rd	16	2						2										3														3											
Drain @ Woodbridge Rd	18		17	15				2	13									1																									1
Drain to Bishop Cut @ North Rio Blanco Rd	2		3	3					2																																		
Duck Creek @ Hwy 4	54	3						7			1							18					1									1								7		3	4
Empire Tract @ 8 Mile Rd	12		5	8				2	7																																1	1	
French Camp Slough @ Airport Way	21	7						38				12	2			1	1	13					2		2	1		3					1					2	1	2		3	5
Grant Line Canal @ Clifton Court Rd	42	7	43	16	1			19	10			6	3		1		1	6			2	1				1														1		4	7
Grant Line Canal near Calpack Rd	56	1	78	25	1			19	4									4			1						1	1			1	1								4		15	10
Kellogg Creek @ Hwy 4	3	1	8	5				5										1[1]																			1			1	2[1]	1	3
Kellogg Creek along Hoffman Ln	9	16	5	3		1		4				3						0[1]			3	2																		2	0[1]	4	6
Littlejohns Creek @ Jack Tone Rd	33	3*						6			2	5					1	9					1																		1	5	2*
Lone Tree Creek @ Jack Tone Rd	20	6	1	1	4			26				7	1					10	1		1	1	2					3										2	1	1	2	7	2
Mokelumne River @ Bruella Rd	5	12						6				3										1																		5		11	
Mormon Slough @ Jack Tone Rd	16	12						1										8																1				1	2		4	1
Roberts Island Drain @ Holt Rd	36	1	59	45				12	1									4			3							2											2		5	2
Roberts Island Drain along House Rd	23	3	22	14				7	1									2	1		2	1																	2*		4	4
Roberts Island @ Whiskey Slough Pump[3]	23		34	32			1	5																1															1	1	2	
Sand Creek @ Hwy 4 Bypass	48		65	19				17										2		1	5	3	2		6		3		1					1					3	1	3	14
South Webb Tract Drain	17	1	5	5	1			5	12	1				1																						1			1				
Terminous Tract Drain @ Hwy 12[4]	69	1	53	44			1	17	8									3				1										1									1	4	2
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	10	1	3	1				10			2	5	2				1	20			1							4					1				3	2	5		5	9
Walthall Slough @ Woodward Ave	54		19	17	1		7	7										2			1									3												1	2
Grand Total	**597**	**76**	**421**	**256**	**9**	**1**	**9**	**220**	**60**	**1**	**5**	**41**	**8**	**2**	**1**	**1**	**4**	**106**	**2**	**1**	**19**	**10**	**8**	**1**	**8**	**2**	**4**	**14**	**1**	**3**	**1**	**6**	**2**	**1**	**1**	**1**	**1**	**7**	**5**	**39**	**10**	**82**	**74**

[1]Exceedances from the Kellogg Creek @ Hwy 4 site count toward the management plan for Kellogg Creek along Hoffman Ln (site location was moved in May 2006 due to urban influences).

[2]All MPM for the three Roberts Island monitoring locations takes place at the Roberts Island @ Whiskey Slough Pump Core Monitoring site (as of January 2012).

[3] Exceedances from Delta Drain-Terminous Tract off Guard Rd and off Glasscock Rd count toward the management plan for Terminous Tract Drain @ Hwy 12 (*H. azteca, P. promelas, and S. capricornutum*), tally only includes count of exceedances from Terminous Tract Drain @ Hwy 12.

*Not prioritized for MPM; either the exceedances were not within a three year period or both toxic samples were from the same sampling event (sample and resample to test for persistence).

† Exceedances of the hardness based WQTL for dissolved and total copper are evaluated under the same management plan

XII. A. ii. Management Plans Implemented in 2014

New sites requiring a focused management plan approach are added to the priority list (Table 51). Source identification, outreach, and evaluation of management practices will be addressed at all new site subwatersheds that have been added to the focused management plan list during their years of high priority status as specified in Table 51.

As a result of monitoring from January through September 2014, several new site/constituent specific management plans are required or have been reinstated (see dark and light green highlights in Table 51). Below is a list of sites/constituents with exceedances of WQTLs that triggered new management plans or required previously removed management plans to be reinstated following January through September 2014 monitoring:

- DO
  - Bacon Island Pump @ Old River
  - Kellogg Creek along Hoffman Ln (reinstated management plan)
- SC
  - Bacon Island Pump @ Old River
  - Empire Tract @ 8 Mile Rd
- *E. coli*
  - Bacon Island Pump @ Old River
- Arsenic
  - Bacon Island Pump @ Old River
- Diuron
  - French Camp Slough @ Airport Way (reinstated management plan)
- *S. capricornutum* Toxicity
  - French Camp Slough @ Airport Way (reinstated management plan)
  - Mokelumne River @ Bruella Rd (reinstated management plan)

Table 54. SJCDWQC exceedance tally based on January through September 2014 monitoring.

Sites are listed alphabetically by site name and constituents are listed alphabetically within each of the following groups: field parameters (F), inorganics (I), bacteria (B), metals (M), pesticides (P) and toxicity (T). Green highlighted cells refer to constituents that require a new management plan; blue highlights refer to constituents already in a management plan; light green highlights refer to reinstated management plans due to January through September 2014 exceedances. The tally only includes field duplicate exceedances if no exceedances occurred in the environmental sample.

		F			I		B	M		P			T		
Zone	Site Name	Oxygen, Dissolved	pH	Specific Conductivity	Total Dissolved Solids[1]	Ammonia	*E. coli*	Arsenic	Molybdenum	Dichlorvos	Diuron	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*
4	Bacon Island Pump @ Old River	8	1	2	3	1	3	2	1		1			1	
1	Bear Creek @ North Alpine Rd	2													
3	Drain @ Woodbridge Rd	1		1											
2	Duck Creek @ Hwy 4	4													
3	Empire Tract @ 8 Mile Rd	5		5	6		1	4						1	1
2	French Camp Slough @ Airport Way	2					1				1	1			1
4	Grant Line Canal @ Clifton Court Rd	5		6											
4	Grant Line Canal near Calpack Rd	6	1	9											3
4	Kellogg Creek along Hoffman Ln	1	1	1											
2	Littlejohns Creek @ Jack Tone Rd	4	1												
2	Lone Tree Creek @ Jack Tone Rd	1	1												
1	Mokelumne River @ Bruella Rd		1												1
2	Mormon Slough @ Jack Tone Rd	2	3												
4	Roberts Island @ Whiskey Slough Pump	9		10	9		1			1			1	1	2
6	Sand Creek @ Hwy 4 Bypass	6		6											
3	Terminous Tract Drain @ Hwy 12	8		3	3		2								
2	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	1													
5	Walthall Slough @ Woodward Ave	9		3	2		1								
	Grand Total	**74**	**9**	**46**	**23**	**1**	**9**	**6**	**1**	**1**	**2**	**1**	**1**	**3**	**8**

[1]Sites will not be placed in new management plans for TDS; the Coalition no longer analyzes for TDS. TDS will be addressed under the SC management plans.

XII. A. iii. Evaluation of Management Practice Effectiveness

Since the initiation of focused outreach, there were two or more years for growers to implement new management practices in the 15 site subwatersheds listed in Table 55. In addition, water quality results were collected for two or more years during MPM (Table 55). The Coalition uses the results of all monitoring to evaluate the effectiveness of current and newly implemented management practices. The following evaluation of management practice effectiveness includes these 15 site subwatersheds. An evaluation of management practice effectiveness within the sixth priority site subwatershed will be included in the 2016 Annual Report.

Table 55. Years of current management practice assessment, newly implemented management practices and water quality assessment for evaluating management practice effectiveness.

Priority Group	Site Name	Year of Current Management Practice Determined During Contacts	Year New Management Practices were Implemented	Years MPM Occurred
First (2008-2010)	Duck Creek @ Hwy 4	2008	2009-2010, 2012	2009-2014
	Lone Tree Creek @ Jack Tone Rd	2008	2009-2010, 2012	2009-2014
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2008	2009-2010, 2012	2009-2014
Second (2010-2012)	Grant Line Canal @ Clifton Court Rd	2009	2010	2010-2014
	Grant Line Canal near Calpack Rd	2009	2010	2010-2014
	Littlejohns Creek @ Jack Tone Rd	2009	2010, 2012	2010-2014
Third (2011-2013)	French Camp Slough @ Airport Way	2010	2011	2011-2014
	Mokelumne River @ Bruella Rd	2010	2011	2011-2014
	Terminous Tract Drain @ Hwy 12	2010	2011	2011-2014
Fourth (2012-2014)	Kellogg Creek along Hoffman Ln	2011	2012	2012-2014
	Mormon Slough @ Jack Tone Rd	2011	2012	2012-2014
	Sand Creek @ Hwy 4 Bypass	2011	2012	2012-2014
Fifth (2013-2015)	Bear Creek @ North Alpine Rd	2012	2013	2013-2014
	Roberts Island @ Whiskey Slough Pump	2012	2013	2013-2014
	Walthall Slough @ Woodward Ave	2012	2013	2013-2014

XII. A. iii. a. *Summary of Management Practices*

The Coalition addresses the implementation of management practices by targeting growers organized by priority order of site subwatersheds. The Coalition targeted 112 growers in the first priority site subwatersheds, 20 growers in the second priority site subwatersheds, 29 growers in third priority, and 40 growers in the fourth priority site subwatersheds for focused outreach. New management practices were implemented by 48%, 85%, 97%, 90% of growers in the first through fourth priority site subwatersheds, respectively (Table 56). In 2010 and 2012, additional focused outreach occurred to 25 growers within first priority sites as well as Littlejohns Creek @ Jack Tone Rd (second priority) due to continued exceedances of the WQTL for chlorpyrifos(this is why there is a discrepancy for first and second priorities in number of acreage of targeted members in Tables 56 and 57).

Within the fifth priority site subwatersheds, 22 members on 3,763 acres were targeted for focused outreach within Bear Creek, Roberts Island, and Walthall Slough site subwatersheds (Table 56). Of the

22 members, 77% of targeted members implemented new management practices. New practices were implemented on 69% or 2,583 targeted acres (Table 56). The most common practices implemented in fifth priority site subwatersheds included: 1) reducing tailwater volumes using irrigation management (1,245 acres) and 2) reducing the use of the pesticide types found in the exceedance (1,523 acres, Table 57). The popularity of these two management practices is consistent in first through fourth priorities. In total (within first through fifth priorities) members have reduced the use of pesticides such as chlorpyrifos across 23,375 acres and have reduced runoff water volumes using irrigation management on 21,135 acres (Table 57). The third most common implemented management practice is the installation of sprinkler or micro irrigation which was implemented on 427 acres within fifth priority site subwatersheds and 11,342 acres in total (first through fifth priorities).

Table 56. Percentage of new management practices for first through fifth priority site subwatersheds.

	First Priority (2008-2010)	Second Priority (2010-2012)	Third Priority (2011-2013)	Fourth Priority (2012-2014)	Fifth Priority (2013-2015)				First through Fifth Priority Total[1]
					Bear Creek	Roberts Island	Walthall Slough	Fifth Priority Total	
# of Targeted Members	112	20	29	40	7	7	8	22	**223**
# Members with New Practices	54	17	28	33	6	6	5	17	**149**
Percent of Contacted Members with New Practices	48%	85%	97%	90%	86%	86%	63%	77%	**67%**
Acreage of Targeted Members	15,183	6,496	6,482	2,307	655	1,618	1,490	3,763	**34,231**
Acreage with New Practices	8,282	6,256	6,463	2,005	650	1,015	918	2,583	**25,589**
Percent of Targeted Acreage with New Practices	55%	96%	94%	93%	99%	63%	62%	69%	**75%**

[1]The acreages and counts of all members are counted only once in the 'total' column, even if they are represented in more than one site subwatershed or were contacted more than once.

Table 57. First through fifth priority site subwatershed acreage with newly implemented management practices.

Includes additional contacts in first and second priority site subwatersheds from 2010 and 2012. Targeted acreage based on acreage of members contacted.

	First Priority (2008-2010)	Second Priority (2010-2012)	Third Priority (2011-2013)	Fourth Priority (2012-2014)	Fifth Priority (2012-2014)				First Through Fifth Priority Sum of Acreage	Percent of Targeted Acreage
					Bear Creek	Roberts Island	Walthall Slough	Fifth Priority Total		
Targeted Acres	**15,967**	**7,067**	**6,482**	**2,307**	**655**	**1618**	**1490**	**3,763**	**35,586**	**NA**
Management Practices										
Installation of retention pond / holding basin / return systems	704	87	205	0	0	0	0	0	**996**	**3%**
Installation of sprinkler or micro irrigation when an option	4,998	1,643	3,509	765	61	128	238	427	**11342**	**32%**
Reduce runoff water volumes using irrigation management	4,376	6,948	5,892	1,245	531	1015	1128	2674	**21135**	**59%**
Reduce use of the pesticide types found in exceedance	8,398	6,521	4,460	1,523	643	1015	815	2473	**23375**	**66%**
Use of center grass rows, grass waterways, or grass filter strips	2,310	2,572	2,130	133	246	120	0	366	**7511**	**21%**
Treat runoff waters with PAM or other materials	0	1,748	0	0	0	0	766	766	**2514**	**7%**

XII. A. iii. b. *Evaluation of Water Quality (January through September 2014 Results)*

During focused outreach, management practices are suggested to growers within targeted priority site subwatersheds through mailings and grower meetings. Between 2008 and September 2014, the Coalition monitored water quality with the goal of demonstrating the effectiveness of newly implemented management practices.

Table 55 indicates when the Coalition initiated MPM for high priority management plan constituents at in each high priority set of site subwatersheds. High priority management plan constituents monitored to determine the effectiveness of management practices include: organophosphates (chlorpyrifos, diazinon, and disulfoton), herbicides (diuron and simazine), and toxicity (water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*). The number of samples collected for these constituents varied from year to year due to changes in MPM schedules and the rotation of Assessment and Core Monitoring constituents. Table 58 includes a summary of all exceedances, samples, and pounds of Active Ingredient (AI) applied for high priority constituents in the first through fifth priority site subwatersheds. Table 59 includes a summary of all toxicity and samples in the first through fifth priority site subwatersheds.

Between 2009 and September 2014, monitoring data reflect a decreasing trend in the number of exceedances for organophosphates, herbicides, copper and toxicity indicating improved water quality (Figure 21). A disproportionate number of toxicity and exceedances of WQTLs occurred in 2008, which was prior to the beginning of focused outreach for first priority site subwatersheds.

The largest decrease in the number of water quality impairments was observed in toxicity. In 2008, there were 36 samples that were toxic to *C. dubia*, *S. capricornutum,* and *H. azteca* compared to eight in 2014. In 2014, there were samples that were toxic to *C. dubia* (1) and *S. capricornutum* (7); there were no samples toxic to *H. azteca* (Table 59).

Overall, the number of organophosphate exceedances has decreased in each priority subwatershed since 2009; there were 33 exceedances in 2008 compared to no exceedances through September 2014 (Table 58). According to PUR data, the number of pounds of organophosphates applied in the first through fifth priority site subwatersheds has decreased. Chlorpyrifos is still the most widely applied organophosphate in first through fifth priority site subwatersheds. Since 2009, however, exceedances of the WQTL have significantly decreased over time demonstrating that the outreach strategy and implemented management practices are successful in improving the water quality (Table 58).

Exceedances of WQTLs for herbicides occurred in 2007 (8) and in 2008 (5). Nearly half of these exceedances (6 out of 13) were in first priority site subwatersheds. From January through September 2014, there were two exceedances of the WQTLs for herbicides (diuron and simazine), the first exceedances since 2008. The pounds of simazine applied in the first through fifth priority site subwatersheds from 2006 to September 2014 have decreased by nearly half (Table 58). Applications of diuron were trending down until 2010 when it spiked; in 2014, applications of diuron were reduced to

the lowest since the Coalition began monitoring (Table 58). More information on the exceedances of herbicides in 2014 can be found in the Summary of Exceedances section of this report.

Exceedances of the WQTL for copper have also decreased over time with the highest number of exceedances (22) occurring back in 2007. In 2009, 2013, and through September 2014, there were no exceedances of the WQTL for copper. In 2006, the percentage of exceedances of the WQTL for copper relative to the number of samples collected was 26% for first through fifth priority site subwatersheds. Comparatively, in 2013 and January through September 2014 the percentage of copper WQTL exceedances was zero percent in first through fifth priority site subwatersheds (Table 58).

Monitoring within high priority subwatersheds has indicated an overall improvement in water quality across the SJCDWQC region. The Coalition received approval to remove constituents from management plans based on these monitoring results and documented management practices. Although monitoring data indicate an overall improvement in water quality, four management plans were reinstated due to exceedances of the WQTLs: Kellogg Creek along Hoffman Rd (DO), French Camp Slough @ Airport Way (diuron and *S. capricornutum*) and Mokelumne River @ Bruella Rd (*S. capricornutum*).

Table 52 provides the status of management plan constituents within all high priority site subwatersheds where focused outreach was initiated or is complete. To date, the Coalition has received approval for the removal of 40 constituents from management plans at twelve high priority site subwatersheds (approval letters received March 22, April 17, May 21, 2012, February 27, 2013, and August 22, 2014). Below is a more in depth analysis of the effects management practices have had on specific high priority constituents and toxicity.

Table 58.Exceedances, samples, and pounds AI applied for chlorpyrifos, diazinon, copper, diuron, disulfoton, and simazine in first through fifth priority site subwatersheds.

PUR data only complete through July 2014 for San Joaquin County; PUR data are complete through September 2014 for all other counties.

	Chlorpyrifos				Diazinon				Copper[1]				Diuron				Disulfoton				Simazine			
Year	Exceedance Count	Samples[2]	%Exceedance	Lbs applied	Exceedance Count	Samples[2]	%Exceedance	Lbs applied	Exceedance Count	Samples[2]	%Exceedance	Lbs applied	Exceedance Count	Samples[2]	%Exceedance	Lbs applied	Exceedance Count	Samples[2]	%Exceedance	Lbs applied	Exceedance Count	Samples[2]	%Exceedance	Lbs applied
2006	14	84	17%	79,353	1	84	1%	5,807	9	35	26%	374,974	0	66	0%	46,436	0	65	0%	1,447	0	55	0%	41,559
2007	15	123	12%	60,495	4	112	4%	3,807	22	76	29%	336,168	7	113	6%	25,795	1	111	1%	1,468	2	95	2%	40,539
2008	30	122	25%	39,098	3	109	3%	4,442	11	101	11%	247,263	4	107	4%	13,198	3	102	3%	153	2	103	2%	23,676
2009	8	46	17%	68,145	0	34	0%	2,789	0	11	0%	280,211	0	19	0%	16,269	0	41	0%	1,098	0	19	0%	36,721
2010	12	81	15%	54,523	0	67	0%	7,741	2	37	5%	312,303	0	28	0%	8,066	0	36	0%	610	0	26	0%	18,926
2011	15	103	15%	26,513	0	70	0%	2,719	2	44	5%	284,327	0	52	0%	28,393	0	51	0%	175	0	50	0%	28,356
2012	1	80	1%	39,821	0	43	0%	2,989	1	33	3%	266,486	1	20	5%	10,988	0	15	0%	330	0	14	0%	14,344
2013	3	71	4%	40,442	0	28	0%	2,917	0	28	0%	280,295	0	30	0%	28,258	0	27	0%	0	0	24	0%	16,355
2014	0	59	0%	31,028	0	27	0%	3,393	0	36	0%	284,586	1	29	3%	6,070	0	30	0%	0	1	27	4%	7,173
Total	**98**	**769**	**13%**	**439,418**	**8**	**574**	**1%**	**36,604**	**47**	**401**	**12%**	**2,666,612**	**13**	**464**	**3%**	**183,474**	**4**	**478**	**1%**	**5,281**	**5**	**413**	**1%**	**227,651**

[1]Since October 2008, the Coalition analyzes for both the total and dissolved fraction of copper. For counting exceedances and samples scheduled for copper analysis, this table ignores fraction (e.g. if site A is scheduled for copper total and copper dissolved analysis in Event 1, the table counts only one sample for copper). There has never been an exceedance of both the total and dissolved WQTLs for copper at any one site.

[2]Refers to all samples scheduled for constituent analysis (dry sites are included).

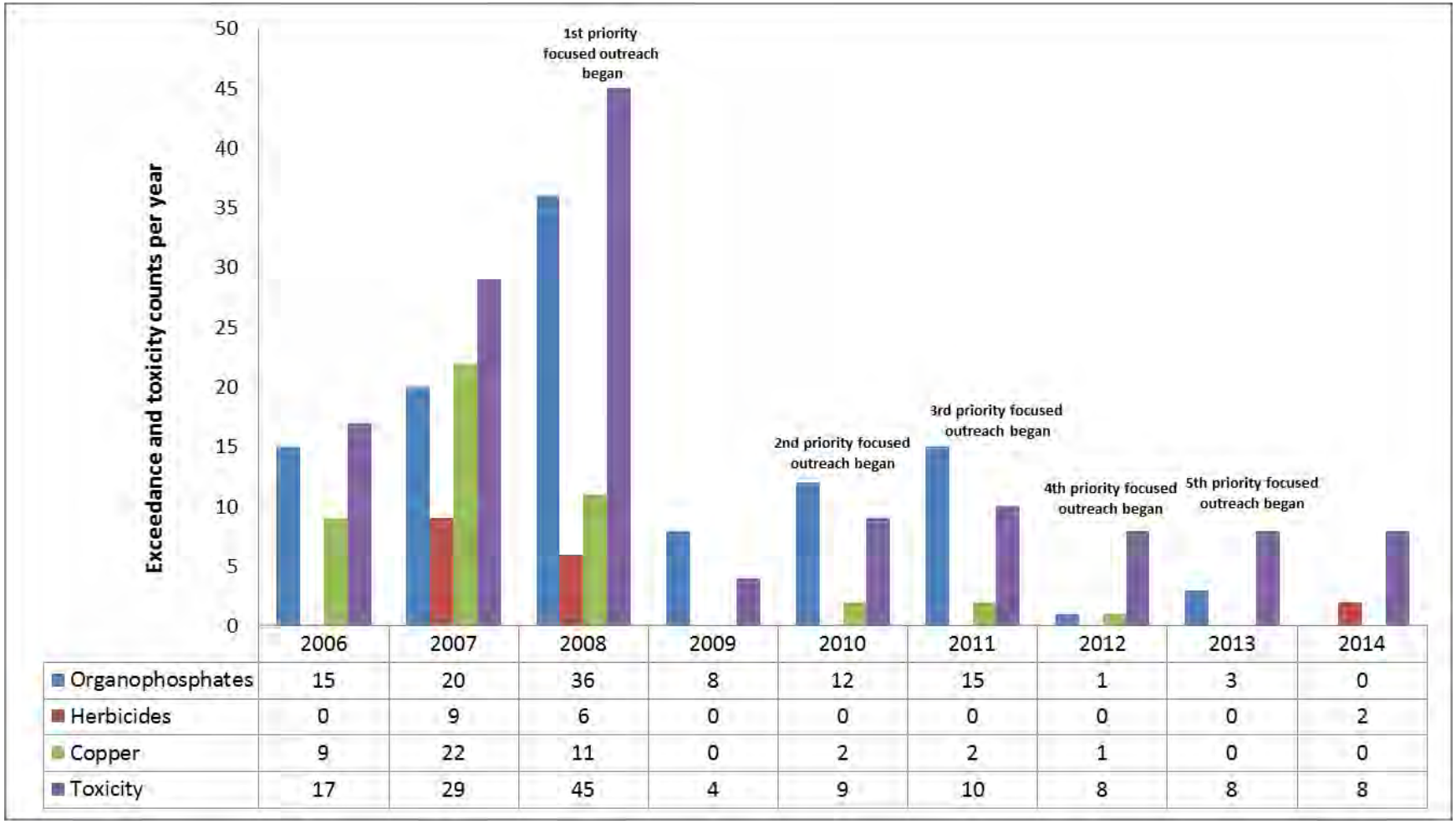
Table 59. Toxicity count and samples collected for toxicity analysis in the first through fourth priority site subwatersheds.

Year	*C. dubia* toxicity			*S. capricornutum* Toxicity			*H. azteca* Toxicity		
	Toxicities	Samples[1]	% Toxic	Toxicities	Samples[1]	% Toxic	Toxicities	Samples[1]	% Toxic
2008	8	111	7%	30	117	26%	7	30	23%
2009	2	31	6%	1	23	4%	1	2	50%
2010	1	42	2%	1	43	2%	7	12	58%
2011	1	48	2%	1	67	1%	8	16	50%
2012	1	33	3%	1	54	2%	6	21	29%
2013	0	36	0%	2	44	5%	6	24	25%
2014	1	34	3%	7	42	17%	0	22	0%
Total	**27**	**537**	**5%**	**57**	**585**	**10%**	**54**	**178**	**30%**

[1]Refers to all samples scheduled for constituent analysis (dry sites are included). Resampling events are not scheduled monitoring events and are not included.

Figure 21. Number of exceedances of high priority constituents and toxic samples from 2006 through September 2014 in first through fifth priority site subwatersheds.

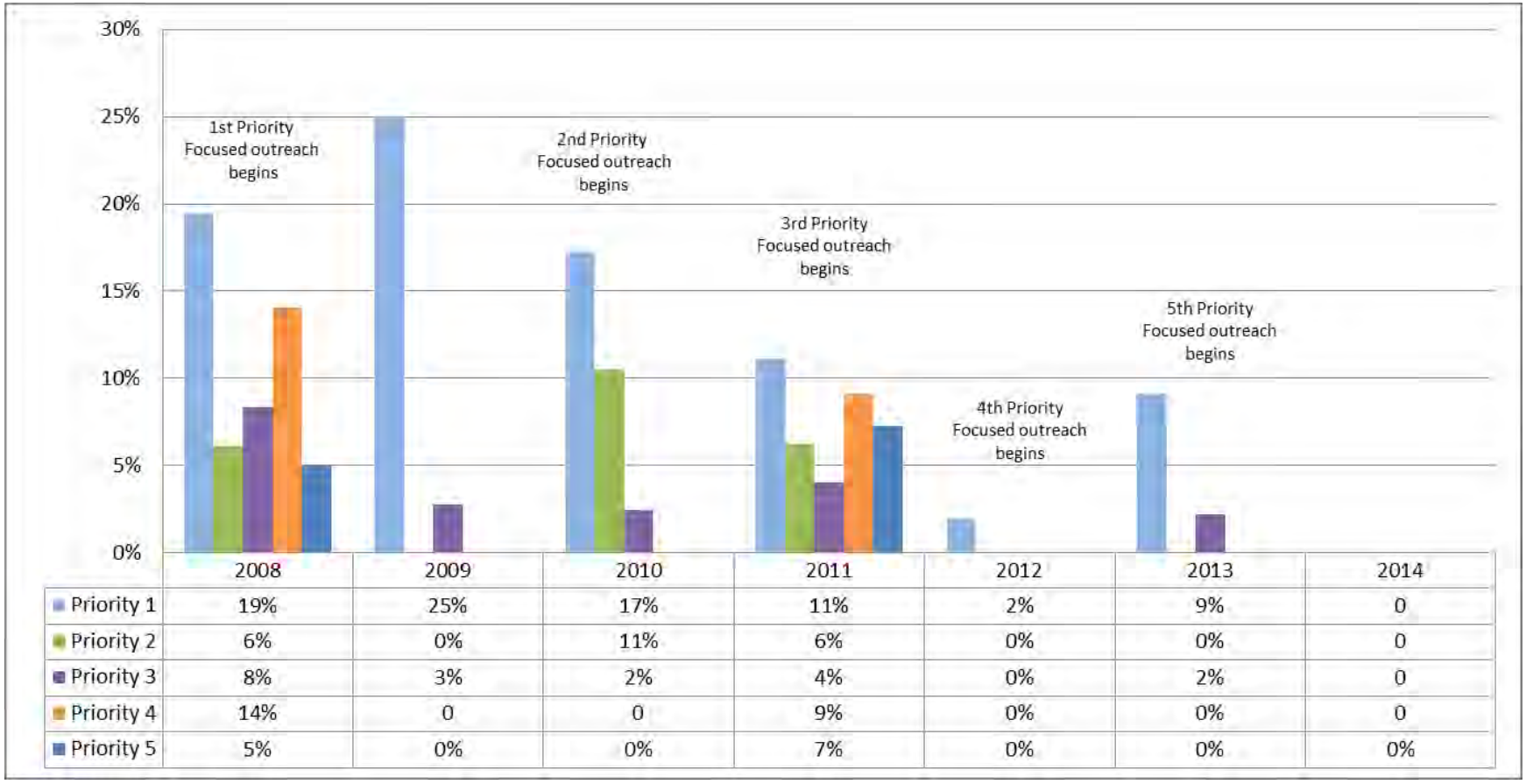
Organophosphates include results of chlorpyrifos, diazinon, and disulfoton. Herbicides include results of simazine and diuron. Toxicity includes results of water column toxicity to *S. capricornutum*, *C. dubia* and sediment toxicity to *H. Azteca*.



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Organophosphates	15	20	36	8	12	15	1	3	0
Herbicides	0	9	6	0	0	0	0	0	2
Copper	9	22	11	0	2	2	1	0	0
Toxicity	17	29	45	4	9	10	8	8	8

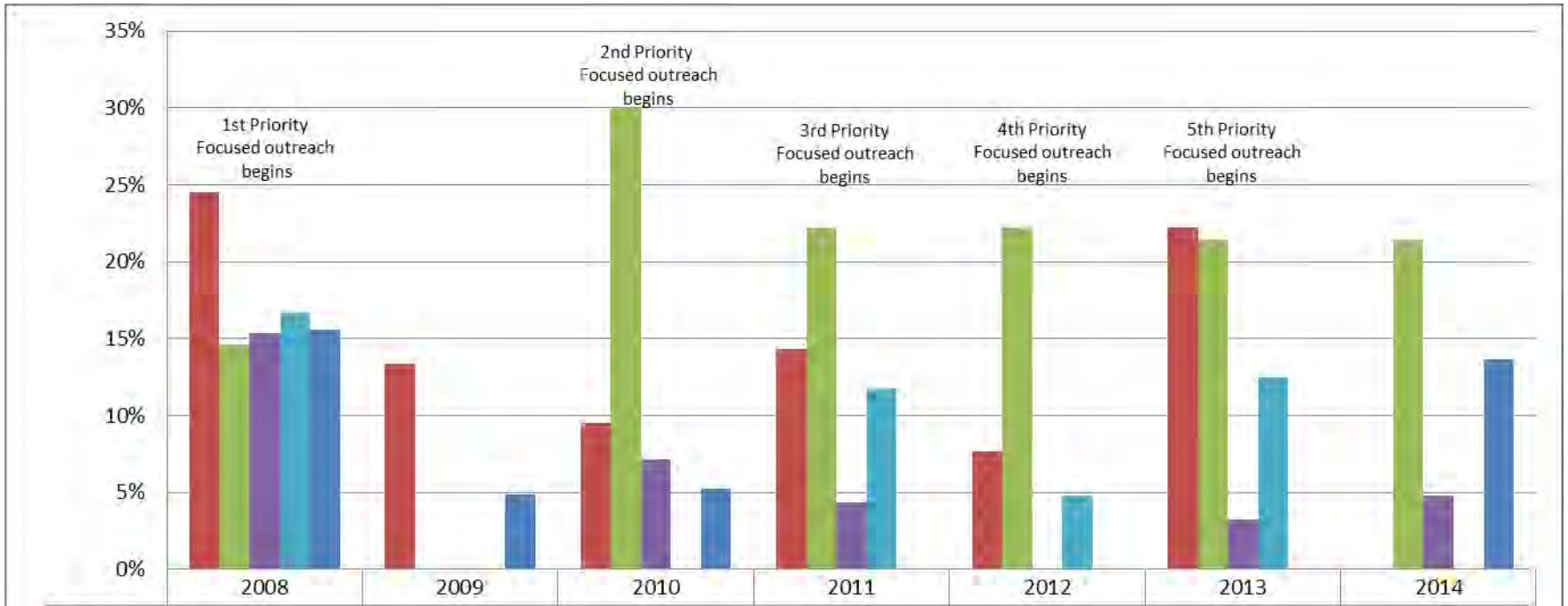
Figure 22. Percentage of organophosphate exceedances relative to the number of samples collected by priority since focused outreach began in first through fifth priority site subwatersheds.

Organophosphates include chlorpyrifos, diazinon, and disulfoton. These constituents represent high priority constituents under a management plan at one or more site subwatersheds. 'NA' indicates that samples were not collected for these constituents during that year.



	2008	2009	2010	2011	2012	2013	2014
Priority 1	19%	25%	17%	11%	2%	9%	0
Priority 2	6%	0%	11%	6%	0%	0%	0
Priority 3	8%	3%	2%	4%	0%	2%	0
Priority 4	14%	0	0	9%	0%	0%	0
Priority 5	5%	0%	0%	7%	0%	0%	0%

Figure 23. Percentage of toxicity relative to the number of samples collected by priority since focused outreach began in first through fifth priority site subwatersheds.



	2008	2009	2010	2011	2012	2013	2014
Priority 1	25%	13%	10%	14%	8%	22%	0%
Priority 2	15%	0%	30%	22%	22%	21%	21%
Priority 3	15%	0%	7%	4%	0%	3%	5%
Priority 4	17%	0%	0%	12%	5%	13%	0%
Priority 5	16%	5%	5%	0%	0%	0%	14%

Chlorpyrifos

The Coalition received approval to remove chlorpyrifos from a site subwatershed within the second priority set of site subwatersheds (Grant Line Canal at Clifton Court Rd) on August 22, 2014.

Management plans for chlorpyrifos were implemented within the first through fifth priority site subwatersheds, with the exception of Mokelumne River @ Bruella Rd subwatershed in which no exceedances of the WQTL has occurred. Since 2006, 13% of the samples collected at first through fifth priority site subwatersheds were in exceedance of the WQTL for chlorpyrifos (98 of 769 samples, Table 58). Of those samples with exceedances, 43% of them were collected between 2006 and 2008 prior to the start of focused outreach; 2008 had the most exceedances of the WQTL for chlorpyrifos (30 exceedances, Table 58). By the start of 2014, the first through fifth priority sites had received focused outreach. During outreach with growers, the Coalition discussed the importance of irrigation management to reduce runoff into downstream surface waters and encouraged growers to implement additional practices to reduce spray drift.

From January through September 2014, there were no exceedances of the WQTL for chlorpyrifos in the first through fifth priority site subwatersheds. The Coalition attributes the improvement in water quality to focused outreach and the implementation of effective management practices (Figure 22) by Coalition members.

Diazinon

Diazinon was removed from all SJCDWQC site subwatershed management plans. The highest number of exceedances of the WQTL for diazinon (4) occurred in first priority site subwatersheds in 2007. From 2009 to September 2014, 269 samples were collected to test for the presence of diazinon in the first through fifth priority site subwatersheds; no exceedances of the WQTL for diazinon occurred in samples collected in any of the site subwatersheds (Table 58). The Coalition believes that management practices implemented as a result of focused outreach contributed to water quality improvements (Figure 22).

Copper

Copper remains in an active management plan for the Littlejohns Creek @ Jack Tone Rd and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatersheds. The Coalition received approval to remove copper from five site subwatersheds from 2012 through September 2014. Since 2006, there were 47 exceedances of the hardness based WQTL for copper at first through fifth priority site subwatersheds. Since focused outreach was initiated in 2008, there were only five exceedances: two in 2010, two in 2011, and one in 2012 (Table 58). From January through September, no exceedances of the hardness based WQTL for copper occurred across the entire coalition region (Appendix III, Table III-2A).

Disulfoton

From 2006 through September 2014, 1% of samples collected (4 out of 478 samples) exceeded the WQTL for disulfoton. In two of the eight years, there was no use of disulfoton within the Coalition region; the highest use occurred in 2007 with 1,468 pounds applied (Table 58). Three of the four

exceedances of the WQTL for disulfoton occurred in the Sand Creek @ Hwy 4 Bypass site subwatershed (fourth priority). Since the last exceedance in 2008, MPM for disulfoton occurred within the Sand Creek @ Hwy 4 Bypass site subwatershed from 2011 through June 2014 and no exceedances of the WQTL occurred. The Coalition received approval to remove disulfoton from the Sand Creek @ Hwy 4 Bypass site subwatershed on August 22, 2014.

Diuron

Diuron was removed from two SJCDWQC site subwatershed (Lone Tree Creek @ Jack Tone Rd and French Camp Slough @ Airport Way) management plans in 2012 and 2013. Due to an exceedance of the WQTL for diuron (38 µg/L, Table 36) in the French Camp Slough @ Airport Way site subwatershed on February 11, 2014, diuron will be reinstated into the site's active management plan for in the 2015 WY. Roberts Island @ Whiskey Slough Pump and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd are the other site subwatersheds with diuron in active management plans. The Coalition petitioned to remove diuron from the Roberts Island @ Whiskey Slough Pump management plan on June 9, 2014, but the Regional Board identified the status as "Pending" and will address the request in a future memorandum. Through September 2014, there were a total of 13 exceedances of the WQTL for diuron representing 3% of the 464 samples collected (Table 58). A majority of the exceedances occurred during January or February (12 of 13 samples), which corresponded with the periods of greatest diuron applications.

Simazine

Simazine was removed from the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed management plan in 2012; there are no active management plans for simazine within the Coalition region. From January through September 2014, there was one exceedance of the WQTL for simazine that occurred in the French Camp Slough @ Airport Way site subwatershed on March 3, 2014; the first ever exceedance of the WQTL for simazine in this site subwatershed. Since 2006, only 1% of the samples collected exceeded the WQTL for simazine (5 out of 413 samples, Table 58). The Coalition believes that management practices implemented as a result of focused outreach contributed to the improved water quality results in addition to the decreasing use of products containing simazine (Figure 21).

C. dubia toxicity

The Coalition received approval to remove toxicity to *C. dubia* from five site subwatersheds in 2012 and 2013.

Toxicity to *C. dubia* is listed in active management plans for Duck Creek @ Hwy 4, Grant Line Canal near Calpack Rd, Mormon Slough @ Jack Tone Rd, and Roberts Island @ Whiskey Slough Pump site subwatersheds. The Coalition petitioned to remove toxicity to *C. dubia* from the Roberts Island @ Whiskey Slough Pump active management plan on June 9, 2014 and the Regional Board stated the status was "Pending" and that they would address it in a separate memorandum. However, due to the toxic sample collected from Roberts Island @ Whiskey Slough Pump on June 15, 2014, the Coalition will continue MPM for toxicity to *C. dubia*. Across the SJCDWQC region, water toxicity to *C. dubia* is often associated with organophosphate pesticides. Therefore, the Coalition's strategy has focused on

chlorpyrifos and diazinon water quality impairments to address the toxicity. The Coalition emphasizes during general and focused outreach that all pesticides carry risks to water quality, and preventing the offsite movement of all pesticides through stormwater, irrigation tailwater, and sediment management is the most effective method to reduce/eliminate agriculturally induced water quality impairments. Since 2010, there were four toxic samples to *C. dubia* in the first through fifth priority site subwatersheds (Table 59).

From January through September 2014, there was one sample out of 34 samples (3%, Table 59) that was toxic to *C. dubia* from Roberts Island @ Whiskey Slough Pump (fifth priority site subwatershed) during MPM on July 15, 2014 (Table 38). Since the survival was 0% compared to the control, a TIE was conducted and indicated non-polar organics as the cause of the toxicity. Further analysis of this toxicity can be found in the Summary of Exceedances section. This was the first and only toxicity in the Coalition region since the 2012 toxicity in the Grant Line Canal near Calpack Rd site subwatershed. Since focused outreach began in 2009, the number of toxic samples has steadily declined (Figure 23).

S. capricornutum toxicity

The Coalition received approval to remove toxicity to *S. capricornutum* from the management plans at Kellogg Creek along Hoffman Ln, Mormon Slough @ Jack Tone Rd, and Sand Creek @ Hwy 4 Bypass on August 22, 2014. Toxicity to *S. capricornutum* is still listed in active management plans for Grant Line Canal @ Clifton Court, Grant Line Canal near Calpack Rd, and Roberts Island @ Whiskey Slough Pump. Toxicity to *S. capricornutum* was previously removed from management plans at French Camp Slough @ Airport Way and Mokelumne River @ Bruella Rd (both third priority site subwatersheds), but due to toxic samples in 2014 at both sites, the Coalition will re-instate the management plans in the 2015 WY. Toxicity to *S. capricornutum* has not occurred at any first priority site subwatersheds since focused outreach began in 2009 (Table 59).

From January through September 2014, there were seven out of 42 samples (17%, Table 59) collected within first through fifth priority site subwatersheds that were toxic to *S. capricornutum*. Toxicity was below 50% growth compared to the control for samples collected for the samples from Grant Line Canal near Calpack Rd (6% growth compared to control, Table 38) in January 2014 and from French Camp Slough @ Airport Way and Grant Line Canal near Calpack Rd (0% and 23% growth compared to the control, respectively, Tables 36 and 38) in February 2014. The TIEs for all three samples indicated non-polar organics as the cause of toxicity. There were no TIEs conducted for the remaining 4 toxic samples because growth was above 50% compared to the control. Further analysis of these toxic events can be found in the Summary of Exceedances section.

H. azteca toxicity

Management plans were implemented for sediment toxicity to *H. azteca* for all first through fifth priority site subwatersheds except for: Littlejohns Creek @ Jack Tone Rd (second priority), Mokelumne River @ Bruella Rd (third priority), Mormon Slough @ Jack Tone Rd (fourth priority), and Bear Creek @ North Alpine Rd (fifth). The Coalition received approval to remove sediment toxicity from the Lone Tree Creek

@ Jack Tone Rd active management plan on May 21, 2012; toxicity to *H. azteca* has not occurred at the site since 2006.

Since the Coalition initiated focused outreach in 2009, there were a total of 54 out of 178 samples (30%, Table 59) collected within first through fifth priority site subwatersheds which were toxic to *H. azteca*. From January through September 2014, the Coalition sampled for toxicity to *H. azteca* on 22 events; none of which resulted in a toxicity. The number of toxic events has steadily declined in recent years from 58% of samples collected in 2010 to 0% of samples collected in 2014 (Figure 21).

XII. A. iv. Management Plans Approved for Removal

In 2014, the Coalition received approval on August 22nd to remove specific site/constituent pairs from active management plans. Table 52 lists all of the specific site/constituent pairs approved for removal from active management plans. Three years of monitoring at a site subwatershed with no exceedances of a specific constituent indicates improved water quality due to grower reduction/elimination of the offsite movement of agricultural constituents and/or newly implemented management practices.

XIII. TMDL CONSTITUENTS

From January through September 2014, the SJCDWQC conducted monitoring to evaluate compliance with EPA approved TMDL discharge limitations. Approved TMDLs within the SJCDWQC region include chlorpyrifos and diazinon, DO, methyl mercury, salt, and boron. Table 60 lists all constituents with TMDLs in one or more waterbodies within the Coalition boundary, and the USEPA approved documents that apply to these TMDLs.

Table 60. USEPA approved TMDL documents that apply to waterbodies within the SJCDWQC boundaries and that list agriculture as one of the potential sources.

Constituents	Basin Plan Amendment name	Date Approved	Applicable Waterbody Within the Coalition
Diazinon and Chlorpyrifos	Diazinon and Chlorpyrifos Runoff into the Sacramento-San Joaquin Delta	10/10/2007	Sacramento-San Joaquin Delta named waterways listed in Appendix 43 of the Basin Plan
Diazinon and Chlorpyrifos	Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River	10/20/2006	San Joaquin River (Mendota Dam to Airport Way Bridge near Vernalis)
Methyl Mercury and Total Mercury	Methyl Mercury and Total Mercury in the Sacramento-San Joaquin River Delta Estuary	10/20/2011	Sacramento-San Joaquin Delta named waterways listed in Appendix 43 of the Basin Plan
Low Dissolved Oxygen	Dissolved Oxygen Impairment in the Stockton Deep Water Ship Channel	2/27/2007	San Joaquin River (between Turner Cut and Stockton, 1 September through 30 November)
Electrical Conductivity and Boron	Salt And Boron Discharges into the Lower San Joaquin River	2/8/2007	San Joaquin River (Mendota Dam to Airport Way Bridge near Vernalis)

If an exceedance of the WQTL occurs for an approved TMDL constituent, a management plan is required for that constituent in that site subwatershed. Coalition efforts to address exceedances of TMDL constituents include but are not limited to: 1) additional monitoring and source identification, 2) focused outreach within the site subwatershed, which includes conducting site subwatershed grower meetings and encouraging the implementation of management practices, 3) evaluating the efficacy of management practices, and 4) addressing the seven surveillance and monitoring objectives described in the Basin Plan. Intensive outreach and documentation of implemented management practices occur throughout the Coalition every year. Greater efforts to acquire information are made in locations the Coalition has designated as high priority site subwatersheds (Table 64). The Coalition conducts annual meetings to provide growers with information on management practices designed to improve water quality. These actions enable Coalition members to address the agricultural sources of TMDL constituents.

In the following sections, a narrative is provided concerning each USEPA approved TMDL constituent, the Coalition's strategy, and actions taken to meet the TMDL requirements during monitoring from January through September 2014.

XIII. A. i. Chlorpyrifos and Diazinon TMDL

There are two approved chlorpyrifos and diazinon TMDLs applicable to waterbodies in the SJCDWQC region (Table 60). The Coalition is responsible for determining compliance only with the Sacramento and San Joaquin Delta chlorpyrifos and diazinon TMDL. The Lower San Joaquin River chlorpyrifos and diazinon TMDL includes one compliance point within the SJCDWQC boundary (San Joaquin River @ Vernalis). However, this compliance point receives most of its drainage from areas outside of the Coalition region. Therefore, it was agreed that the East San Joaquin Water Quality Coalition and the Westside San Joaquin River Watershed Coalition assume management for this monitoring location, and the associated compliance and reporting responsibilities.

The Coalition collaborated with the Regional Board to establish a monitoring and reporting strategy to demonstrate compliance with the chlorpyrifos and diazinon TMDL. The strategy includes assessing compliance with the chlorpyrifos and diazinon TMDL program Monitoring Objectives:

1. Determine compliance with established water quality objectives and the loading capacity applicable to diazinon and chlorpyrifos in the Delta Waterways.
2. Determine compliance with the load allocations applicable to discharges of diazinon and chlorpyrifos into the Delta Waterways.
3. Determine the degree of implementation of management practices to reduce offsite movement of diazinon and chlorpyrifos.
4. Determine the effectiveness of management practices and strategies to reduce offsite migration of diazinon and chlorpyrifos.
5. Determine whether alternatives to diazinon and chlorpyrifos are causing surface water quality impacts.
6. Determine whether the discharge causes or contributes to toxicity impairment due to additive or synergistic effects of multiple pollutants.
7. Demonstrate that management practices are achieving the lowest pesticide levels technically and economically achievable.

The Coalition evaluates compliance with WQOs for loading capacity and load allocations within the Delta subareas and 303d listed waterbodies through representative monitoring.

To assess compliance with loading capacity, on March 15, 2013 the Coalition received approval to conduct representative monitoring of four Delta monitoring locations: Old River at the West End of Clifton Court Rd, San Joaquin River @ West Neugerbauer Rd, Light House Restaurant @ West Brannon Island Rd, and Walthall Slough @ Woodward Ave (Table 61 and Figure 24). Monitoring for chlorpyrifos and diazinon TMDL compliance at the four locations is required annually during one storm event and once a month from May through August. This TMDL compliance monitoring strategy focuses on periods of peak pesticide use, and allows the monitoring program to better meet the TMDL monitoring requirements by using representative monitoring in Delta Waterways.

Table 61. Loading capacity sites used to asses loading capacity of Chlorpyrifos and Diazinon From January through September 2014 by the SJCDWQC, and the Delta segments that they represent.

Site Name	Delta Segment Represented	Latitude	Longitude
Light House Restaurant @ West Brannon Island Rd	Delta Waterways (central and eastern portions), Mosher Slough (downstream of I-5) and Five Mile Slough (Alexandria Place to Fourteen Mile Slough)	38.10487	-121.59299
Old River @ the West End of Clifton Court Rd	Delta Waterways (export area, southern and western portions)	37.84195	-121.53721
San Joaquin River @ West Neugerbauer Rd	Delta Waterways (Stockton Ship Channel)	37.99493	-121.44173
Walthall Slough @ Woodward Ave	San Joaquin River (Stanislaus River to Delta Boundary)[1]	37.77046	-121.29227

[1] This section is addressed in the Lower San Joaquin River Diazinon and Chlorpyrifos TMDL and is associated with the compliance location San Joaquin River @ Vernalis. This section was delisted from the 303(d) list for diazinon in 2008.

To assess compliance with load allocation from January through September 2014, the Coalition sampled at eleven tributary sites for chlorpyrifos and diazinon as part of Assessment Monitoring or MPM (Table 62 and Figure 24). Sites monitored for load allocation include named Delta waterways and tributaries that drain to named Delta waterways from both inside and outside the legal Delta boundary. The Basin Plan amendment suggests that "*For Delta Waterways that flow into the Legal Delta from outside, the Load Allocations for the discharges to each waterbody upstream of the Legal Delta would be defined at the point where the waterway enters the legal Delta*". Some Coalition sample sites are located upstream of the legal Delta; therefore, compliance was evaluated by using water quality data from the most downstream waterbody. For instance, Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek all drain into French Camp Slough and therefore load allocation compliance was evaluated only at French Camp Slough @ Airport Way, which is the most downstream monitoring location.

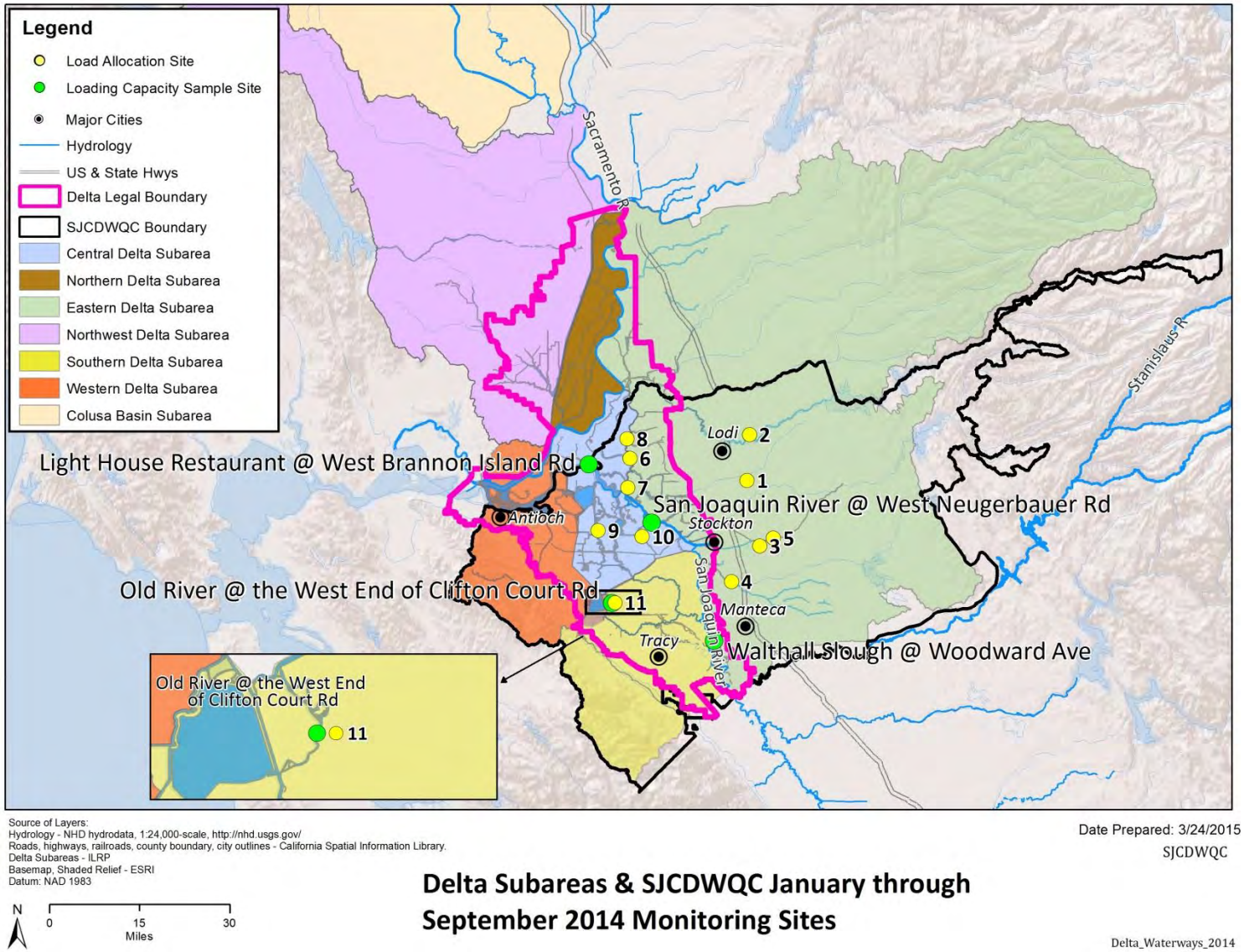
From January through September 2014, the timing and location of monitoring at load allocation sites varied depending on the monitoring type (Assessment or MPM). The chlorpyrifos and diazinon monitoring schedule for both loading capacity and load allocation sites is detailed in Table 63.

Table 62. Monitoring sites used to assess chlorpyrifos and diazinon load allocation compliance from January through September 2014 and the Delta segments that they represent; sorted by Delta Segment.

Delta Segment	Site Name	Latitude	Longitude	Constituent monitored [2]	Map key
Delta eastern portion, outside legal Delta	Bear Creek @ North Alpine Rd	38.07386	-121.21215	C	1
	Mokelumne River @ Bruella Rd	38.16022	-121.20643	C, D	2
	Duck Creek @ Highway 4	37.94949	-121.18208	C	3
	French Camp Slough @ Airport Way	37.88172	-121.24933	C, D	4
	Mormon Slough @ Jack Tone Road	37.96470	-121.14880	C	5
Drain to Delta waterways (eastern portion)	Terminous Tract Drain @ Hwy 12	38.11558	-121.49380	C	6
	Empire Tract @ 8 Mile Rd [2]	38.06012	-121.49912	C, D	7
	Drain @ Woodbridge Rd	38.15256	-121.50095	C	8
Drain to Delta Waterways (central portion)	Bacon Island Pump @ Old River	37.97916	-121.57023	C, D	9
	Roberts Island @ Whiskey Slough Pump	37.96737	-121.46434	C, D	10
Drain to Delta waterways (southern portion)	Grant Line Canal @ Clifton Court Rd [1]	37.84182	-121.52999	C	11

[1] Sampling site is located on Union Island and not within Grant Line Canal itself.
[2] C – Chlopryrifos; D - Diazinon

Figure 24. Loading capacity sites (green) and load allocation sites (yellow, refer to number key in Table 62) used by the SJCDWQC to evaluate Chlorpyrifos and Diazinon TMDL compliance from January through September 2014.



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.
Delta Subareas - ILRP
Basemap, Shaded Relief - ESRI
Datum: NAD 1983

N
0 15 30
Miles

Date Prepared: 3/24/2015
SJCDWQC

Delta Subareas & SJCDWQC January through September 2014 Monitoring Sites

Delta_Waterways_2014

Table 63. Monitoring schedule for January through September 2014 loading capacity and load allocation sites.

Sites were monitored for chlorpyrifos (C) and/or diazinon (D).

Site Name	Site Type	1/28/2014	2/11/2014	3/3/2014	4/15/2014	5/20/2014	6/17/2014	7/15/2014	8/19/2014	9/16/2014
Walthall Slough @ Woodward Ave	Loading Capacity		C,D			C,D	C,D	C,D	C,D	C
San Joaquin River @ West Neugerbauer Rd	Loading Capacity		C,D			C,D	C,D	C,D	C,D	
Old River @ the West End of Clifton Court Rd	Loading Capacity		C,D			C,D	C,D	C,D	C,D	
Light House Restaurant @ West Brannon Island Rd	Loading Capacity		C,D			C,D	C,D	C,D	C,D	
Bacon Island Pump @ Old River	Load Allocation	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D
Bear Creek @ North Alpine Rd	Load Allocation	C								C
Drain @ Woodbridge Rd	Load Allocation				C					
Duck Creek @ Highway 4	Load Allocation				C	C	C	C	C	C
Empire Tract @ 8 Mile Rd2, 3	Load Allocation	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D
French Camp Slough @ Airport Way	Load Allocation	D	C,D	D	C,D	C,D	D	C,D	C,D	C,D
Grant Line Canal @ Clifton Court Rd	Load Allocation	C	C	C						
Mokelumne River @ Bruella Rd	Load Allocation	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D	C,D
Mormon Slough @ Jack Tone Road	Load Allocation					C		C	C	C
Roberts Island @ Whiskey Slough Pump	Load Allocation	C	C						C	C
Terminous Tract Drain @ Hwy 12	Load Allocation								C	C

XIII. A. i. a. *Compliance with Chlorpyrifos and Diazinon WQOs*

From January through September 2014, the Coalition evaluated compliance with chlorpyrifos and diazinon WQOs by reviewing monitoring results from the sites listed in Table 62. There was one exceedance of the WQO for chlorpyrifos at the Old River @ the West End of Clifton Court Rd (Table 64). Old River @ the West End of Clifton Court Rd is a TMDL monitoring location representative of the Delta Waterways export area, the southern portion, and the western portion (Table 61 and Figure 24). Chlorpyrifos was not detected in any other sample collected during SJCDWQC monitoring. Diazinon was not detected in any sample collected from January through September 2014.

Table 64. SJCDWQC January through September 2014 exceedances of the WQO for chlorpyrifos at sites assessed for TMDL compliance.

There were no exceedances of the WQO for diazinon at any site in the SJCDWQC region from January through September 2014.

Station Name	TMDL Compliance Type	Sample Date	Analyte	Result	WQO
Old River @ the West End of Clifton Court Rd	Loading Capacity	5/20/2014	Chlorpyrifos	0.070 µg/L	0.015 µg/L

XIII. A. i. b. *Compliance with Chlorpyrifos and Diazinon Loading Capacity and Load Allocations*

Loading capacity and load allocations for nonpoint source discharges to Sacramento-San Joaquin Delta Waterways, including agricultural discharges, are calculated with the following equation:

$$S = \frac{C_D}{WQO_D} + \frac{C_c}{WQO_c} \leq 1.0$$

S= load capacity
C_D = diazinon concentration in µg/L
C_C = chlorpyrifos concentration in µg/L
WQO_D = diazinon water quality objective; 0.1 µg/L
WQO_C = chlorpyrifos water quality objective; 0.015 µg/L

The Coalition assessed load capacity compliance from the sites listed in Table 61. There was one exceedance of the WQTL for chlorpyrifos and an associated loading capacity out of compliance (Table 65).

The Coalition assessed load allocation compliance at monitoring sites listed in Table 62 did not detect chlorpyrifos or diazinon in any of the samples. Therefore, all samples collected from January through September 2014 were in compliance with the established loading capacity (Table 66). Table 67 provides a summary of loading capacity and load allocation compliance by Delta subarea and waterbody from January through September 2014.

Table 65. Sacramento-San Joaquin Delta Waterways TMDL load capacity compliance calculations for diazinon and chlorpyrifos runoff for nonpoint source discharges from January through September 2014.

If a site was scheduled for chlorpyrifos and/or diazinon analysis during an event and the result is not included in this table, the site was dry during the event.

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load	Load Capacity Compliance
Light House Restaurant @ West Brannon Island Rd	2/11/2014	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	2/11/2014	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	2/11/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	2/11/2014	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	5/20/2014	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	5/20/2014	0.070	<0.004	4.67	Out of compliance
San Joaquin River @ West Neugerbauer Rd	5/20/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	5/20/2014	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	6/17/2014	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	6/17/2014	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	6/17/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	6/17/2014	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	7/15/2014	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	7/15/2014	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	7/15/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	7/15/2014	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	8/19/2014	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	8/19/2014	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	8/19/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	8/19/2014	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	9/16/2014	<0.0026	<0.004	0	In compliance

Table 66. Sacramento-San Joaquin Delta Waterways TMDL load allocation compliance calculations for diazinon and chlorpyrifos runoff for nonpoint source discharges January through September 2014.

If a site was scheduled for chlorpyrifos and/or diazinon analysis during an event and the result is not included in this table, the site was dry during the event.

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load	Load Capacity Compliance
Bacon Island Pump @ Old River	1/28/2014	<0.0026	<0.004	0	In Compliance
Bear Creek @ North Alpine Rd	1/28/2014	<0.0026	NS	0	In Compliance
Empire Tract @ 8 Mile Rd	1/28/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	1/28/2014	<0.0026	<0.004	0	In Compliance
Grant Line Canal @ Clifton Court Rd	1/28/2014	<0.0026	NS	0	In Compliance
Mokelumne River @ Bruella Rd	1/28/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	1/28/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	2/11/2014	<0.0026	<0.004	0	In Compliance
Empire Tract @ 8 Mile Rd	2/11/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	2/11/2014	<0.0026	<0.004	0	In Compliance
Grant Line Canal @ Clifton Court Rd	2/11/2014	<0.0026	NS	0	In Compliance
Mokelumne River @ Bruella Rd	2/11/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	2/11/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	3/3/2014	<0.0026	<0.004	0	In Compliance
Empire Tract @ 8 Mile Rd	3/3/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	3/3/2014	<0.0026	<0.004	0	In Compliance
Grant Line Canal @ Clifton Court Rd	3/3/2014	<0.0026	NS	0	In Compliance
Mokelumne River @ Bruella Rd	3/3/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	3/3/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	4/15/2014	<0.0026	<0.004	0	In Compliance
Drain @ Woodbridge Rd	4/15/2014	<0.0026	NS	0	In Compliance
Empire Tract @ 8 Mile Rd	4/15/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	4/15/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	4/15/2014	<0.0026	<0.004	0	In Compliance

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load	Load Capacity Compliance
Roberts Island @ Whiskey Slough Pump	4/15/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	5/20/2014	<0.0026	<0.004	0	In Compliance
Duck Creek @ Hwy 4	5/20/2014	<0.0026	NS	0	In Compliance
Empire Tract @ 8 Mile Rd	5/20/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	5/20/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	5/20/2014	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	5/20/2014	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	5/20/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	6/17/2014	<0.0026	<0.004	0	In Compliance
Duck Creek @ Hwy 4	6/17/2014	<0.0026	NS	0	In Compliance
Empire Tract @ 8 Mile Rd	6/17/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	6/17/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	6/17/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	6/17/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	7/15/2014	<0.0026	<0.004	0	In Compliance
Duck Creek @ Hwy 4	7/15/2014	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	7/15/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	7/15/2014	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	7/15/2014	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	7/15/2014	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	8/19/2014	<0.0026	<0.004	0	In Compliance
Duck Creek @ Hwy 4	8/19/2014	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	8/19/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	8/19/2014	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	8/19/2014	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	8/19/2014	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	8/19/2014	<0.0026	NS	0	In Compliance
Bacon Island Pump @ Old River	9/16/2014	<0.0026	<0.004	0	In Compliance
Bear Creek @ North Alpine Rd	9/16/2014	<0.0026	NS	0	In Compliance
Duck Creek @ Hwy 4	9/16/2014	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	9/16/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	9/16/2014	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	9/16/2014	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	9/16/2014	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	9/16/2014	<0.0026	NS	0	In Compliance

NS-Not sampled; analyte not scheduled for analysis during event.

Table 67. Summary of load capacity and allocation compliance from January through September 2014 in the Sacramento-San Joaquin Delta Subareas.

Type of load compliance	Delta segment represented	Site Name	In compliance	Out of compliance	Total
Loading Capacity	Delta Waterways (central and eastern portions), Mosher Slough (downstream of I-5) and Five Mile Slough (Alexandria Place to Fourteen Mile Slough)	Light House Restaurant @ West Brannon Island Rd	5	0	5
	Delta Waterways (export area, southern and western portions)	Old River @ the West End of Clifton Court Rd	4	1	5
	Delta Waterways (Stockton Ship Channel)	San Joaquin River @ West Neugerbauer Rd	5	0	5
	San Joaquin River (Stanislaus River to Delta Boundary) [1]	Walthall Slough @ Woodward Ave	6	0	6
Load Allocation	Delta eastern portion, outside legal Delta	Bear Creek @ North Alpine Rd	2	0	2
		Duck Creek @ Hwy 4	5	0	5
		French Camp Slough at Airport Way	9	0	9
		Mokelumne River @ Bruella Rd	9	0	9
		Mormon Slough @ Jack Tone Rd	4	0	4
	Drain to Delta waterways (eastern portion)	Drain @ Woodbridge Rd	1	0	1
		Empire Tract @ 8 Mile Rd	6	0	6
		Terminous Tract Drain @ Hwy 12	2	0	2
	Drain to Delta Waterways (central portion)	Bacon Island Pump @ Old River	9	0	9
		Roberts Island @ Whiskey Slough Pump	9	0	9
	Drain to Delta waterways (southern portion)	Grant Line Canal @ Clifton Court Rd [1]	3	0	3

[1] The sampling site is located on Union Island and not within the Grant Line Canal.

XIII. A. i. c. *Implementation and Effectiveness of Management Practices to Reduce Chlorpyrifos and Diazinon Offsite Movement*

The Coalition evaluates effectiveness of implemented management practices across the entire SJCDWQC region by associating water quality with newly implemented management practices per each zone (refer to the Evaluation of Management Practice Effectiveness section of this report). The management practices recommended by the Coalition are designed to improve water quality by preventing the offsite movement of agricultural constituents, including chlorpyrifos and diazinon.

Management plans for chlorpyrifos were implemented within the first through fifth priority site subwatersheds; Mokelumne River @ Bruella Rd was an exception since no exceedances of the WQTL for chlorpyrifos have occurred. By the start of 2014, the first through fifth priority sites received focused outreach; additional focused outreach occurred within four priority subwatersheds in 2010 and 2012 due to continued exceedances of the chlorpyrifos WQTL.

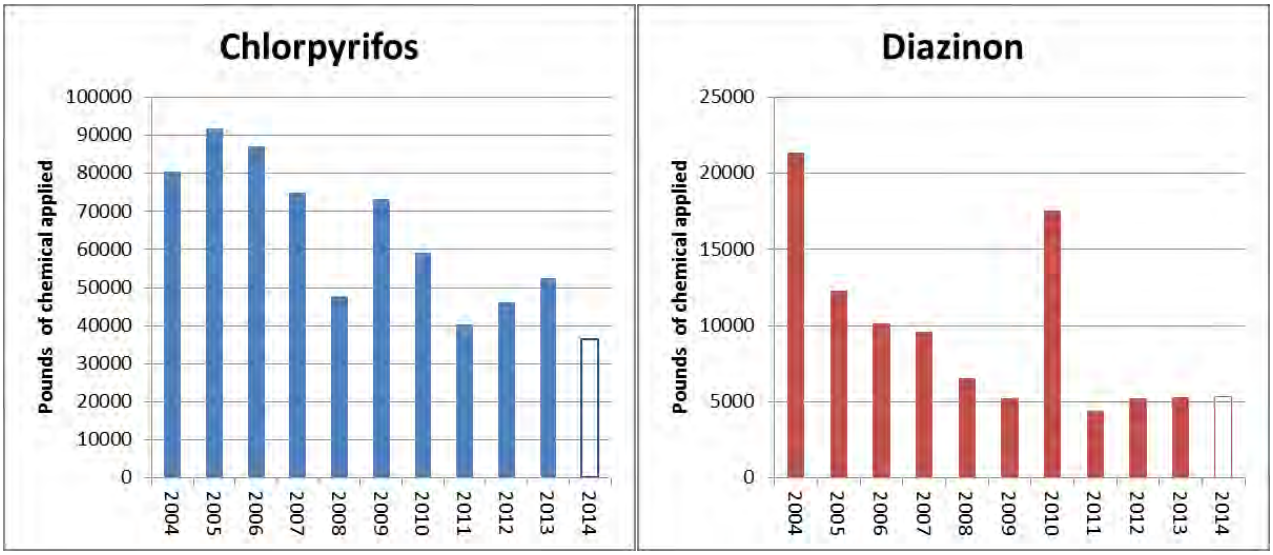
Diazinon was removed from all SJCDWQC site subwatershed management plans. From 2009 to 2014, 269 samples were collected to test for the presence of diazinon in the first through fifth priority site subwatersheds; no exceedances of the WQTL for diazinon (Table 58). Results from MPM indicated that diazinon is not entering the waterways in first through fifth priority site subwatersheds.

XIII. A. i. d. *Alternatives to Chlorpyrifos and Diazinon*

The pounds of diazinon and chlorpyrifos applied in the SJCDWQC region have declined since 2004 (Figure 25). With the exception of an increase in use during 2010, the use of diazinon has steadily declined over the years (Figure 25). The increase in use in 2010 was most likely due to a large outbreak of a relatively new pest (spotted winged drosophila) that occurred during 2010 in cherry orchards within the SJCDWQC region (Lee et al., 2011).

Figure 25.Pounds of diazinon and chlorpyrifos applied in the SJCDWQC region from 2004 through September 2014.

All PUR data are considered preliminary until received from CalPIP; CalPIP data are available through December 2010. PUR data are incomplete through 2014.



Several alternative pesticides and product options exist, including other organophosphates, pyrethroids, and neonicotinoids. During outreach, the Coalition encourages growers to switch to lower-risk, alternative products. However, alternatives to chlorpyrifos and diazinon depend on the product registration, commodity, pest pressures, timing, among other factors.

To evaluate potential alternatives to chlorpyrifos and diazinon, the Coalition identified the top five commodities in the SJCDWQC region with the most chlorpyrifos and/or diazinon applications between 2004 and 2014. Table 68 lists these top five commodities for Contra Costa, San Joaquin, and Stanislaus Counties, and PUR data indicating total pounds of pesticide. For these five commodities the Coalition identified the pests of major concern (or high priority pests) listed in the University of California Agriculture and Natural Resources (UC ANR). The Coalition reviewed alternative pesticides and other management strategies (i.e. applications of plant growth regulators) for each of the top five commodities and their high priority pests (CA DWR 2013; Elliott et al., 2004; IRAC, 2005; Summers et al., 2007; UC ANR; Zalom et al., 1999).

Table 68.Commodities in the SJCDWQC region with the most pounds of chlorpyrifos and diazinon applied from 2004 through September 2014.

All PUR data are considered preliminary until received from CalPIP; CalPIP data are available through December 2010. PUR data are incomplete through 2014.

Top commodities for Chlorpyrifos Use (pounds AI applied)	Top commodities for Diazinon Use (pounds AI applied)
Walnuts (305,995)	Cherries (36,136)
Alfalfa (133,732)	Almonds (32,833)
Almonds (70,186)	
Grapes (64,807)	

Several alternatives exist to manage the pests of concern for each commodity (Table 69). For example, over 10 different classes of pesticides are used to manage pests of high concern in almonds; and even more are available to manage pests of concern in walnuts. In addition, the timing of applications varied both by pesticide choice and target pest (Table 69). For example, in almonds, pyrethroids were applied in August to treat navel orange worms, and in November through February to target peach twig borers. In walnuts, spinosyns were applied in March through May, August, and October to treat codling moths, and in June through August to manage walnut husk flies.

Table 69. High priority pests for the five commodities in the SJCDWQC region that receive the most diazinon and chlorpyrifos applications since 2004.

For each pest, the table lists alternatives to chlorpyrifos and/or diazinon for the recommended application period.

Commodity	Pest	Pest Appearance	Pesticide Class[1]	Active Ingredient	Common Product Name	Recommended Application Period
Almond	Navel orange worm	All months	Avermectin	Emamectin benzoate	NA	Mar-May
			Bacterium	Bacillus thuringiensis	Vectobac	Mar-May, Aug
			Diacylhydrazine	Methoxyfenozide	Intrepid	Mar-May, Aug
			Diamide	Chlorantraniliprole	Voliam Xpress	Mar-May, Aug
				Flubendiamide	NA	Mar-May, Aug
			Organophosphate	Phosmet	Imidan	Aug
			Pyrethroid	Bifenthrin	Athena	Aug
				Esfenvalerate	Asana	Aug
				Fenpropathrin	NA	Aug
				Lambda-cyhalothrin	Warrior	Aug
			Spinosyn	Spinetoram	Delegate	Mar-May, Aug
				Spinosad	Success	Mar-May, Aug
			Unclassified	Buprofezin	Tourismo	Mar-May, Aug
	Peach twig borer	Feb-Oct	Avermectin	Emamectin benzoate	NA	Mar-May
			Bacterium	Bacillus thuringiensis	Javelin	Mar-May
			Benzoylurea	Diflubenzuron	Dimlin	Nov-Mar
			Diacylhydrazine	Methoxyfenozide	Intrepid	Mar-May
			Diamide	Chlorantraniliprole	Voliam Xpress	Nov-May
				Flubendiamide	NA	Mar-May
			Neonicotinoid	Acetamprid	Assail	Nov-May
			Pyrethroid	Bifenthrin	Athena	Nov-Feb
				Cyfluthrin	Leverage	Nov-Feb
				Esfenvalerate	Asana	Nov-Feb
				Lambda-cyhalothrin	Warrior	Nov-Feb
			Spinosyn	Spinetoram	Delegate	Nov-May
				Spinosad	Success	Nov-May
			Unclassified	Buprofezin	Tourismo	Mar-May
	San Jose scale	Feb-Aug	Carbamate	Carbaryl	Sevin	Nov-Jan
			Organophosphate	Methidathion	Supracide	May

Commodity	Pest	Pest Appearance	Pesticide Class[1]	Active Ingredient	Common Product Name	Recommended Application Period
			Unclassified	Buprofezin	Tourismo	Apr
				Pyriproxyfen	NA	Nov-Jan, Apr
Cherry	Cherry leafhopper	Apr-Oct	Neonicotinoid	Thiamethoxam	Cruiser	Nov-Jan, Jun-Aug
			Organophosphate	Methidathion	Supracide	Nov-Jan
			Pyrethroid	Esfenvalerate	Asana	Nov-Jan, Jun-Aug
				Lambda-cyhalothrin	Warrior	Nov-Jan, Jun-Aug
	Fruit tree leafhopper	Mar-Jun	Bacterium	Bacillus thuringiensis	Javelin	Apr-May
			Carbamate	Carbaryl	Sevin	Apr-May
			Diacylhydrazine	Methoxyfenozide	Intrpeid	Apr-May
			Diamide	Chlorantraniliprole	Altacor	Apr-May
				Flubendiamide	Belt	Apr-May
			Organophosphate	Methidathion	Supracide	Jan-Feb
			Pyrethroid	Esfenvalerate	Asana	Jan-Feb
				Lambda-cyhalothrin	Warrior	Jan-Feb
			Spinosyn	Spinetoram	Delegate	Apr-May
				Spinosad	GF-120 Naturalyte	Apr-May
	Mountain leafhopper	May-Jul	Neonicotinoid	Thiamethoxam	Cruiser	May-Jul
			Pyrethroid	Esfenvalerate	Asana	May-Jul
				Lambda-cyhalothrin	Warrior	May-Jul
Walnut	Codling Moth	May-Nov	Avermectin	Emamectin benzoate	Proclaim	Mar-May, Aug, Oct
			Bacterium	Bacillus thuringiensis	Javelin	Mar-May, Aug, Oct
			Benzoylurea	Diflubenzuron	Dimlin	Mar-May, Aug, Oct
			Carbamate	Carbaryl	Sevin	Mar-May, Aug, Oct
			Diacylhydrazine	Methoxyfenozide	Intrpeid	Mar-May, Aug-Oct
			Diamide	Chlorantraniliprole	Altacor	Mar-May, Aug, Oct
				Flubendiamide	Belt	Mar-May, Aug, Oct
			Organophosphate	Phosmet	Imidan	Mar-May, Aug, Oct
			Pyrethroid	Bifenthrin	Brigade	Mar-May, Aug, Oct
				Cyfluthrin	Leverage	Mar-May, Aug, Oct
				Lambda-cyhalothrin	Warrior	Mar-May, Aug, Oct
				Permethrin	Perm-Up	Mar-May, Aug, Oct
			Spinosyn	Spinetoram	Delegate	Mar-May, Aug, Oct
				Spinosad	GF-120 Naturalyte	Mar-May, Aug, Oct
	Walnut husk fly	Jun-Sept	Neonicotinoid	Imidacloprid	Pasada	Jun-Aug
			Organophosphate	Malathion	Clean Crop	Jun-Aug
				Phosmet	Imidan	Jun-Aug
			Plant growth regulator	Ethephon	Ethrel	Jun-Aug
			Pyrethroid	Esfenvalerate	Asana	Jun-Aug
			Spinosyn	Spinetoram	Delegate	Jun-Aug
				Spinosad	GF-120 Naturalyte	Jun-Aug
Alfalfa	Alfalfa weevil	Feb-Jun	Organophosphate	Malathion	Clean Crop	Mar-May
				Phosmet	Imidan	Mar-May
			Oxadiazine	Indoxacarb	Steward	Mar-May
			Pyrethroid	Cyfluthrin	Leverage	Mar-May
				Lambda-cyhalothrin	Warrior	Mar-May
	Blue, pea aphid	Feb-Jun	Botanical	Azadirachtin	Azatin (various)	Mar-May
				Pyrethrin	NA	Mar-May
			Organophosphate	Dimethoate	Drexel	Mar-May
	Spotted alfalfa aphid	Jun-Sept	Botanical	Azadirachtin	Azatin (various)	Jun-Nov
				Pyrethrin	NA	Jun-Nov
			Organophosphate	Dimethoate	Drexel	Jun-Nov
Grapes	Vine mealybug	May-Oct	Carbamate	Methomyl	Lannate	Jun-Nov
			Neonicotinoid	Acetamiprid	Assail	Jun-Aug
				Imidacloprid	Provado	Apr-Aug
			Organophosphate	Dimethoate	Drexel	Jun-Nov
			Unclassified	Buprofezin	Applaud	Feb, Jun-Aug

[1]For organization purposes, the Pesticide Class column includes categories that are not pesticides, such as bacterium.
Source: CA DWR 2013; IRAC, 2005; Summers et al., 2007; UC ANR, 2013; Zalom et al., 1999

The Coalition reviewed PUR data for trends in applications of chlorpyrifos, diazinon, and alternative pesticides listed in Table 69 per each commodity in the SJCDWQC region. The pounds of chlorpyrifos, diazinon, and major alternative pesticides are shown in Figure 26 through 30. The Coalition included 2004 through 2014 in the analysis, though PUR data is incomplete through 2014 and, as a result, the final amounts applied may be higher than the value shown in the figures. After 2007, general outreach focused on management plan constituents, which included discussing alternatives to chlorpyrifos and diazinon with growers.

For alfalfa, there was a small decrease (8% average reduction per year) in the use of chlorpyrifos (Figure 26). Before 2007, chlorpyrifos was the single most significant pesticide for the crop, with applications nearly ten times as high as any other pesticide. Since 2007, other organophosphates such as dimethoate and malathion displayed strong increases in their use (23% and 15% average increase per year, respectively (Figure 26). Although there were high applications of dimethoate and malathion, there was only one detection of dimethoate (0.14 µg/L) and no detections of malathion during monitoring from January through September 2014. Indoxacarb, phosmet, and the pyrethroids lambda-cyhalothrin and cyfluthrin are also possible alternatives to chlorpyrifos used in the control of alfalfa weevil; however, the applications of these pesticides were much less than the organophosphates.

In cherries, there were only small fluctuations in pesticide use over time, and no single pesticide seemed to dominate applications. With the exception of a peak in diazinon use in 2010 due to a spotted wing drosophila outbreak, the pounds of diazinon applied per year remained relatively constant since 2004 (Figure 27). There were also rather insignificant changes in alternative pesticides. Use of carbaryl and methidathion decreased significantly even before focus outreach; and applications of methoxyfenozide and lambda-cyhalothrin increased by 8% and 19% per year, respectively (Figure 27). There were eight alternative pesticides to diazinon applied to cherries since 2004, but their average use per year was so low that only three of them are displayed in Figure 27. Of those, spinosad and spenetoram use increased close to 25% per year since 2009 (Figure 27).

Figure 26. Pounds of major pesticides applied to alfalfa since 2004.
Grey dotted line indicates the start date in which general outreach became more focused on management plan constituents. PUR data are incomplete through 2014, hence values shown are tentative.

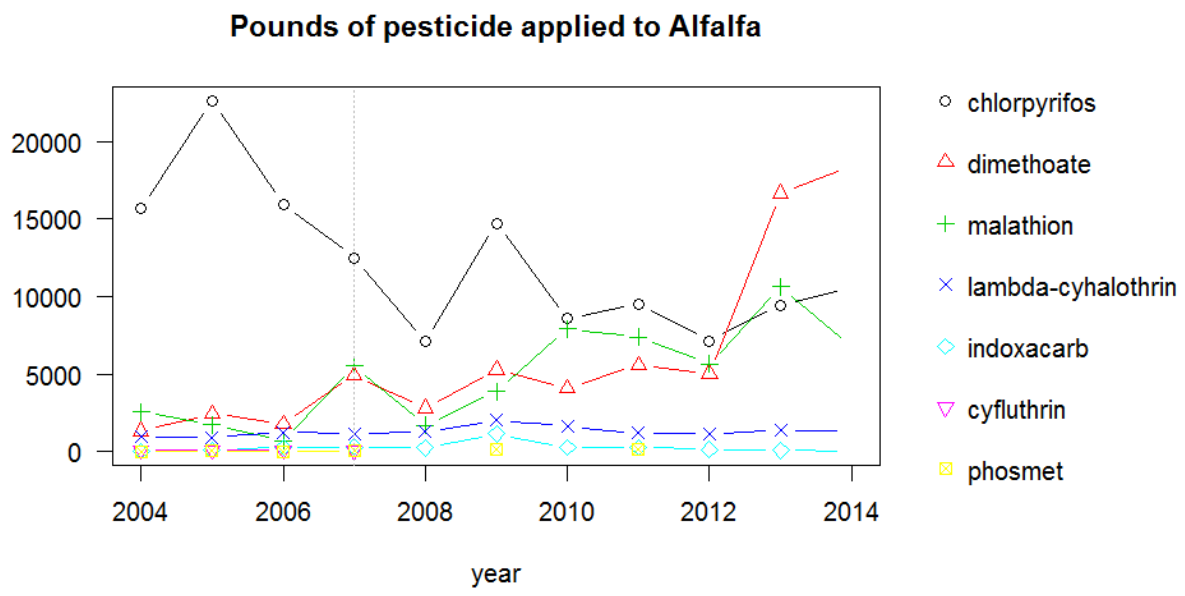
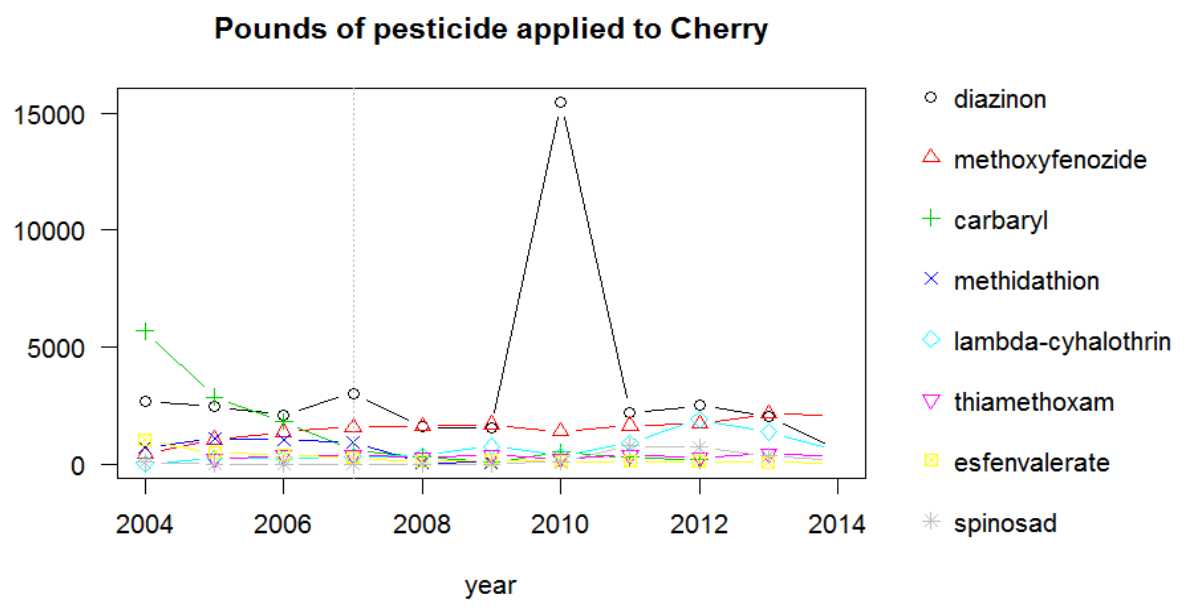


Figure 27. Pounds of major pesticides applied to cherries since 2004.
Grey dotted line indicates the start date in which general outreach became more focused on management plan constituents. PUR data are incomplete through 2014, hence values shown are tentative.



In grapes, the use of chlorpyrifos decreased since 2004. Applications of chlorpyrifos increased from 2004 to 2007; in 2009 there was a sharp peak in applications, but by 2011 applications significantly decreased (Figure 28). Since 2011, the use of chlorpyrifos slightly increased but remained low relative to previous years. Levels of chlorpyrifos use since 2011 are only 24% of pre-2007 levels. The neonicotinoid, imidacloprid, also increased in use since 2007 (18% average increase per year), and has now replaced chlorpyrifos as the major pesticide applied to grapes (Figure 28). Other than a peak in buprofezin use during 2009-2010, all other alternative pesticides remained relatively unchanged with very low use levels. The buprofezin peak may represent the selection of an alternative pesticide instead of chlorpyrifos.

In walnuts, chlorpyrifos remains the most important pesticide, though use has decreased an average of 6% per year (Figure 29). During 2013 there was a sharp peak in the use of malathion, another organophosphate. However, malathion use remained otherwise relatively constant over time. The malathion peak may represent the selection of an alternative pesticide instead of chlorpyrifos to control an outbreak. Ethephon, a plant growth regulator that can be used to speed up the maturation of the walnut to prevent late damage from Walnut Husk fly, displayed a steady increase in use averaging 12% per year, and, together with malathion, is currently the most important alternative to chlorpyrifos (Figure 29). There were 15 other alternative pesticides applied to walnuts since 2004; however, all of those have very low applications and only five are shown in Figure 29. Of those low use alternative pesticides, methoxyfenozide, imidacloprid, the pyrethroids bifenthrin and lambda-cyhalothrin, the diamides chlorantraniliprole and flubendiamide, and spinetoram, all were introduced in 2007 and trends indicated increase in usage. Since 2012, those alternatives together amount to applications of 7000-8000 pounds per year, similar to ethephon and malathion.

In almonds, organophosphates including chlorpyrifos, diazinon, and methidathion, were all major pesticides before 2007 but all indicated clear reductions since then (15%, 34% and 29% per year, respectively) (Figure 30). Of those organophosphates, only chlorpyrifos remains a major pesticide, diazinon is now a minor pesticide, and methidathion was phased out. Since 2007, there were substantial increases in applications of methoxyfenozide and bifenthrin (both over 35% per year on average), and are now major pesticides with application levels similar to chlorpyrifos.

In summary, chlorpyrifos applications to each major crop (alfalfa, grapes, walnuts and almonds) have decreased over time. Chlorpyrifos is still a major pesticide used for the control of pests in walnuts. In alfalfa, grapes, and almonds, alternative pesticides (including other organophosphates, one pyrethroid, and one diacylhydrazine) are now applied at similar or higher levels than chlorpyrifos. In the case of grapes, the neonicotinoid, imidacloprid, has replaced chlorpyrifos as the most significant pesticide. The use of diazinon decreased considerably in almonds, but its use has been consistent across time in cherries. Diazinon is not a major pesticide used for cherries, except for one major peak in use during 2010. Changes in crop acreages over time may affect trends in pesticide use.

Figure 28. Pounds of major pesticides applied to grapes since 2004.
Grey dotted line indicates the start date in which general outreach became more focused on management plan constituents. PUR data are incomplete through 2014, hence values shown are tentative.

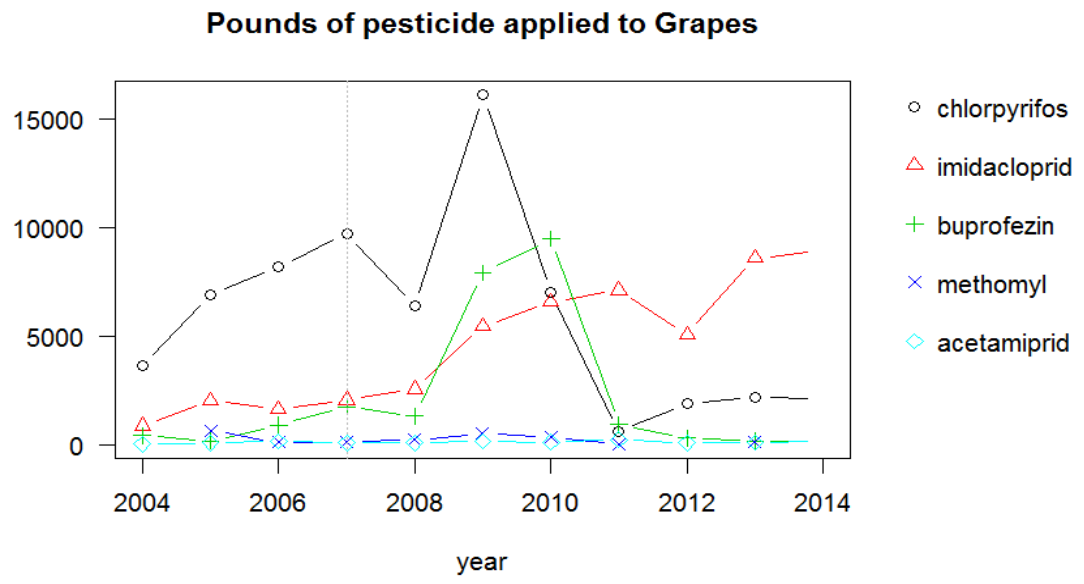


Figure 29. Pounds of major pesticides applied to walnuts since 2004.
Grey dotted line indicates the start date in which general outreach became more focused on management plan constituents. PUR data are incomplete through 2014, hence values shown are tentative.

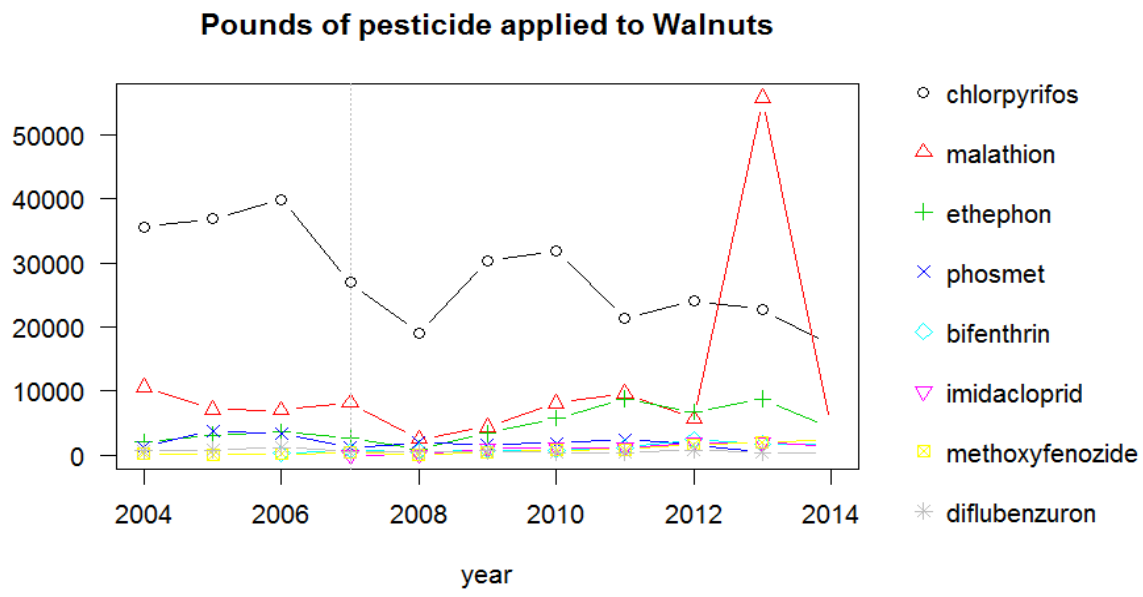
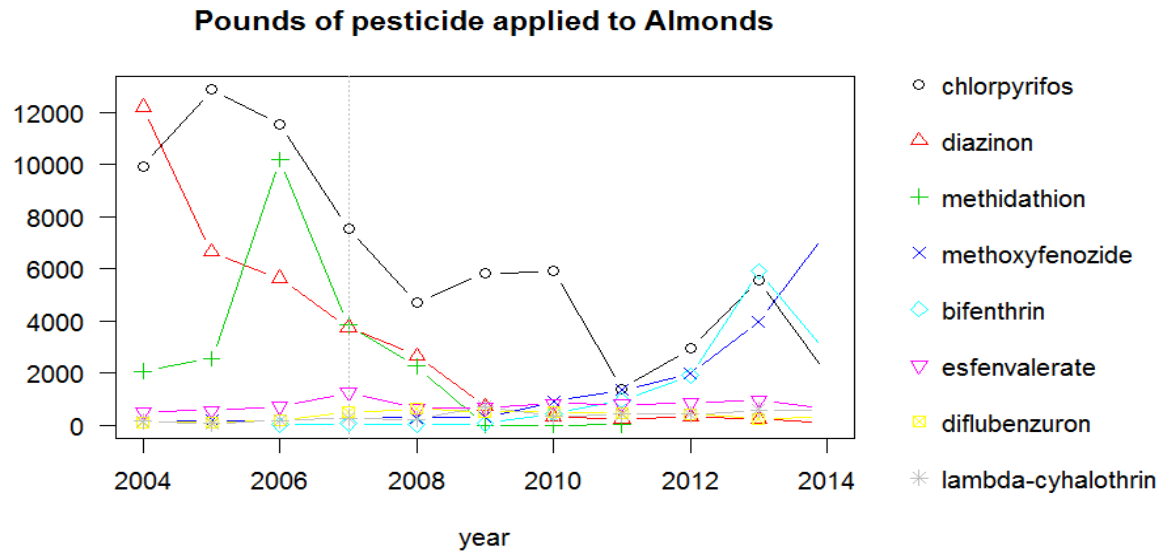


Figure 30. Pounds of major pesticides applied to almonds since 2004.
Grey dotted line indicates the start date in which general outreach became more focused on management plan constituents. PUR data are incomplete through 2014, hence values shown are tentative. Twelve alternative pesticides are left out of the figure because of very low yearly applications.



In the course of Assessment Monitoring and MPM, the Coalition assessed the concentration of organophosphates, carbamates, and pyrethroids in ambient waters to effectively characterize the water quality in each zone (Table 70). The Coalition also evaluated sediment and water column toxicity. Table 70 lists the site monitored for the specific pesticide or toxicity and whether monitoring was Assessment Monitoring which occurs monthly (A) or MPM which occurs during months of past exceedances or toxicity (M).

During Assessment Monitoring from January through September 2014, there were 16 water column detections of pesticides in Bacon Island Pump @ Old River, French Camp Slough @ Airport Way, and Roberts Island @ Whiskey Slough Pump (Table 71). Twelve of these detections corresponded to Diuron, a herbicide that cannot be considered an alternative to Chlorpyrifos or Diazinon. The other four detections corresponded to the insecticides dimethoate and dichlorvos (organophosphates), and methomyl (carbamate). Dimethoate was detected once in Bacon Island Pump @ Old River, and methomyl was detected twice at French Camp Slough @ Airport Way. Dimethoate and methomyl detections were below the WQTL. Dichlorvos was detected once at Roberts Island @ Whiskey Slough Pump in July and was in exceedance of the dichlorvos WQTL of 0.53 µg/L. Dichlorvos is not listed in Table 69, suggesting it is not a likely alternative to chlorpyrifos and diazinon.

Table 70. Sites monitored for organophosphates and carbamates in the water column from January through September 2014, including alternatives to chlorpyrifos and diazinon, and for toxicity in the water column.

Site Name	Organophosphates											Carbamates						Toxicity		
	Azinphos-methyl	Dichlorvos	Dimethoate	Demeton-s	Disulfoton	Malathion	Methamidophos	Methidathion	Parathion, methyl	Phorate	Phosmet	Aldicarb	Carbaryl	Carbofuran	Methiocarb	Methomyl	Oxamyl	*Ceriodaphnia dubia*	*Pimephales promelas*	*Hyalella azteca*[1]
Bear Creek @ North Alpine Rd						M														
Mokelumne River @ Bruella Rd	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Duck Creek @ Hwy 4																		M		M
French Camp Slough at Airport Way	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M[2]
Mormon Slough @ Jack Tone Rd																		M		
Terminous Tract Drain @ Hwy 12																				M
Empire Tract @ 8 Mile Rd[4]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Bacon Island Pump @ Old River	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Grant Line Canal @ Clifton Court Rd																				M
Grant Line Canal near Calpack Rd																		M		M
Kellogg Creek along Hoffman Ln																				M
Roberts Island @ Whiskey Slough Pump	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M	A	M
Walthall Slough @ Woodward Ave																				M
Sand Creek @ Hwy 4 Bypass					M															M

A - Assessment Monitoring, conducted monthly.
M - Management Plan Monitoring, conducted during months of past exceedances.
[1] If *H. azteca* survival is 80% or less compared to the control, sediment sample is analyzed for pyrethroids (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, fenpropathrin) and chlorpyrifos.
[2]MPM at sites under Assessment Monitoring in 2013.

Table 71. Detections of potential alternative pesticides during SJCDWQC tributary monitoring from January through September 2014.

Site Name	Sample Date	Analyte	Concentration (µg/L)	WQO (µg/L)
Bacon Island Pump @ Old River	2/11/2014	Dimethoate, Total	0.14	1
French Camp Slough at Airport Way	3/3/2014	Methomyl, Total	0.063	0.52
French Camp Slough at Airport Way	6/17/2014	Methomyl, Total	0.15	0.52
Roberts Island @ Whiskey Slough Pump	7/15/2014	Dichlorvos, Total	0.53 *	0.085

* Detection was in exceedance of the WQTL

There were three samples that were toxic to *Pimephales promelas*, and one sample toxic to *Ceriodaphnia dubia*. There were no sediment samples toxic to *Hyalella azteca.* Toxicity results are listed in detail in Table 33 and discussed in detail in the "Summary of Exceedances" section.

Toxicity to *P. promelas* was observed in samples collected from Empire Tract @ 8 Mile Rd, Bacon Island Pump @ Old River, and Roberts Island @ Whiskey Slough Pump during March 3, 2014. During toxicity testing, accumulation of particulate material in the gills of *P. promelas* was observed. The corresponding water sample also contained a high level of suspended particles, which could be attributed to increased flow from storm runoff throughout the week prior to the sampling event.

Toxicity to *C. dubia* was observed in samples collected at Roberts Island @ Whiskey Slough Pump on July 15, 2014. A TIE indicated that non-polar organics were the cause of toxicity. The PUR data indicated 95 applications of insecticides (primarily pyrethroids) applied over 4,505 acres including alfalfa, potato, corn, wine grapes, walnuts, and watermelon. This toxicity also coincided with an exceedance level detection of dichlorvos (organophosphate).

XIII. A. i. e. *Toxicity Impairment Due to Additive or Synergistic Effects of Multiple Pollutants*

In order to understand whether there is additivity or synergy in toxicity caused by different chemicals in an ambient sample, the Coalition needs to identify the number of toxic units of each chemical in the ambient sample. Based on the chemicals detected in the water column or sediment, and their toxic units, a determination is made of whether the potential cause(s) of the toxicity have been identified. While the Coalition analyzes for numerous pesticides, there are far more applied pesticides than the pesticides included in the water chemistry analyses performed by the laboratories. A full TIE isolates the organic compounds by a solid phase extraction column and then characterizes the compounds by mass spectrometry analysis. The Coalition performs a Phase I and Phase III TIE which allows for the isolation of a compound type (i.e. Non-polar organic, metals) but does not analyze the isolate to identify the specific compound. The cost of a full TIE is quite high and the Coalition found targeted outreach using the results of the Phase I and Phase III TIEs is sufficient. Consequently, unidentified chemicals can remain in the samples.

If all chemicals in a sample were quantified with confidence, and the LC_{50} is available for the test species for all quantified chemicals, it is possible to determine if the toxicity observed is matched by the sum of the toxic units of the chemicals in the sample. If the toxic units are accounted for by the individual chemicals and the chemicals have the same mode of action, the toxicity is additive. If the number of toxic units quantified from the ambient sample is greater than the sum of the toxic units of the quantified chemicals, the chemicals are synergistic or there are additional chemicals in the water that are not identified. If the sum of the toxic units calculated from the concentrations of the chemicals known to be present in the sample is lower than the number of toxic units in the ambient sample determined by toxicity testing, and if there are unknown chemicals in the ambient sample, it cannot be determined if synergy among chemicals is present. It is unlikely that true synergy can be identified given the chemical analyses performed by the Coalition.

The Coalition monitored for toxicity to *C. dubia, P. promelas,* and/or *H. azteca* at tributary sites in the Coalition boundary from January through September 2014 (Table 70). Water column tests with *C. dubia* and *P. promelas* indicated toxicity due to water soluble pesticides. From January through September 2014, there were four instances of toxicity in the water column, and no instances of sediment toxicity. Diazinon and chlorpyrifos were not detected in any of the samples associated with toxicity. A diuron detection below the WQTL was associated with one sample toxic to *S. capricornutum* from Bacon Island Pump @ Old River in March. However, as no other pesticides were detected, there is no way to evaluate for possible additivity or synergy in toxicity caused by different chemicals. Toxicity to *C. dubia* at Roberts Island @ Whiskey Slough Pump in July was associated with an exceedance of dichlorvos.

Since no other pesticide was detected during that event, it is not possible to evaluate for possible additivity or synergy in toxicity caused by the different chemicals.

XIII. A. i. f. *Demonstrate That Management Practices Are Achieving the Lowest Pesticide Levels Technically and Economically Achievable*

A determination of technical and economic feasibility of achieving the lowest pesticide levels possible is assessed at the individual farm level, and consequently is expected to vary with the specific operation and commodity farmed. The goal of the Coalition is for its members to eliminate the discharge of pesticides to surface waters. Economic feasibility is determined by factors outside the control of the Coalition. Profitable operations can afford to implement expensive management practices such as sediment basins or pressurized irrigation. Both of these management practices can significantly reduce runoff of irrigation and storm water carrying agricultural discharges. Marginally profitable operations may not afford these practices. The Coalition publicizes available funding information through the Proposition 84 grant program run by CURES and works with local NRCS offices to notify growers of available EQIP and AWEP funds (refer to Funding Resources section of this report). There are also many growers who are not members of the Coalition, and improvements to their farming operations are not possible through Coalition efforts.

It is possible to reduce discharges to surface waters so that they do not impair beneficial uses. Within the SJCDWQC region, the percentage of samples with exceedance level detections of chlorpyrifos from January through September 2014 was similar to 2013 (1.1% in 2013 vs 1.3% in 2014). Since 2012, there was only one exceedance of chlorpyrifos per year. Exceedances of the WQO for diazinon have not occurred in the Coalition region since 2008. Management practices implemented by growers are resulting in a reduction of discharges, and growers are in the process of achieving the lowest pesticide levels technically and economically achievable.

XIII. A. ii. Salt and Boron TMDL

The *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River* was approved by the US EPA on February 7, 2007 and established load allocations to meet the existing WQOs for salt and boron in the San Joaquin River at Airport Way (Vernalis). The amendment includes a requirement for a second phase TMDL to prepare and implement new salt and boron objectives in the San Joaquin River upstream of Airport Way (Vernalis).

In 2006, the State Water Board, Regional Board and stakeholders initiated the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS), a collaborative effort to develop and implement a salinity and nitrate management program and Basin Plan Amendment. The Central Valley Salinity Coalition (CVSC) formed in July 2008 to organize, facilitate and fund efforts to fulfill goals of CV-SALTS.

The export area, southern, and western Delta waterways and the San Joaquin River (Stanislaus River to Delta Boundary) are within the SJCDWQC region and are 303(d) listed for salt (electrical conductivity). The SJCDWQC recognizes that salt, nitrate, and boron water quality impairments are a Central Valley

wide concern. The Coalition closely follows the planning and reviewing of studies relevant to the development of a Basin Plan amendment for salt and boron and will participate in the efforts concerning the Delta area once the CV-SALTS process is complete. In addition, the Coalition monitored salt as SC in every zone, TDS and nitrate in five zones, and boron in four zones (Table 72). The Coalition includes these constituents in discussions with growers about water quality impairments and applicable management practices.

Table 72. SJCDWQC sites monitored for salts, measured as specific conductance (SC) and total dissolved solids (TDS), nitrate, and boron from January through September 2014.

Zone	Site Name	SC	TDS	Nitrate + Nitrite (as N)	Boron
Zone 1	Bear Creek @ North Alpine Rd	F			
	Mokelumne River @ Bruella Rd	A	A	A	A
Zone 2	Duck Creek @ Hwy 4	F			
	French Camp Slough at Airport Way	A	A	A	A
	Littlejohns Creek @ Jack Tone Rd	F			
	Mormon Slough @ Jack Tone Rd	F			
	Lone Tree Creek @ Jack Tone Rd	F			
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	F			
Zone 3	Terminous Tract Drain @ Hwy 12	C	C	C	
	Drain @ Woodbridge rd	F			
	Empire Tract @ 8 Mile Rd[4]	A	A	A	A
Zone 4	Bacon Island Pump @ Old River	A	A	A	A
	Grant Line Canal @ Clifton Court Rd	F			
	Grant Line Canal near Calpack Rd	F			
	Kellogg Creek along Hoffman Ln	F			
	Roberts Island @ Whiskey Slough Pump	A	A	A	A
Zone 5	Walthall Slough @ Woodward Ave	C	C	C	
Zone 6	Sand Creek @ Hwy 4 Bypass	F			
Delta TMDL	San Joaquin River @ West Neugerbauer Rd	F			
	Old River @ the West End of Clifton Court Rd	F			
	Light House Restaurant @ West Brannon Island Rd	F			

A–Constituent monitored as part of Assessment Monitoring.
C–Constituent monitored as part of Core Monitoring.
F–Constituent monitored as part of field parameter data collected at sites scheduled for MPM.

XIII. A. iii. Dissolved Oxygen TMDL

The EPA approved the *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control Program for Factors Contributing to the Dissolved Oxygen Impairment in the Stockton Deep Water Ship Channel* (hereafter, DO Basin Plan Amendment) on February 27, 2007 to address the low levels of DO in the Stockton Deep Water Ship Channel (DWSC). The Regional Board identifies three contributing factors to DO impairments in the DWSC: 1) loads of oxygen demanding substances from upstream sources, 2) geometry of the DWSC, and 3) reduced flow through the DWSC. All factors are considered equally responsible for reducing DO concentrations in the DWSC. Discharges from irrigated lands are associated with 60% of the load allocation from upstream nonpoint sources.

The Coalition reviews DO monitoring results in the Stockton DWSC and from within its tributaries to assess compliance with the DO WQOs required in the TMDL. The DO Basin Plan Amendment specifies that DO concentrations in the Stockton DWSC shall not be reduced below 5.0 mg/L from December through August and below 6.0 mg/L from September through November in the legal boundaries of the

Delta. Because DO is a field parameter, the Coalition monitors for DO during all scheduled monitoring events. The Coalition will continue to participate in meetings and review technical documents as they are made available.

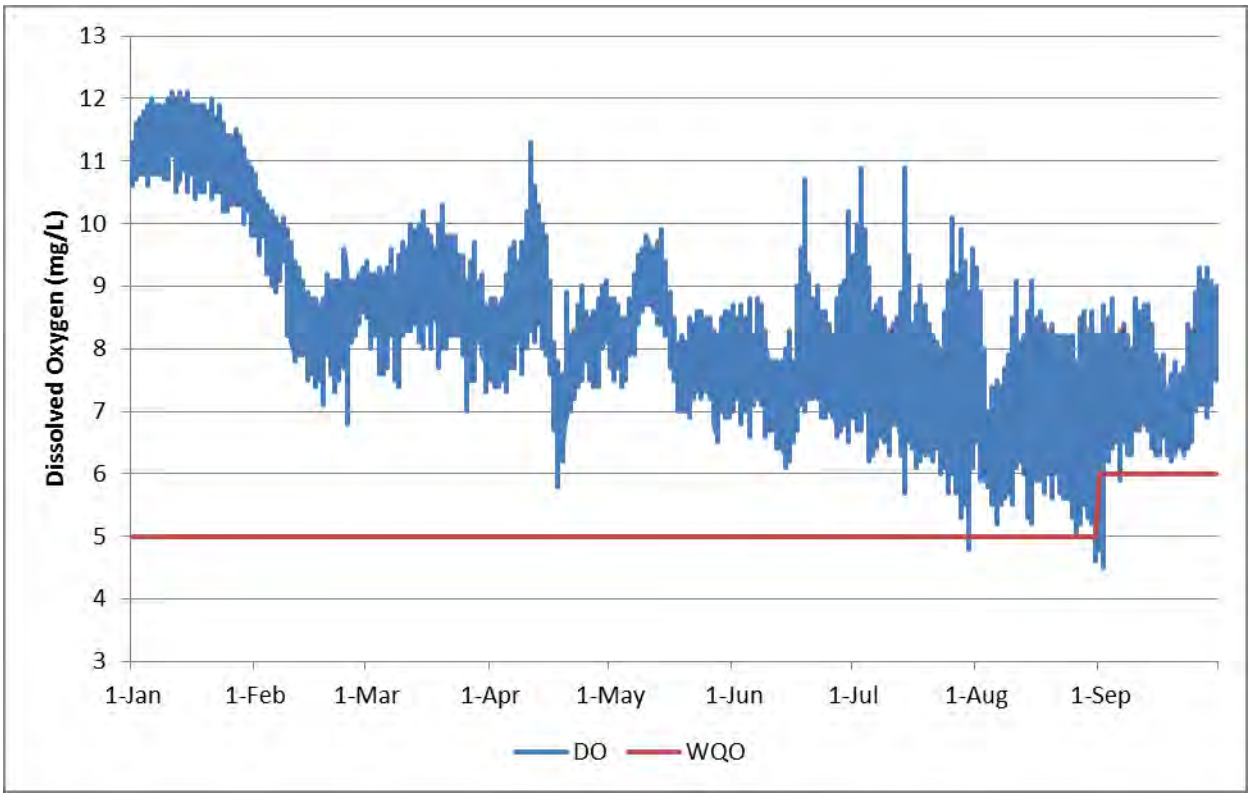
The Coalition reviewed monitoring data from the CDEC Rough and Ready Island station to evaluate DO concentrations in the Stockton DWSC from January through September (Figure 31). This monitoring station is located within the Stockton DWSC and is therefore consistent with the Stockton DWSC Demonstration DO Aeration Facility reports (last report produced in June 2011). Dissolved oxygen measurements occur at the station on 15-minure intervals via an auto sampler.

If a measurement of DO from one or more 15-minute event(s) is less than the WQO, the water quality is defined as non-compliant for the day. There were five days with exceedances of the WQO for DO in the Stockton DWSC from January through September 2014 (Figure 31). A few isolated non-compliant DO concentrations below 5 mg/L occurred in July (3 times) and August (2 times); and there were multiple recurrent non-compliant DO concentrations in September, some over three hours long.

In addition, the Coalition reviewed tributary monitoring results from Zone 2, which contains agriculturally-influenced tributaries that possibly drain to the Stockton DWSC and could contribute oxygen demanding substances. The coalition monitored for DO in Zone 2 at five site subwatersheds in July, August, and September (Table 72), bracketing the non-compliant dates in the Stockton DWSC. DO data was not recorded by the SJCDWQC during the July 15 monitoring event due to sampler error. Among the ten DO measurements conducted between August and September, there were four DO exceedances (Table 73). Two exceedances at Duck Creek @ Hwy 4 (August and September) coincided with very low flow rates (less than 5 ft/s). One exceedance at Littlejohns Creek @ Jack Tone Rd and one in Mormon Slough @ Jack Tone Rd in September occurred despite high flow rates (Table 73). Given the changing flow rates and hydrology, it is unlikely that these low DO levels contributed to the noncompliant measurements of DO in July and August at the Rough and Ready monitoring location.

Figure 31. Rough and Ready Island (RRI) Dissolved Oxygen measurements and WQO from January through September 2014.

Dissolved oxygen is measured at the station on 15-minute intervals by an auto sampler.



Source: CA DWR, n.d.1. Data generated on February 20 2015

Table 73.Dissolved Oxygen (DO) monitoring results and WQO for tributary sites in Zone 2 bracketing the dates of exceedances of the WQO for DO in the Stockton DWSC from January through September 2014.

Exceedances of the DO WQO based on the DWSC criteria are highlighted in bold. An additional sampling event, carried out on July 15, is not included here as DO measurements were missing due to sampler error.

Sample Date	Station Name	Discharge (cfs)	DO (mg/L)	Temperature (C)	Flow rate (ft/s)
8/19/2014	Duck Creek @ Hwy 4	NR	**3.07**	23.2	1-5
8/19/2014	French Camp Slough at Airport Way	24.28	7.35	22.7	5-20
8/19/2014	Lone Tree Creek @ Jack Tone Rd	NR	6.61	21.1	20-50
8/19/2014	Mormon Slough @ Jack Tone Rd	NR	5.02	25.3	0.1-1
8/19/2014	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	11.66	7.6	22.6	5-20
9/16/2014	Duck Creek @ Hwy 4	NR	**3.24**	23.3	NA
9/16/2014	French Camp Slough at Airport Way	33.37	8.23	23.1	20-50
9/16/2014	Littlejohns Creek @ Jack Tone Rd	NR	**2.38**	23	20-50
9/16/2014	Mormon Slough @ Jack Tone Rd	NR	**5.71**	24.9	20-50
9/16/2014	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	6.33	8.09	22.6	5-20

NR – Not recorded; too deep to measure discharge.

The Coalition addresses exceedances of the WQTL for DO through its management plan process. Because the cause of low DO is difficult to determine with the resources currently available to the Coalition, DO is classified as a Priority E constituent. The Coalition includes discussions of DO water quality concerns during general outreach to growers and encourages the implementation of

management practices designed to reduce the offsite movement of agricultural constituents such as fertilizers.

In addition, the Coalition continues to follow developments in achieving WQOs for DO in the Stockton DWSC. The Coalition participated in several DO TMDL Technical Working Group meetings during 2010 to discuss the progress of several studies and pilot programs (2011 MPUR, page 99, Table 28). These include the upper San Joaquin River DO project and the performance of the Aeration Facility, located at the west (downstream) end of Rough and Ready Island at the Port of Stockton. The *Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Aeration Facility Project Final Report* was released in December 2010 and indicates the Aeration Facility is a useful and effective tool to achieve the Basin Plan DO WQO in the DWSC. The Coalition will continue to participate in meetings and review technical documents as they are made available.

XIII. A. iv. Methyl Mercury TMDL

On October 20, 2011, the US EPA approved the *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methyl mercury and Total Mercury in the Sacramento-San Joaquin River Delta Estuary* (hereafter, Methyl Mercury Basin Plan Amendment). The Methyl Mercury Basin Plan Amendment program intends to reduce the amount of methyl mercury in the Sacramento-San Joaquin Delta and to implement through a phased, adaptive management approach. During Phase 1, stakeholders conduct studies and pilot projects to evaluate the effectiveness of management practices to control methyl mercury production and release. The Regional Board will evaluate the outcomes of Phase 1 during the Phase 1 Delta Mercury Control Program Review, which has an expected completion date by October 20, 2020. Phase 2 begins after the Phase 1 Delta Mercury Control Program Review is completed or after October 20, 2022, whichever comes first, and ends in 2030.

The Delta Methyl Mercury TMDL Nonpoint Sources (NPS) Workgroup was formed to provide nonpoint dischargers with an organizational structure to develop collaborative control studies and carry out the actions dictated for Phase 1. Initial funding from a 319(h) planning grant was used to identify the potential management practices and potential study sites, support development of Control Study Workplans, and provide outreach and communications for the existing NPS Workgroup. In April 2012, the Coalition submitted a letter confirming participation in the Phase 1 Methyl Mercury Control Studies through the Methyl Mercury Nonpoint Source Workgroup. Coalition representatives participated in NPS Workgroup and Methyl Mercury TMDL for the Delta Technical Advisory Committee (Methyl Mercury TAC) meetings throughout 2013, and Coalition representative, Mike Wackman, served on the NPS Workgroup Steering Committee. The NPS Workgroup submitted a Methyl Mercury Control Study Workplan on April 19, 2013. There were no additional NPS Workgroup meetings or deliverables scheduled from January through September 2014.

The Delta Mercury Exposure Reduction Program (Delta MERP) is a multi-year effort to reduce human exposure to mercury from eating fish caught in the Sacramento-San Joaquin Delta. Coalition representatives participated in meetings regarding the development of the Delta MERP Strategy

released on November 15, 2012; and participated in the development of the Delta MERP Work Plan submitted in October 20, 2013. The Coalition will incorporate the outcomes of the mercury control plan into its management plan so that members remain in compliance and continue to implement measures to improve water quality.

XIV. SUMMARY OF REQUIRED GROWER SUBMITTALS

The SJCDWQC serves as the third-party group for members of the SJCDWQC within the San Joaquin County and Delta Area. The WDR applies to growers within the area who are members of the SJCDWQC. Table 74 includes a list of all SJCDWQC submittals, approvals, and upcoming due dates related to the WDR programs. Further details on grower reporting requirements and upcoming due dates are outlined in the sections below.

Following the adoption of the WDR on March 12, 2014, the Coalition's Notice of Applicability (NOA) was approved on April 25, 2014. The approval date associated with the NOA starts the timeline for several other submittal requirements, including the submittal and/or comments on templates designed to provide information about management practices of each Coalition member's farming operation (Farm Evaluations, Nitrogen Management Plan, Sediment and Erosion Control Plan), the Groundwater Quality Assessment Report (GAR), and MPU.

Comments on the Farm Evaluation template were submitted on July 7, 2014. The Coalitions Farm Evaluation template was approved August 21, 2014. The Groundwater Quality Assessment Report (GAR) outline was approved at the December 22, 2014 meeting with the Regional Board. Phase 1 and 2 of the GAR was submitted on April 25, 2015 (approval pending). The Coalitions submitted the Management Practice Evaluation Plan (MPEP) group agreement on January 14, 2014 (approved March 13, 2014). The approval was followed by identifying technical experts (September 23, 2014), identifying the Program Administrator (November 1, 2014), and Conceptual Design meeting (December 11, 2014). The Coalition's Nitrogen Management Plan template (submitted April 11, 2013 and resubmitted December 18, 2014) was approved for all Coalitions on December 23, 2014. The Sediment and Erosion Control Assessment Report was submitted on April 25, 2015 (approval pending). The Coalition's MPU for the 2015 WY was submitted August 1, 2014 and resubmitted October 7, 2014 (approved on January 5, 2015).

Table 74. SJCDWQC WDR related due dates, submittals, and approvals.
The SJCDWQC WDR (R5-2014-0029) was approved March 12, 2014.

Document Description	Submittal/ Due Date	Approval Date
Notice of Applicability-third party application	April 11, 2014	April 25, 2014
Notice of Confirmation to Members	May 25, 2014	NA
Member Confirmations	June 15, 2014	NA
Member List	July 31, 2014	NA
Non-members Sign Up	August 23, 2014	NA
2015 MPU	August 1, 2014 October 7, 2014	January 5, 2015
Farm Evaluation Template (All Coalitions)	April 11, 2013 December 6, 2013	December 9, 2013
Farm Evaluation Template Comments	July 7, 2014	August 21, 2014
Farm Evaluation (High Vuln Areas-all members)	Due June 15, 2015 Report May 1,2016	NS
Farm Evaluation (Low Vuln Area-all members)	Due June 15, 2015 Report May 1,2016	NS

Document Description	Submittal/ Due Date	Approval Date
GAR Outline	July 24, 2014	Approved at December 22, 2014 meeting with Regional Board
Groundwater Quality Management Plan	60days after GAR approval	NS
Groundwater Quality Assessment Report (Phase 1 and 2)	April 25, 2015	Approval Pending
Groundwater Quality Trend Monitoring Workplan (Phase1 and 2)	1yr after GAR approval	NS
Groundwater QAPP for Trend Monitoring	1yr after GAR approval	NS
Groundwater QAPP for MPEP	2yrs after GAR approval	NS
MPEP- Group Agreement	January 14, 2014	March 13, 2014 (conditional approval)
MPEP- Identify Technical Experts	September 23, 2014	NA
MPEP- Identify Program Administrator	November 1, 2014	NA
MPEP- Conceptual Design Meeting	February 4, 2015	NA
MPEP- Conceptual Study Design submitted for discussion	June 4, 2015	NS
MPEP- Draft Workplan	March 1, 2016	NS
MPEP- Final Workplan	June 4, 2016	NS
Nitrogen Management Plan Template (All Coalitions)	April 11, 2013, December 18, 2014	December 23, 2014
Nitrogen Management Plan Certified (HVA GW)	June 15, 2015 and June 15, 2016[1]	NA
Nitrogen Management Plan Summary Report (HVA GW)	June 15, 2016	NA
Nitrogen Management Plan (low vulnerability)	June 15, 2017	NA
Sediment Discharge and Erosion Control Plan Template (All Coalitions)	April 11, 2013	Approval Pending
Sediment Discharge and Erosion Assessment Report	April 25, 2015	Approval Pending
Inform members required to prepare Sediment Plans	30 days from approval	NS
Sediment Discharge and Erosion Control Plan	180 days from approval	NS

NA-Not applicable
NS-Not submitted yet
HVA – High Vulnerability Areas
GW – Groundwater
SW – Surface water
[1]- On January 26, 2015 the Coalition submitted a request to extend the due date for members in High Vulnerability areas to have NMP certified from June 15, 2015 to June 15, 2016 (approved April 16-17, 2015).

XIV. A. FARM EVALUATIONS

The SJCDWQC WDR requires that all Coalition members complete a Farm Evaluation by June 15, 2015. The Farm Evaluation is intended to gather information on general site conditions and management practices that members currently have in place to protect surface and groundwater quality (Farm Evaluation Template for all Coalitions was approved December 9, 2013, comments submitted July 7, 2014, and approved August 21, 2014).

The Farm Evaluations are designed to collect the following information:

1. identification of crops grown and acreage of each crop,
2. geographical location of the member's farm,
3. identification of on-farm management practices implemented to achieve the WDR farm management performance standards,
4. identification of whether or not there is the potential for movement of soil during storm events and/or during irrigation (sediment and erosion risk areas) and a description of where this occurs,
5. identification of whether or not water leaves the property and is conveyed downstream and a description of where this occurs,
6. location of active wells and abandoned wells, and
7. identify if wellhead protection and backflow prevention devices have been implemented.

Members are also required to provide information on any outreach events they attended in the last year. Farm Evaluations are designed to describe how each member implements management practices to protect water quality while trend data are collected through monitoring. Management practices that are designed to protect the quality of groundwater should be implemented, where applicable, by members in high or low vulnerability areas. Information attained from Farm Evaluations describes how each member is implementing management practices to protect the quality of groundwater and surface water; water quality trend data are collected through monitoring. Data from the Farm Evaluations can be used to evaluate changes in surface water quality relative to changes in management practices.

The Farm Evaluations contain four different sections with questions specific to both surface and groundwater management practices, 1) whole farm evaluation, 2) specific field evaluation, 3) irrigation well information, and 4) sediment and erosion control practices.

Members complete their Farm Evaluation as prioritized by whether they are in a high or low vulnerability area. Table 74 includes the Farm Evaluation submittal deadlines for high and low vulnerability areas. The focus on high vulnerability areas is to determine where surface and/or groundwater quality are most impacted. All SJCDWQC members within high vulnerability areas must submit a Farm Evaluation annually by June 15 annually. Low vulnerability farming operation areas have a reporting frequency of every five years (Table 74). Data obtained from the Farm Evaluations will be assessed in the May 1, 2016 Annual Report.

XIV. B. GROUNDWATER QUALITY ASSESSMENT REPORT/ EVALUATION, AND MONITORING WORKPLANS

For groundwater protection, the WDR requires 1) a Groundwater Quality Assessment Report (GAR), 2) a Management Practices Evaluation Program, 3) a Groundwater Quality Trend Monitoring Program, and 4) a Groundwater Quality Management Plan. Table 74 includes all deadlines associated with the GAR and Monitoring Workplans.

XIV. B. i. Groundwater Quality Assessment Report

Upon receipt of the April 25, 2014 approval of the NOA, the timeline for several requirements began, including the requirement that three months after, "the third-party will provide a proposed outline of the GAR to the Executive Officer that describes the data sources and references that will be considered in developing the GAR." The Coalition submitted the GAR outline on July 24, 2014. Originally anticipated to be submitted in two parts corresponding to the Delta and non-Delta areas, the GAR covering both areas was submitted on April 25, 2015 (approval pending; Table 74). The GAR was prepared in accordance with the outline submitted to the Regional Board on July 24, 2014 and contains details on the approach and methods applied to determine high and low vulnerability areas in the SJCDWQC region. The Coalition's Groundwater Quality Management Plan is due 60 days after the approval of the GAR.

The GAR is designed to provide information necessary for the design of the Management Practices Evaluation Program, the Groundwater Quality Trend Monitoring Program, and the Groundwater Quality Management Plan. Therefore, the GAR includes the following:

1. An assessment of available, applicable, relevant data, and information to determine high/low vulnerability areas where irrigated land discharge may affect groundwater quality,
2. priorities for implementation of monitoring and studies within high vulnerability areas,
3. the basis for establishing workplans to assess groundwater quality trends,
4. the basis for establishing workplans and priorities to evaluate the effectiveness of agricultural management practices to protect groundwater quality, and
5. provide a basis for establishing groundwater quality management plans in high vulnerability areas and priorities for implementation of those plans.

XIV. B. ii. Management Practices Evaluation Program

As a coordinated group effort with the East San Joaquin and Westside Water Quality Coalitions, the Coalition is developing a Management Practices Evaluation Program (MPEP) Workplan. The overall goal of the MPEP is to determine whether various management practices used by irrigated agriculture are protective of groundwater. The MPEP must address the conditions relevant to high vulnerability groundwater areas. Associated submittals/approvals and upcoming due dates are included in Table 74 above.

XIV. B. iii. Groundwater Quality Trend Monitoring Workplan

Within one year of the approval of the GAR, the Coalition is required to develop a Groundwater Quality Trend Monitoring Workplan (Table 70). Originally anticipated to be a two phase process, the completion of the Groundwater Quality Trend Monitoring Program will be provided in a single submission. The overall objectives of groundwater trend monitoring are to 1) determine the current water quality conditions of groundwater relevant to irrigated agriculture, and 2) develop long-term groundwater quality information for evaluation of the regional effects of irrigated agricultural practices.

XIV. C. NITROGEN MANAGEMENT PLAN

Coalition members are required to prepare and implement a Nitrogen Management Plan (NMP) and submit a Nitrogen Management Plan Summary Report for the previous crop year. The NMP template was developed with all of the Central Valley coalitions and was approved on December 23, 2014. The NMP Summary Report template will be developed based on recommendations from the NMP Technical Advisory Work Group (NMP TAWG). All members within groundwater high vulnerability areas must complete and maintain their NMP at their farming operation headquarters or primary place of business by June 15, 2015. On February 19, 2015 the Regional Board issued a memo requesting that the Coalitions submit several documents related to the NMPs; 1) a technical advisory work group description (submitted March 16, 2015), 2) a document or timeline related to the reference guidance documents used by growers and certifiers for the NMPs (due December 18, 2015), and 3) a Crop Nitrogen Knowledge Gap Study Plan with workplan and milestone schedules (due December 18, 2015).

Groundwater high vulnerability areas are identified in the WDR as:

1. areas where groundwater quality impairments exist and irrigated agriculture is a potential contributor,
2. areas where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities, or
3. areas that meet any of the following requirements:
    a) An exceedance of the WQTL for nitrogen occurs in groundwater and irrigated agriculture may have contributed to the exceedance,
    b) Basin Plan requires development of groundwater quality management plan for constituents discharged by agriculture, or
    c) The Executive Officer determines irrigated agriculture may be causing groundwater impairments that may threaten beneficial uses.

All submittal/approval dates associated with the NMP are included in Table 74 above.

XIV. D. SEDIMENT DISCHARGE AND EROSION CONTROL PLAN

All Coalition members are required to implement effective sediment discharge and erosion prevention practices. The Coalition is required to provide an assessment report to determine areas susceptible to

erosion and discharge of sediment that could impact receiving water. All submittal/approval dates associated with the Sediment and Erosion Control Plan are included in Table 74. The East San Joaquin Water Quality Coalition, on behalf of all Coalitions, submitted a Sediment Erosion Control Plan Template on April 11, 2013. The SECP template was distributed for public comment and the coalitions have reviewed those comments including Regional Board staff suggestions. The coalitions are still revising the SECP template and are working with Regional Board staff to ensure that the SDECP template is adequate for documenting practices that are protective of water quality.

The Coalition submitted the Sediment Discharge and Erosion Assessment Report (SDEAR) on April 25, 2015 (approval pending). The SDEAR identifies the areas within the SJCDWQC region where growers will be required to complete Sediment and Erosion Control Plans (SECPs). In addition, the Farm Evaluations include questions which address erosion potential and allow members to self-identify as potential dischargers of sediment to surface waters. Members identified as having high potential to discharge sediment are required to prepare a SECP in one of the following ways:

1. The sediment and erosion control plan must adhere to the site-specific recommendation from the Natural Resources Conservation Service (NRCS), NRCS technical service provider, the University of California Cooperative Extension, the local Resource Conservation District; or conform to a local county ordinance applicable to erosion and sediment control on agricultural lands. The Member must retain written documentation of the recommendation provided and certify that they are implementing the recommendation; or
2. The plan must be prepared and self-certified by the Member, who has completed a training program that the Executive Officer concurs provides necessary training for sediment and erosion control plan development; or
3. The plan must be written, amended, and certified by a qualified professional possessing one of the registrations (Table 7, Page 33 in the WDR); or
4. The plan must be prepared and certified in an alternative manner approved by the Executive Officer. Such approval will be provided based on the Executive Officer's determination that the alternative method for preparing the plan meets the objectives and requirements of this Order.

Therefore, within 30 days of the approval of the SDEAR, the Coalition will contact members located in areas identified as having a high potential for erosion and request that those members complete the SECP. The document must be maintained onsite at the member's farming operation, updated as conditions change, and be accessible by the Regional Board staff if requested during inspections. Members located in areas with high potential for erosion are required to complete and implement a SECP within 180 days of the approval of the SDEAR (Table 74).

XIV. E. MITIGATION MONITORING REPORT

As stated on Page 10 of the WDR, environmental impacts may occur as a result of member's compliance activities. Members are therefore required to either avoid the impacts where feasible or implement identified mitigation measures, if any, to reduce the potential impacts. Where avoidance or implementation of identified mitigation is not feasible, use of the WDR is prohibited and individual

WDRs would be required. The MRP Order, Attachment B, includes a Mitigation Monitoring and Reporting Program for tracking the implementation of mitigation measures. Any California Environmental Quality Act (CEQA) mitigation measures implemented and reported by SJCDWQC members (including the impact measures addressed, location (TRS), and monitoring scheduled to measure the success of mitigation) would be reported May 1 annually. There were no mitigation measures implemented during the reporting period.

XV. PROGRAMMATIC QUESTIONS

The following sections provide responses to the six key programmatic questions outlined in the WDR using water quality information obtained during January through September 2014 monitoring. The Coalition utilizes monitoring data as well as management practice information to make its conclusions. Water quality within the Coalition region was determined using monitoring data from January through September 2014 collected from Assessment, Core, and MPM sites. These data indicate generally that water quality improvements are continuing across the Coalition region.

XV. A. QUESTION 1: ARE RECEIVING WATERS TO WHICH IRRIGATED LANDS DISCHARGE MEETING APPLICABLE WATER QUALITY OBJECTIVES AND BASIN PLAN PROVISIONS?

The CVRWQCB has determined that waters of the State receiving discharge from irrigated lands must be protective of all beneficial uses (BUs) including ones for Agricultural Supply (AG), Aquatic Life (AQ, including cold freshwater habitat spawning, warm freshwater habitat and freshwater habitat), Water Contact Recreation (REC 1), and Municipal and Domestic Supply (MUN or Municipal). Waters of the State are considered protected if no exceedances of constituent-specific WQTLs occur during monitoring events. Table 75 lists the constituents monitored by the Coalition and the BUs impaired by exceedances of the WQTLs of the constituents during the 2014 reporting period. Figure 32 includes percentages of impaired BUs based on Coalition wide monitoring results from January through September 2014.

BUs are listed in the Basin Plan by waterbody, but do not include all of the Coalition's monitoring sites. Therefore, BUs for Coalition monitoring sites are applied based on those assigned to the most immediate downstream waterbody (tributary rule). However, the tributary rule does not apply to constructed agricultural drains such as those found in the Delta islands. Table 76 includes a summary of when Coalition water quality monitoring at specific sites was protective of beneficial uses from 2008 through 2014.

XV. A. i. Protection of Beneficial Uses

Results from monitoring program from January through September 2014 indicate improvement in water quality in the Coalition region. The number of exceedances of pesticides declined between 2013 (3) and through September 2014 (0). The most common exceedances in 2014 were physical parameters (DO and SC) which resulted in impaired Agricultural and Aquatic Life BUs (Table 75 and Figure 32). The bacterium, E. coli, is the only constituent that causes impairment to the Water Contact Recreational BU. Even though some improvements are evident from 2014 monitoring results, water quality is still not completely protective of all BUs across the Coalition region.

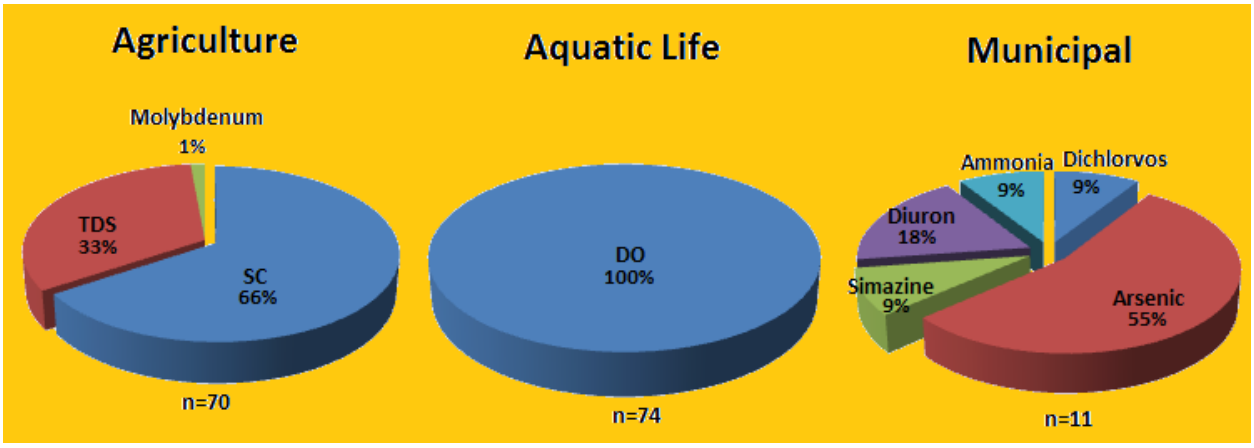
Table 75. Number of times constituents impaired beneficial uses in 2014.

Beneficial Use	DO	SC	TDS	*E. coli*	Dichlorvos	Diuron	Molybdenum	Simazine	Total Metals (Arsenic)	Total
AQ Life	74									**74**
AG		46	23				1			**70**
MUN					1	2		1	6	**10**
REC 1				9						**9**

AQ Life-Aquatic Life (includes cold freshwater habitat spawning, warm freshwater habitat and freshwater habitat)
AG-Agricultural
MUN-Municipal and Domestic Supply
REC 1-Water Contact Recreation

Figure 32. Percentages of impairments of beneficial uses due to exceedances of constituent specific WQTLs through September 2014.

Aquatic Life includes all categories (cold freshwater habitat spawning, warm freshwater habitat and freshwater habitat).



n-Total number of exceedances per each beneficial use.

XV. A. ii. Agricultural BU

Monitoring results from 2014 indicate that elevated levels of SC and TDS were the major parameters resulting in impairments to the Agricultural BU; there was also one occurrence where molybdenum caused impairment to the Agricultural BU (Figure 32). High salinity levels resulting in exceedances of WQTLs for SC and TDS are common in Delta islands (Zones 3 and 4) due to 1) tidal influence, and 2) hydrostatic pressure moving Delta water to the interior of the islands and/or the use of Delta water for irrigation. Parameters such as SC and TDS can increase or decrease as water moves downstream depending on additional sources of water and salt including groundwater accretions, concentrations of these parameters vary seasonally with the source water in the waterbodies. Managing the concentrations of salts is beyond the scope of what the Coalition can control through agricultural management practices and is the focus of the Valley-wide CV-SALTS process.

XV. A. iii. Aquatic Life BU

From January through September 2014, exceedances of the WQTLs for DO contributed to 100% of the impairments to Aquatic Life BUs (Figure 32). Exceedances of the WQTL for DO occurred at least once at every site with the exception of Mokelumne River @ Bruella Rd (Appendix III, Table III-2A). Non-conserved parameters such as DO can increase or decrease in concentration as water moves downstream. Processes occurring on the land surface, in the water column, and in the sediment can reduce the concentration of DO. Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, geography (region, morphology of stream channels and land surface, and patterns of flow) as well as excessive nutrients resulting in algal growth and decomposition. During education and outreach, growers in the Coalition region receive recommendations to implement management practices designed to prevent the offsite movement of constituents and sediment into waterways by reducing irrigation tailwater and storm runoff. As growers implement management practices to reduce discharge, the amount of water flowing into tributaries is reduced. This affects flow and potentially reduces the DO concentrations in the water.

XV. A. iv. Municipal and Domestic Supply BU

Exceedances of the WQTLs for arsenic (55%), diuron (18%), ammonia (9%), dichlorvos (9%), and simazine (9%) caused impairment to Municipal and Domestic Supply beneficial use in 2014 (Figure 14). The Coalition region naturally contains higher levels of arsenic in the soil (Burow et al., 2004; Moran et al., 2009; Westcot et al., 1990). Therefore, any processes moving sediment into the water or simply the movement of water through the surface soils could have contributed in the exceedances that occurred in the Coalition region. Exceedances of the WQTL for diuron occurred twice, and once for each of ammonia, dichlorvos, and simazine; the Coalition attempted to source the exceedances in the Summary of Exceedances section in this report.

XV. A. v. Overall Frequency of Exceedances

A trend of improving water quality in the Coalition region is evident from 2008 through 2014, where monitoring data indicate a significant decrease in frequency of exceedances of WQTLs of high priority constituents. For applied pesticides (chlorpyrifos, copper, and diazinon), exceedances decreased from 12% (44 exceedances) in 2008 to 0% in 2014 (Table 78). Growers in high priority subwatersheds have implemented management practices that were successful in reducing exceedances of the WQTLs for metals, herbicides, and pesticides.

Improvements in water quality are most noticeable in high priority subwatersheds where concentrations of constituents monitored in the water column and sediment were consistently protective of assigned BUs in recent years (Table 76). Even when detected, constituents measured at these sites were protective of Agriculture and Municipal BUs over the last four years (since additional outreach began).

Waste discharged from irrigated lands is one of many possible sources of impairments of BUs. In many instances, natural conditions or other sources could cause impairments in waterways monitored by the

Coalition. Water quality protective of beneficial uses within Coalition boundaries may not depend exclusively on the Coalition efforts alone; other dischargers may need to improve the management of their operations. The difference in geology and geography between Coalition zones influences monitoring results for constituents such as DO, SC, and TDS. Monitoring sites in Zones 3 and 4 are located in an area where high salinity levels are common, resulting in exceedances of the WQTLs for SC and TDS and, subsequently, causing impairments of the Agriculture BU (Table 76). Sites in Zones 3 and 4 naturally contain higher levels of arsenic in the soil (Burow et al., 2004; Moran et al., 2009; Westcot et al., 1990), resulting in exceedances of the WQTL for arsenic and, thus, causing impairments to Municipal BU (Table 76). These geological and geographical factors are outside the scope of what the Coalition is capable of improving through modified agricultural practices.

Table 76. Evaluation of beneficial uses for 2008-2014 monitoring locations (alphabetical by Zone).

'X' indicates no sampling occurred during the specified year. Blue highlights indicate a protected BU in 2014 when the same BU and monitoring site was impaired in one or more previous years.

Zone	Monitoring Site (High Priority Year)	Immediate Downstream Waterbody	Beneficial Use Immediate Downstream Waterbody	Status 2008 Meets BUs?	Status 2009 Meets BUs?	Status 2010 Meets BUs?	Status 2011 Meets BUs?	Status 2012 Meets BUs?	Status 2013 Meets BUs?	Status 2014 Meets BUs?
1	Bear Creek @ North Alpine Rd (2013-2015)	Sacramento San Joaquin Delta	MUN	Yes	X	X	Yes	Yes	Yes	Yes
			AG	Yes	X	X	Yes	Yes	Yes	Yes
			REC 1	No	X	X	No	X	X	X
			AQ Life	Yes	X	X	No	No	Yes	No
1	Mokelumne River @ Bruella Rd (2011-2013)	Mokelumne River (Camanche Res to Delta Reach)	MUN	Yes	No	Yes	Yes	Yes	Yes	Yes
			AG	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	No	Yes	No	No	No	Yes
			AQ Life	No	No	Yes	Yes	Yes	Yes	Yes
2	Duck Creek @ Hwy 4 (2008-2010)	Sacramento San Joaquin Delta	MUN	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			AG	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	X	X	X	No	X	X
			AQ Life	No	No	No	No	No	No	No
2	French Camp Slough @ Airport Way (2011-2013)	Sacramento San Joaquin Delta	MUN	No	Yes	Yes	Yes	Yes	Yes	No
			AG	Yes	No	Yes	Yes	Yes	Yes	Yes
			REC 1	No	No	No	No	No	No	No
			AQ Life	No	No	No	No	No	No	No
2	Littlejohns Creek @ Jack Tone Rd (2010-2012)	San Joaquin Delta	MUN	Yes	X	Yes	Yes	Yes	Yes	Yes
			AG	Yes	X	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	X	X	X	X	X	X
			AQ Life	No	X	No	No	No	No	No
2	Lone Tree Creek @ Jack Tone Rd (2008-2010)	Sacramento San Joaquin Delta	MUN	No	Yes	Yes	Yes	Yes	Yes	Yes
			AG	No	Yes	Yes	Yes	No	Yes	Yes
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	No	No	Yes	Yes	No	No
2	Mormon Slough @ Jack Tone Rd (2012-2014)	Sacramento San Joaquin Delta	MUN	No	X	X	Yes	Yes	Yes	Yes
			AG	Yes	X	X	Yes	Yes	Yes	Yes
			REC 1	Yes	X	X	X	X	X	X
			AQ Life	No	X	X	No	No	No	No
2	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (2008-2010)	Sacramento San Joaquin Delta	MUN	No	Yes	Yes	Yes	No	Yes	Yes
			AG	No	Yes	Yes	No	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	No	No	No	No	No	No
3	Drain @ Woodbridge Rd (2014-2016)	Sacramento San Joaquin Delta	MUN	No	No	No	X	X	Yes	No
			AG	No	No	No	X	X	Yes	Yes
			REC 1	No	Yes	No	X	X	X	X
			AQ Life	No	No	No	X	X	No	No
3	Empire Tract @ 8 Mile Rd	Sacramento San	MUN	X	X	X	X	X	No	No

Zone	Monitoring Site (High Priority Year)	Immediate Downstream Waterbody	Beneficial Use Immediate Downstream Waterbody	Status 2008 Meets BUs?	Status 2009 Meets BUs?	Status 2010 Meets BUs?	Status 2011 Meets BUs?	Status 2012 Meets BUs?	Status 2013 Meets BUs?	Status 2014 Meets BUs?
	(2015-2017)	Joaquin Delta	AG	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	No	No
			AQ Life	X	X	X	X	X	No	No
3	Terminous Tract Drain @ Hwy 12 (2011-2013)	Sacramento San Joaquin Delta	MUN	No	Yes	No	Yes	No	No	Yes
			AG	No	No	No	No	No	No	No
			REC 1	No	No	No	No	No	No	No
			AQ Life	No	No	No	No	No	No	No
4	Bacon Island Pump @ Old River (2016-2018)	San Joaquin Delta	MUN	X	X	X	X	X	X	No
			AG	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	No
			AQ Life	X	X	X	X	X	X	No
4	Grant Line Canal @ Clifton Court Rd (2010-2012)	San Joaquin Delta	MUN	No	X	Yes	Yes	Yes	Yes	Yes
			AG	No	X	No	No	No	No	No
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	No	No	No	No	No
4	Grant Line Canal near Calpack Rd (2010-2012)	San Joaquin Delta	MUN	No	X	Yes	Yes	Yes	Yes	Yes
			AG	No	X	No	No	No	No	No
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	No	No	No	No	No
4	Kellogg Creek along Hoffman Ln (2012-2014)	Sacramento San Joaquin Delta	MUN	No	X	X	Yes	Yes	Yes	Yes
			AG	Yes	X	X	No	Yes	Yes	No
			REC 1	Yes	X	X	X	X	X	X
			AQ Life	No	X	X	No*	No	Yes	No
4	Roberts Island @ Whiskey Slough Pump (2013-2015)	Sacramento San Joaquin Delta	MUN	X	X	X	X	No	Yes	No
			AG	X	X	X	X	No	No	No
			REC 1	X	X	X	X	No	Yes	No
			AQ Life	X	X	X	X	No	No	No
5	Walthall Slough @ Woodward Ave (2013-2015)	Sacramento San Joaquin Delta	MUN	X	No	No	No	No	No	Yes
			AG	X	No	No	No	No	No	No
			REC 1	X	No	No	No	Yes	Yes	No
			AQ Life	X	No	No	No	No	No	No
6	Sand Creek @ Hwy 4 Bypass (2012-2014)	Sacramento San Joaquin Delta	MUN	No	X	X	No	No	Yes	Yes
			AG	No	X	X	No	No	No	No
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	X	No	No	No	No

AG- Agriculture
AQ Life- Aquatic Life (cold freshwater habitat spawning, warm freshwater habitat and freshwater habitat).
MUN- Municipal and Domestic Supply
REC 1- Water Contact Recreation
X-Site was not scheduled for sampling during the year.

*Does not meet BUs requirements due to sediment toxicity to *H. azteca* in one or more occurrences.

XV. B. QUESTION 2: ARE IRRIGATED AGRICULTURAL OPERATIONS CAUSING OR CONTRIBUTING TO IDENTIFIED WATER QUALITY PROBLEMS? IF SO, WHAT ARE THE SPECIFIC FACTORS OR PRACTICES CAUSING OR CONTRIBUTING TO THE IDENTIFIED PROBLEMS?

For many parameters, it is not clear to what extent exceedances of WQTLs are related to agricultural activities that could result in offsite movement of farm inputs and sediment into waterways. Most exceedances are for parameters that are not applied by irrigated agriculture or which may originate from numerous sources in addition to irrigated agriculture. Source identification is difficult, especially for non-conserved constituents and constituents with numerous potential sources. There are many non-conserved constituents that are untraceable upstream, e.g. DO and pH. Even in pristine watersheds, exceedances of the WQTLs of these constituents may occur during normal, diurnal stream processes. Monitoring results from locations within the Delta (Zones 3 and 4) indicate numerous exceedances of the WQTLs for SC and TDS. The presence of elevated levels of SC and TDS in samples comes from 1) tidal influence, and 2) hydrostatic pressure moving Delta water to the interior of Delta islands and/or the use of Delta water for irrigation. Many of the exceedances in the Delta occur as a result of the type of water management that must be employed on the islands. Water for irrigation or winter weed control is brought into the Delta islands from the Delta channels. In addition, for Delta islands located below sea level, the hydrostatic pressure from the Delta channels drives water into the islands where it is collected in the interior drain channels. The water is salty with SC values at many Delta locations (e.g. Grant Line Canal sites) reaching over 2000 µS/cm. In order for the water table to be lowered sufficiently to allow farming, water must be discharged back to the Delta. This water is not recirculated and must be discharged leading to the potential for exceedances of WQTLs for SC and pesticides. Consequently, monitoring in Delta locations may result in exceedances of WQTLs from normal farming practices. Those practices will have to be managed and modified to reduce the potential for discharges which may impair beneficial uses.

Agricultural applications of pesticides and herbicide may result in pesticides entering surface waters due to drift or runoff in stormwater or irrigation return flows. From January through September 2014, there were two exceedances of the WQTL for diuron, one exceedance of the WQTL for dichlorvos, and one exceedance of the WQTL for simazine. The exceedances of WQTL for diuron and simazine occurred at French Camp Slough @ Airport Way, a site in Zone 2, during storm monitoring. The second exceedance of the WQTL for diuron occurred at Bacon Island Pump @ Old River, a site in Zone 4, during Assessment Monitoring. The exceedance of the WQTL for dichlorvos occurred during Assessment Monitoring at Roberts Island @ Whiskey Slough Pump. There were no other exceedances of the WQTL for pesticides or herbicides within the SJCDWQC coalition boundary.

XV. C. QUESTION 3: ARE WATER QUALITY CONDITIONS CHANGING OVER TIME (E.G., DEGRADING OR IMPROVING AS NEW MANAGEMENT PRACTICES ARE IMPLEMENTED)?

Monitoring results indicate water quality is improving in the region and the number of exceedances of applied pesticides and metals is decreasing. The percentage of exceedances of applied pesticides very slightly decreased in 2014 compared to 2012 (Table 77). From January through September 2014, there were no exceedances of the WQTL for metals applied by agriculture (Table 77). The Coalition anticipates further improvements in water quality at high priority management plan locations in the future due to increased education, outreach, and implementation of management practices.

Figure 33 includes the percentages of exceedances from 2008 through 2014 by constituent category. Toxicity resampling events and exceedances from 2008 upstream MPM conducted as part of source evaluation were not included in the calculation. From 2008 through September 2014, the majority (61%) of exceedances were from field parameters (DO, pH, and SC) in the Coalition region. The second highest category with exceedances is nutrients, physical parameters, and *E. coli* (bacteria), accounting for 22% of all exceedances from 2008 through 2014 (Figure 33).

The percentage calculations of exceedances of constituents in Table 77 include only the exceedances of pesticides and metals currently applied by agriculture. Metals applied by agriculture are copper and zinc; however, Figure 15 only includes copper exceedances because copper was the only applied metal to be detected above the hardness based WQTL at sites in the Coalition region from 2008 through September 2014. The most notable decline in metals exceedances occurred from 2008 through 2009. Before October 2008, the concentration of dissolved metals was determined by performing a calculation based on total metals concentrations. In October 2008, the Coalition initiated focused grower outreach and education, management practice implementation, and began analyzing for both the total and hardness based dissolved fractions of metals to better characterize contamination in the water column. Dissolved metals more accurately reflect the bioavailable, and therefore the toxic fraction in the water column. Since the Coalition adopted this method for analyzing dissolved metals, exceedances of the hardness based WQTLs of metals have declined.

The source of the copper causing the exceedances of the WQTL is not known but the relatively restricted geographic areas of exceedances, and the broader distribution of applications to the same commodities argues for a natural source rather than an anthropogenic cause. However, Coalition representatives are discussing management practices with growers that should result in reductions of dissolved copper if the exceedances of the hardness based WQTL for copper are indeed the result of applications of pesticides containing copper. Similar discussions with growers have been successful in reducing exceedances of the WQTL for various pesticides. Since focused outreach began in 2008, exceedances of the hardness based WQTL for copper declined and remained relatively low through the years, despite a consistency in applications over time at some locations. There were no exceedances of the hardness

based WQTL for copper in 2014 (51 samples analyzed) which is a decline from 2012 when one exceedance occurred out of 84 samples analyzed (Table 77).

The most significant decline in exceedances of the WQTLs for applied pesticides occurred directly after initial outreach and education began between 2008 and 2009 (Figure 33; Table 77). Overall, it is evident that exceedances of the WQTLs for applied pesticides since 2009 are declining. In 2014, only 0.4% of the samples analyzed for applied pesticides contained concentrations exceeding the WQTLs (Table 77). This is a substantial improvement over previous years, where 2.0% (2011) and 1.4% (2010) of the samples collected resulted in exceedances of the WQTLs for applied pesticides (Table 77).

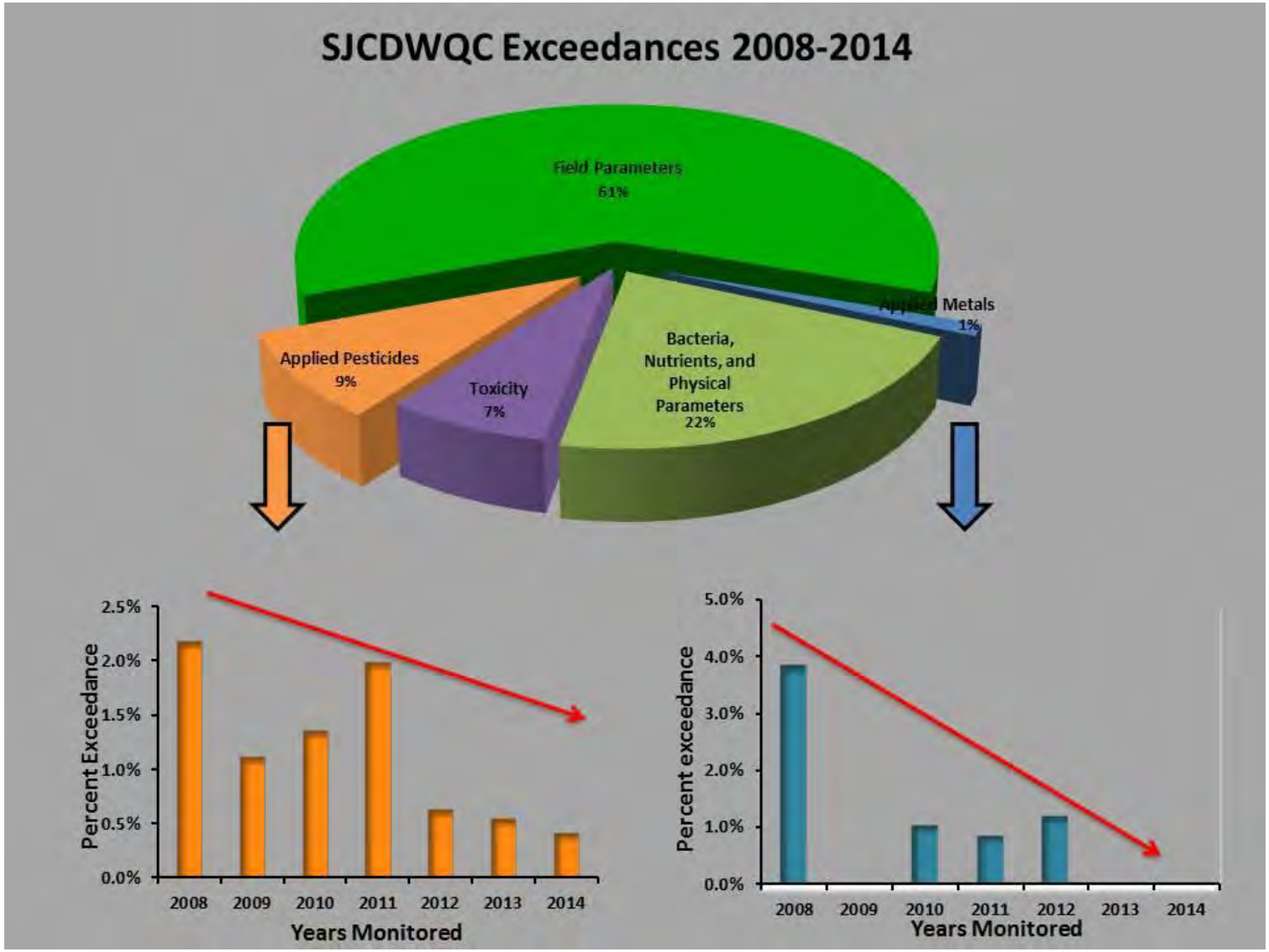
Coalition general outreach and education are ongoing. High priority focused outreach is now complete in the first through fifth high priority subwatersheds. Additional grower outreach occurred in the first and second priority subwatersheds in 2010 and 2012 to educate growers on water quality impairments within the subwatersheds. Growers in priority subwatersheds implemented management practices and water quality has improved substantially in these subwatersheds. Not only have exceedances of high priority constituents been reduced since outreach was initiated, but exceedances of other constituents and water column toxicity have declined as well.

Table 77. Percentages of exceedances of WQTLs for applied metals and applied pesticides from 2008-September 2014.

	Applied Metals			Applied Pesticides		
Years	Total Exceedances	Total Samples	Percent Exceedances	Total Exceedances	Total Sampled	Percent Exceedances
2008	9	234	3.8%	40	1827	2.2%
2009	0	148	0.0%	8	711	1.1%
2010	2	194	1.0%	11	802	1.4%
2011	2	234	0.9%	18	900	2.0%
2012	1	84	1.2%	2	315	0.6%
2013	0	88	0.0%	3	545	0.6%
2014	0	51	0.0%	3	711	0.4%

Figure 33. Percentages of exceedances of WQTLs from 2008 through September 2014.

Pie chart includes percentages of all exceedances from 2008 through 2014 by constituent group. Samples collected during toxicity resampling and 2008 upstream MPM are excluded. The bar graph includes percentages of exceedances of constituents grouped as 'applied pesticides' or 'applied metals' which are ag applied constituents only.



XV. C. i. Spatial Trends

The Coalition evaluated monitoring data to identify potential trends and patterns in surface water quality associated with discharge from irrigated lands. The Coalition reviewed trends in the most frequently applied pesticides that historically related to water quality impairments (chlorpyrifos, diuron, and copper), the constituents applied by agriculture, but for which there are no application records (ammonia and nitrates), and constituents not applied by agriculture (DO, SC, and *E. coli*). To determine water quality, the Coalition compared monitoring results from 2009 through September 2014.

Monitoring data from 2009 represents the year in which Coalition began focused outreach to growers. Monitoring data collected for the 2014 reporting period was compared to 2009 to determine if water quality improved. Comparing the two years represents how the water quality has changed six years after focused outreach began. The Coalition analyzed these data for two types of trends, 1) spatial trends (consistent water quality impairments in a specific area), and 2) temporal trends (consistent water quality impairments across time, i.e. same months and/or seasons). The temporal trend analysis (2009 vs. January through September 2014 monitoring data) includes an assessment of whether exceedances occurred more frequently during a specific time period.

In recent years, drought conditions have persisted in the Coalition region. For conservation purposes, growers throughout the Central Valley were advised to reduce water used for irrigation. Drought conditions reduce soil permeability which limits water from infiltrating into soil and increases runoff potential. Therefore, even during water conservation efforts, irrigation or stormwater runoff may occur more frequently as the drought persists.

I. A. i. a. *Constituents Applied by Agriculture*

Pesticides may be found in the water column or sediments as a result of applications to fields that are irrigated tailwater discharges, have runoff after rainfall events, and/or spray drift to surface waters. Irrigation tailwater flows from fields and stormwater runoff can move sediment and chemicals to surface waters. Heavily applied pesticides may be discharged in to surface waters at levels that cause water quality impairments. Within the SJCDWQC region, chlorpyrifos, diuron, and copper are the three most applied pesticides (Table 78). Malathion was not chosen for the spatial trends analysis even though it has the equal number of exceedances (all occurred in 2011) and more use than diuron. Diuron was chosen instead to evaluate spatial trends associated with an herbicide in the SJCDWQC region.

The Coalition used monitoring data to calculate the frequency of exceedances and the magnitude of the concentrations of chlorpyrifos, copper, and diuron detected in the water column. The frequency of exceedances is calculated by dividing the number of exceedances per constituent by the total samples collected for that constituent during the monitoring year (Table 79). By calculating the frequency of exceedances, the Coalition can evaluate the overall water quality associated with the top applied constituents in the SJCDWQC region. An analysis of the magnitude of the concentration of chlorpyrifos, diuron, and copper detected in the water column was used to evaluate the degree of the concentrations compared to the WQTLs. Magnitude is calculated by dividing the concentration/detection of the constituent by the WQTL of that constituent (Tables 80, 82, and 84). If the magnitude of a concentration

detected is greater than one, then it is an exceedance of the WQTL for the constituent. The magnitudes of concentrations are used as a site-specific indicator for water quality.

Table 78. Top SJCDWQC agriculturally applied constituents from 2009 through September 2014.
Constituents organized by descending use. Three constituents with greatest amount of use and number of exceedance level detections are bolded in red.

Constituent	Total Pounds (lbs AI)	Total exceedances of WQTLs
Glyphosate	2,566,882.71	0
Copper	**1,708,497.96**	**5**
Chlorpyrifos	**331,784.03**	**40**
Paraquat	319,468.27	1
Malathion	239,992.01	3
Trifluralin	154,646.55	0
Simazine	146,268.04	1
Dimethoate	144,803.66	0
Diuron	**114,488.28**	**3**
Methomyl	110,546.39	0
Carbaryl	59,354.26	0
Diazinon	47,392.46	0
Phosmet	46,177.06	0
Phorate	36,614.65	0
Methyl Parathion	32,024.12	0
Atrazine	19,336.56	0
Linuron	10,541.17	0
Disulfoton	9,543.18	0
Oxamyl	3,062.37	0
Zinc	1,678.83	0
Methidathion	1,651.97	0
Methiocarb	932.27	0
Carbofuran	406.20	0
Methamidophos	7.12	0
Dichlorvos	0.27	1

Table 79. Frequency of exceedances of WQTLs for the top applied constituents in the SJCDWQC region in 2009 and from January through September 2014.

Dry sites included in number samples collected.

Analyte	Year	Total Exceedances of WQTL	Total Samples	Frequency (% Exceedance)
Chlorpyrifos	2009	8	73	11%
Chlorpyrifos	2014	0	90	NA
Dissolved Copper	2009	0	106	NA
Dissolved Copper	2014	0	120	NA
Diuron	2009	0	46	NA
Diuron	2014	2	53	4%

Chlorpyrifos

Chlorpyrifos is an organophosphate pesticide applied on a wide variety of crops in California to control pests. The highest amount of pesticide applications occur during the irrigation season (April-September) (Figure 34). Chlorpyrifos is a hydrophobic pesticide (K_{oc} 6070) and adsorbs to soils; when irrigation or stormwater runoff occurs, chlorpyrifos bound to sediment can be transported to nearby waterbodies. Despite the elevated K_{oc} value, a significant portion of the chemical does remain in the dissolved state. Chlorpyrifos is highly toxic to aquatic organisms even at low concentrations dissolved in the water column. The Coalition provides outreach to growers informing them of management practices that aim to reduce water quality impairments caused by agricultural discharge. Such practices include ways to effectively manage runoff during irrigation or storm events and/or use of alternative pesticides. Since 2009, annual applications (total lbs) of chlorpyrifos have declined within the Coalition region (Figure 35).

When comparing 2009 to 2014 monitoring data, the number of exceedances of the WQTL for chlorpyrifos decreased from eight in 2009 and zero from January through September 2014 (Table 80, Figure 36). In 2009, all of the exceedances occurred in samples collected from site subwatersheds located in Zone 2 (Figure 36). The magnitude of the detections of chlorpyrifos ranged between 0.30 to 44 times greater than the WQTL. From January through September 2014, there were no detections of chlorpyrifos in any of the samples collected from SJCDWQC tributary sites (Figure 37). Due to all exceedances occurring in sites located in Zone 2 in 2009, the spatial trends analysis focused on trends in chlorpyrifos use to establish a relationship in use and exceedances. The monitoring data demonstrate an improvement in water quality because the same number of samples was collected from the sites in both years and no detections or exceedances of the WQTL for chlorpyrifos occurred.

Chlorpyrifos use remained consistent in the two years where March and July were the months of greatest use (Figure 34). Chlorpyrifos use has declined considerably in every subwatershed that had exceedance level detections in samples (Table 81). All of the exceedances in 2009 appear to coincide with chlorpyrifos applications during the irrigation season. However, provided that there were no exceedances through September 2014, the connection between chlorpyrifos use and exceedances becomes less clear. The reason for the decoupling relationship between applications and exceedances is likely due to management practices implemented by Coalition members.

Focused outreach is complete in all four of the site subwatersheds in Zone 2; Duck Creek @ Hwy 4, Lone Tree Creek @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd completed focused

outreach in 2010, and French Camp Slough @ Airport Way completed focused outreach in 2013. In all four site subwatersheds, growers most frequently implemented management practices to reduce use in types of pesticides that result in exceedances. Chlorpyrifos was listed in a management plan in 15 site subwatersheds. Of the 15 subwatersheds, chlorpyrifos has been removed from four management plans.

Table 80. Magnitude of detections chlorpyrifos in 2009 and January through September 2014.

Field duplicates not included unless exceedance occurred in the duplicate only. All results were non detect from January through September 2014. Exceedances of the WQTLs are in red bold.

Analyte	Zone	Site subwatershed	Year	Sample Date	Result	WQTL[1] (ug/L)	Magnitude
Chlorpyrifos	1	Bear Creek @ North Alpine Rd	2009	2/10/2009	0.0084	0.015	0.56
	2	Duck Creek @ Hwy 4	2009	1/13/2009	0.005	0.015	0.33
				2/10/2009	0.0037	0.015	0.25
				5/12/2009	0.011	0.015	0.73
				6/9/2009	0.07	0.015	**4.67**
				7/14/2009	0.15	0.015	**10**
				8/11/2009	0.031	0.015	**2.07**
		French Camp Slough at Airport Way	2009	4/14/2009	0.0045	0.015	0.3
				10/6/2009	0.029	0.015	**1.93**
		Lone Tree Creek @ Jack Tone Rd	2009	8/11/2009	0.1	0.015	**6.67**
		Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2009	5/12/2009	0.032	0.015	**2.13**
				7/14/2009	0.66	0.015	**44**
				9/15/2009	0.086	0.015	**5.73**
	4	Roberts Island Drain @ Holt Rd	2009	2/10/2009	0.0057	0.015	0.38

Table 81. Applications of chlorpyrifos in total Lbs and Lbs per acre to commodities in 2009 and January through September 2014.

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
2	Duck Creek @ Hwy 4	Grapes	2009	October	43	1.88	80.75	1%	-73%
				November	280	7.51	525.84	9%	
			2014	September	88	1.88	165.35	5%	
		Walnut	2009	April	23	2	23.01	0%	-40%
				May	1082	25.58	1,442.92	23%	
				June	442.8	19.53	867.49	14%	
				July	1012	37.82	2,024.12	33%	
				August	250	11.89	499.15	8%	
				September	23	2	46.01	1%	
			2014	April	338	7.12	343.67	11%	
				May	52	1.88	97.7	3%	
				June	50	1.88	93.95	3%	
				July	1097	26.42	2,071.42	64%	
				August	212.5	6.37	327.6	10%	
2	French Camp Slough @ Airport Way	Alfalfa	2009	March	1195.5	12.92	937.39	7%	-84%
				July	315.6	1.97	155.87	1%	
				August	85.8	0.5	42.96	0%	
			2014	February	110	1.8	65.08	1%	
				March	231	3.92	103.87	2%	
				April	32	0.47	15	0%	
		Almond	2009	January	10	0.4	3.99	0%	-87%
				May	445	12.91	844.39	6%	
				June	15.6	2.75	18.74	0%	
				July	1138.5	46.44	2,192.28	16%	
				August	212	4.73	255.55	2%	
				September	12	1.52	18.18	0%	
			2014	January	55	2.02	111.1	2%	
				March	10	0.19	1.88	0%	
				April	90	1.01	90.9	2%	
				May	104	1.94	59.18	1%	
				June	38	3.76	71.4	1%	
				July	55	3.76	103.34	2%	
		Grapes	2009	July	8	1.99	15.95	0%	-87%
				October	1677.4	16.95	3,152.03	23%	
				November	556.5	9.39	1,045.11	8%	
			2014	September	295	7.52	554.29	11%	
		Walnut	2009	April	92.3	2.7	110.05	1%	-15%
				May	329	14.65	646.89	5%	
				June	774.8	31.58	1,532.21	11%	
				July	623	36.24	1,192.34	9%	

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
				August	412	26.77	798.73	6%	
				September	40	3	40.02	0%	
			2014	March	3	1.25	3.76	0%	
				May	207	15.15	362.6	7%	
				June	220	12.54	411.91	8%	
				July	755	40.42	1,435.88	30%	
				August	774.1	29.97	1,440.64	30%	
				September	17	1.18	20.04	0%	
2	Lone Tree Creek @ Jack Tone Rd	Alfalfa	2009	March	148.5	5.94	336.27	9%	-73%
			2014	February	110	1.8	65.08	8%	
				March	45	2.42	26.59	3%	
		Almond	2009	January	10	0.4	3.99	0%	-97%
				May	123	5.39	239.68	7%	
				July	762.5	33.67	1,523.37	41%	
				August	212	4.73	255.55	7%	
				September	12	1.52	18.18	0%	
			2014	March	10	0.19	1.88	0%	
				July	30	1.88	56.37	7%	
		Grapes	2009	October	186	7.56	351.19	10%	11%
			2014	September	207	5.64	388.94	47%	
		Walnut	2009	April	35	2	70.03	2%	-67%
				May	110.5	9.88	219.73	6%	
				June	107.4	10.06	215.13	6%	
				July	171.5	16.09	284.19	8%	
				August	68	6.81	109.56	3%	
			2014	March	3	1.25	3.76	0%	
				May	22	8.08	44.44	5%	
				June	70	5.63	129.89	16%	
				July	44	9.96	85.5	10%	
				August	17	3.76	31.94	4%	
2	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Alfalfa	2009	March	534	8.53	573.4	8%	-80%
				July	144	0.97	69.94	1%	
			2014	February	49	0.59	28.69	1%	
				March	196	2.52	87.45	4%	
				April	32	0.47	15	1%	
		Almond	2009	May	322	7.51	604.72	8%	-85%
				July	338	10.78	593.14	8%	
				August	32	1	32.02	0%	
			2014	April	90	1.01	90.9	4%	
				May	20	1.01	20.2	1%	
				June	38	3.76	71.4	4%	

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
		Grapes	2009	July	8	1.99	15.95	0%	-95%
				October	1394	7.51	2,617.93	36%	
				November	496.5	7.51	932.43	13%	
			2014	September	88	1.88	165.35	8%	
		Walnut	2009	April	57.3	0.7	40.02	1%	-4%
				May	122.5	2.02	247.66	3%	
				June	194	5.5	368.13	5%	
				July	185.5	8.06	372.39	5%	
				August	273	12.01	546.6	7%	
				September	40	3	40.02	1%	
			2014	May	100	2.02	202.01	10%	
				June	10	1.01	10.1	0%	
				July	466	11.39	885.81	44%	
				August	240.5	7.24	432.34	21%	
				September	17	1.18	20.04	1%	

Figure 34. Chlorpyrifos use between 2009 and January through September 2014.

A tally of the number of exceedances of the WQTL for chlorpyrifos during the months of the years is provided.

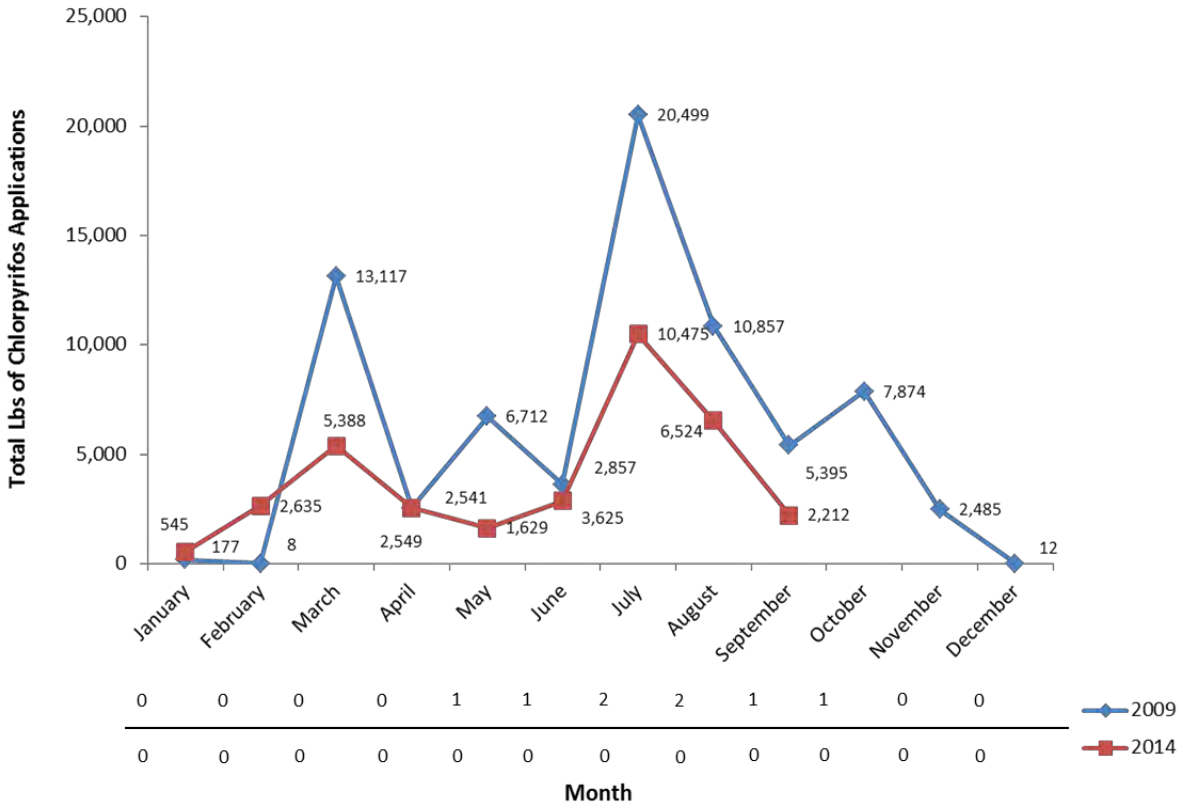


Figure 35. Change in chlorpyrifos use in the SJCDWQC region.

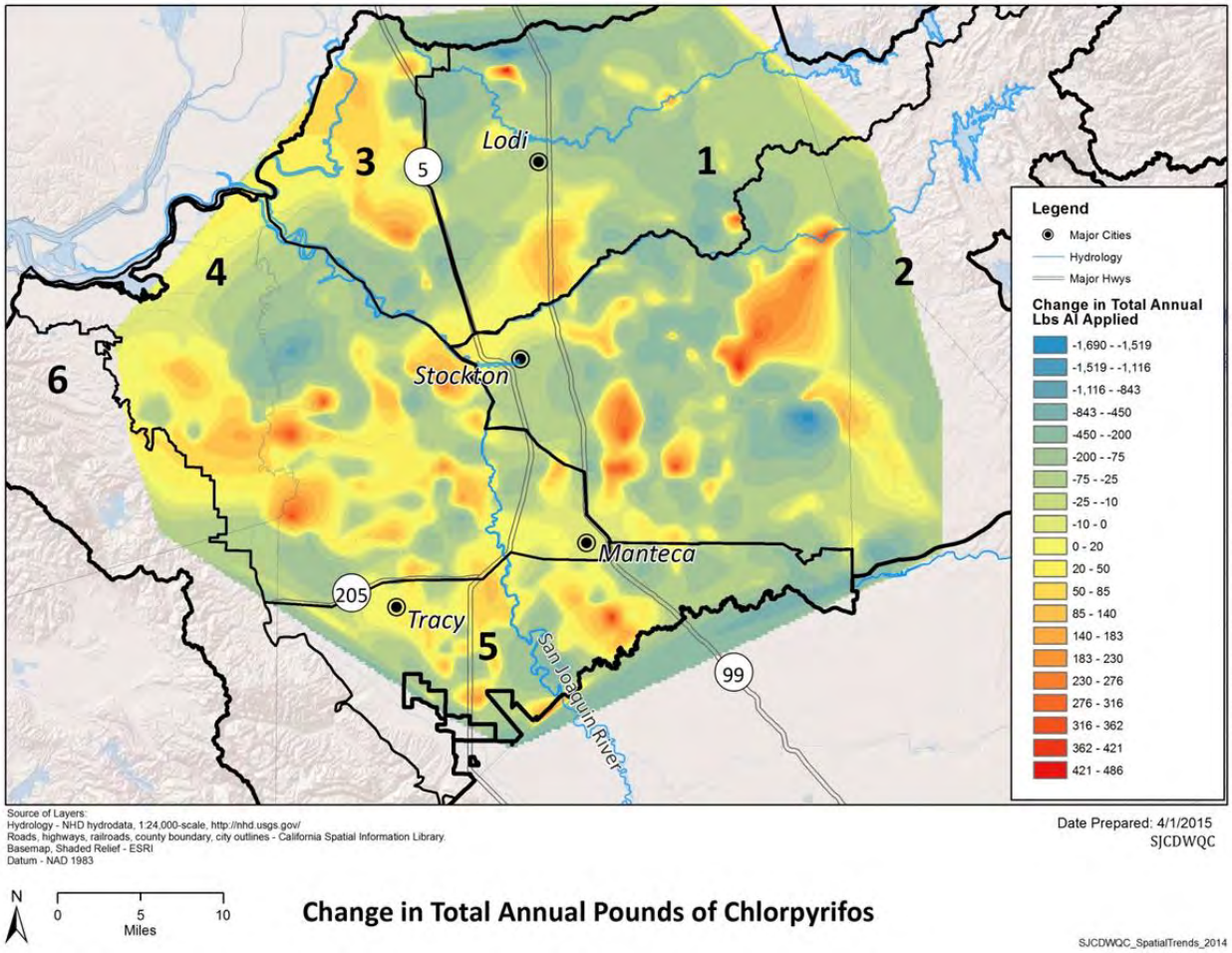


Figure 36. Frequency of detections and total number of exceedances of the WQTL for chlorpyrifos at sites in the SJCDWQC region during 2009.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for chlorpyrifos corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of chlorpyrifos applied in the SJCDWQC region.

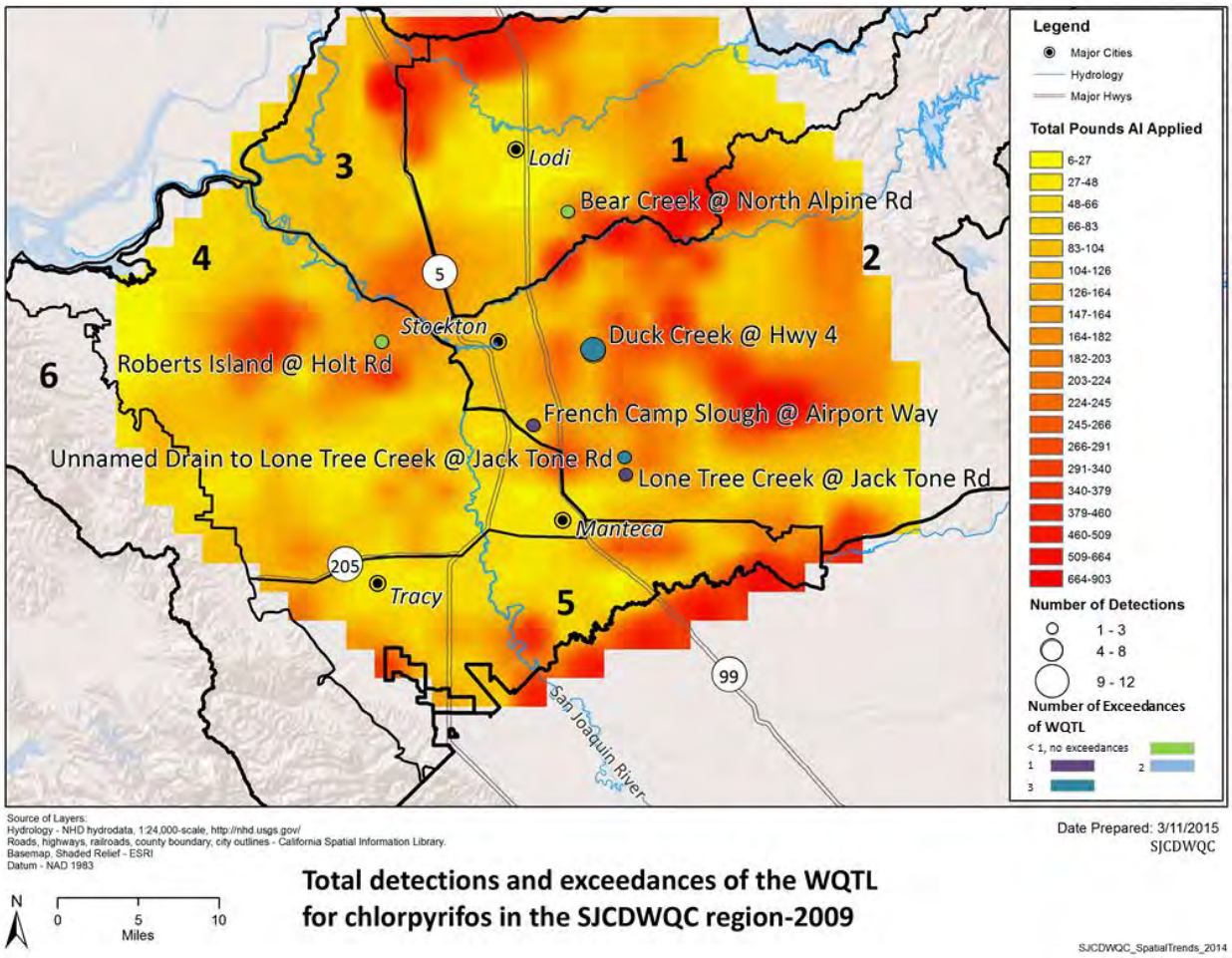
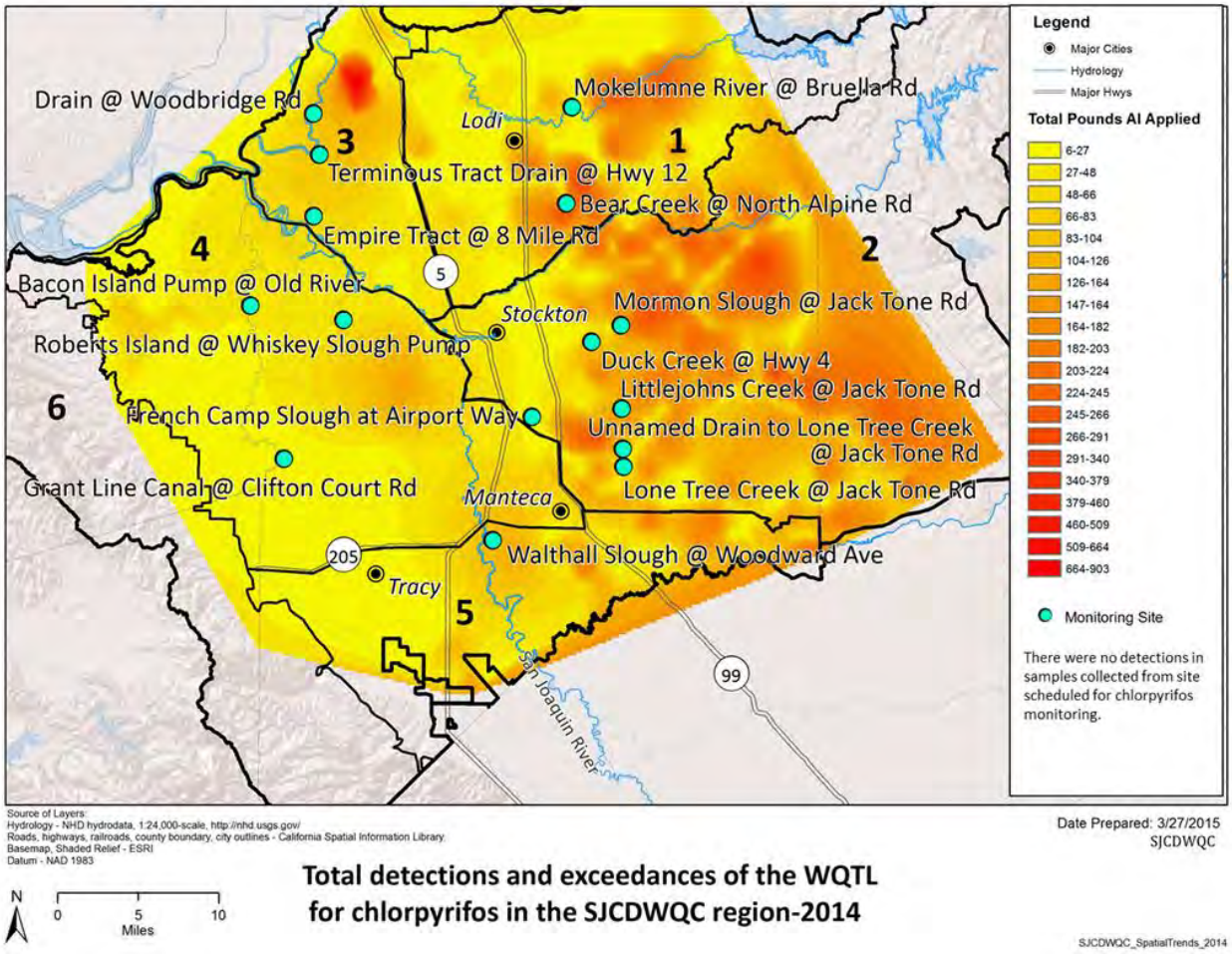


Figure 37. Site locations of site sampled for chlorpyrifos in the SJCDWQC region from January through September 2014.

All chlorpyrifos results were non-detect.



Diuron

Diuron is a broad-spectrum herbicide used for weed control on agriculture, highway rights of way, and by homeowners. It inhibits photosynthesis and also affects seed germination. Diuron is applied mostly from December through February. In both 2009 and January through September 2014, minimal applications were made from May through August (Figure 39). Diuron is very water soluble (K_{oc} of 480) and is therefore more mobile during seasons with rainfall. Diuron use increased in 2014 compared to diuron use in 2009 (Figure 40).

During 2009, there were eight detections of diuron; none of the detections exceeded the WQTL (Table 82, Figure 42). From January through September 2014, there were 12 detections of diuron; two of the detections were exceedances of the WQTL for diuron (Table 82, Figure 39). The 2014 exceedances occurred in samples collected from Bacon Island Pump @ Old River Rd in May and French Camp Slough @ Airport Way in February (Figure 43). The frequency of the total number of exceedances of the WQTL for diuron increased in 2014 compared to 2009 (Table 79).

From January through September 2014, Assessment Monitoring occurred at Bacon Island Pump @ Old River Rd and samples were collected every month for the analysis of diuron; detections of diuron occurred in samples every month (Table 81, Figure 39). However, there is no reported agricultural use of diuron in the site subwatershed in either 2009 or 2014. The only reported use of diuron was on December 24, 2013 (91 lbs AI, alfalfa). Due to the 90 day half-life of diuron, the detections in January through March could be associated with applications as far back as December 2013. However, it is unlikely that rest of the detections (and the exceedance of the WQTL in May 2014) could be associated with the December agricultural application.

Diuron use has changed substantially within the French Camp Slough @ Airport Way site subwatershed. Applications to grapes have increased while those to alfalfa and walnuts have decreased (Table 83). Despite the February 11, 2014 storm monitoring event exceedance, the discharge measured at the site was considerably low in both January (1.39 cfs) and February (0.53 cfs). However, rainfall from this storm could have mobilized diuron and transported it to the waterbody. Because diuron is commonly found in the dissolved state, the rainfall in February and the stagnant conditions at the site could have resulted in the exceedance level detection in March 2014.

A spatial trend associated with diuron applications and detections and/or exceedances of the WQTL is not apparent because there is little to no reported use of diuron in the site subwatersheds where exceedances occurred. Similar to Bacon Island Pump @ Old River Rd, samples collected from Drain @ Woodbridge that resulted in detections of diuron could not be associated with any diuron applications because there was no reported use in the site subwatershed. Temporally, applications occur during fall and winter months and detections tend to coincide with months of use (Figure 39). The temporal detections are due to the water solubility of diuron, which makes it highly mobile and if management practices are not in place, diuron can easily move off-site to receiving waterbodies. Management practices to prevent irrigation and/or storm water runoff are discussed with growers during focused outreach in site subwatersheds with water quality impairments associated with diuron.

Table 82. Magnitude of detections of diuron in 2009 and January through September 2014.

Field duplicates not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in red bold.

Analyte	Zone	Site subwatershed	Year	Sample Date	Result	WQTL[1] (ug/L)	Magnitude
Diuron	2	Duck Creek @ Hwy 4	2009	1/13/2009	0.2	2	0.1
			2009	2/10/2009	0.25	2	0.13
		French Camp Slough at Airport Way	2014	2/11/2014	38	2	**19**
			2014	3/3/2014	1.1	2	0.55
			2014	5/20/2014	0.21	2	0.11
	3	Drain @ Woodbridge Rd	2009	2/10/2009	0.23	2	0.12
			2009	3/10/2009	0.61	2	0.31
	4	Bacon Island Pump @ Old River	2014	1/28/2014	0.48	2	0.24
			2014	2/11/2014	0.76	2	0.38
			2014	3/3/2014	0.69	2	0.35
			2014	4/15/2014	0.31	2	0.16
			2014	5/20/2014	6.3	2	**3.15**
			2014	6/17/2014	0.98	2	0.49
			2014	7/15/2014	0.52	2	0.26
			2014	8/19/2014	0.25	2	0.13
			2014	9/16/2014	0.22	2	0.11
	5	Walthall Slough @ Woodward Ave	2009	1/13/2009	0.37	2	0.19
			2009	2/10/2009	0.29	2	0.15
			2009	3/10/2009	0.25	2	0.13
			2009	4/14/2009	0.28	2	0.14

Table 83. Applications of diuron in total Lbs and Lbs per acre to commodities in 2009 and January through September 2014.

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
2	Duck Creek @ Hwy 4	Grapes	2009	January	380.00	0.96	182.37	7%	-96%
				March	42.00	8.00	83.97	3%	
				December	1,007.40	15.18	698.43	26%	
			2014	March	20.00	4.00	40.04	19%	
		Walnut	2009	January	285.00	5.85	833.29	31%	-89%
				March	83.00	0.62	27.19	1%	
				November	129.00	9.01	193.52	7%	
			2014	February	38.00	4.50	57.06	27%	
				April	20.00	2.00	40.04	19%	
				July	11.00	2.00	22.02	10%	
2	French Camp Slough @ Airport Way	Alfalfa	2009	January	102.50	3.54	60.51	3%	-86%
				December	404.60	8.87	596.61	28%	
			2014	February	184.00	2.50	92.01	12%	
		Grapes	2009	January	76.00	1.03	39.11	2%	352%
				March	38.33	4.98	68.19	3%	
			2014	February	192.00	4.00	384.38	48%	
				March	40.00	8.01	80.08	10%	
				April	30.00	0.67	20.02	3%	
		Walnut	2009	January	46.00	1.09	25.08	1%	-69%
				February	55.20	2.67	67.02	3%	
				March	43.00	0.71	12.12	1%	
				April	37.83	3.94	53.87	3%	
				May	174.00	3.85	110.57	5%	
				June	39.20	1.46	57.31	3%	
				July	25.00	0.90	11.90	1%	
				November	102.00	8.35	149.14	7%	
				December	53.00	3.05	34.74	2%	
			2014	May	9.00	3.94	17.71	2%	
				June	37.50	2.93	109.99	14%	
				July	16.00	2.00	32.03	4%	
5	Walthall Slough @ Woodward Ave	Alfalfa	2009	January	30.00	0.97	29.24	15%	39%
				December	184.00	3.34	168.81	85%	
			2014	January	184.00	7.51	276.27	88%	

Figure 38. Diuron use between 2009 and January through September 2014.

A tally of the number of exceedances of the WQTL for diuron during the months of the years is provided.

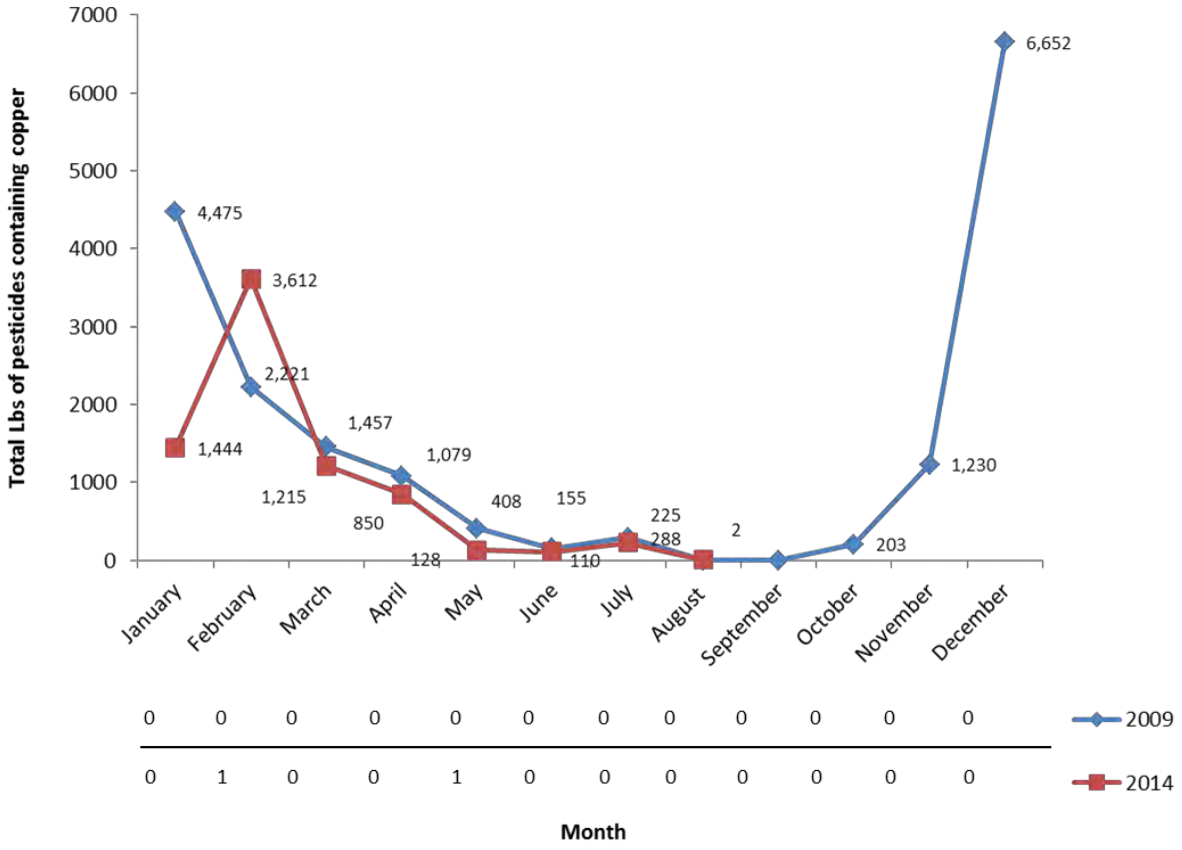


Figure 39. Change in diuron use in the SJCDWQC region.

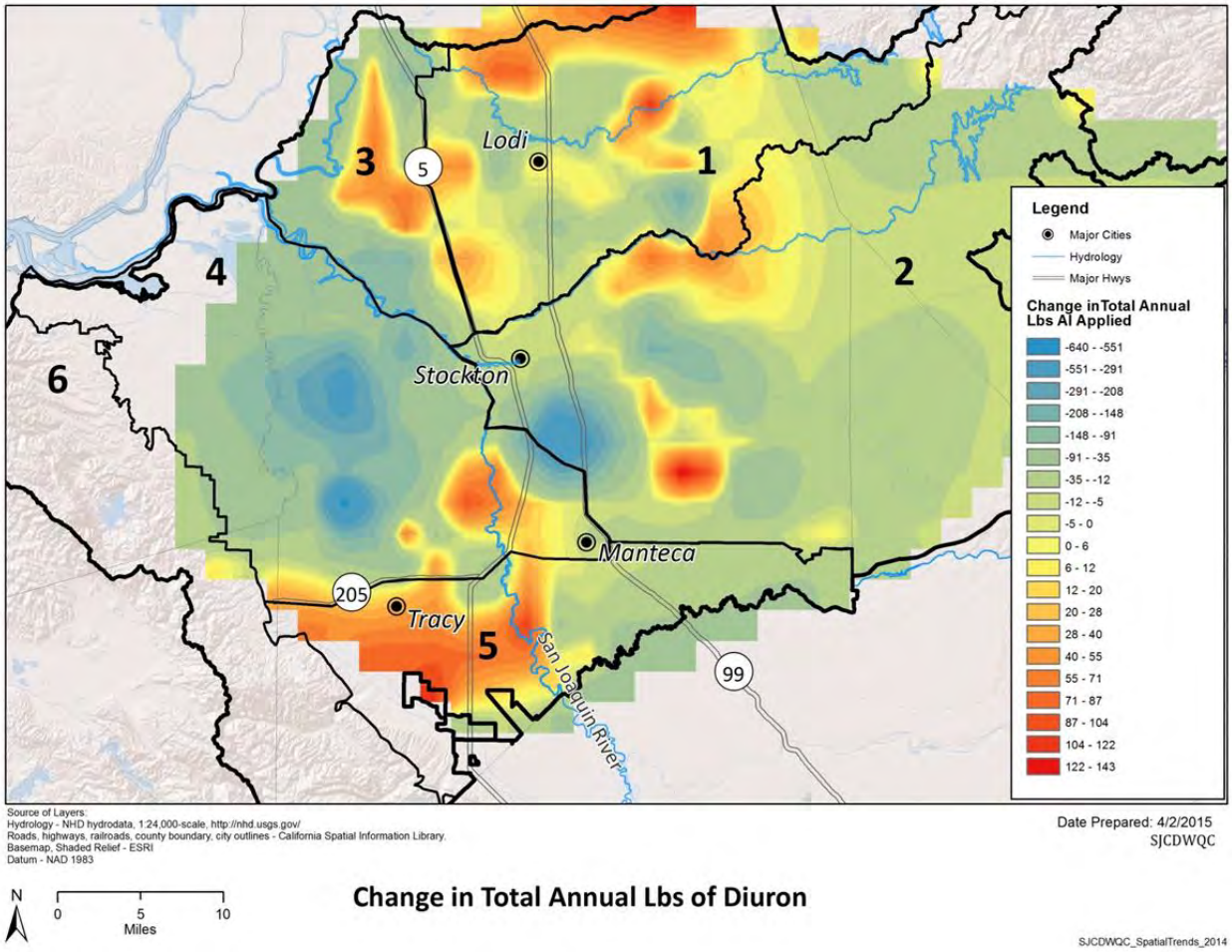


Figure 40. Frequency of detections and total number of exceedances of the WQTLs for diuron at sites in the SJCDWQC region during 2009.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for diuron corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of diuron applied in the SJCDWQC region.

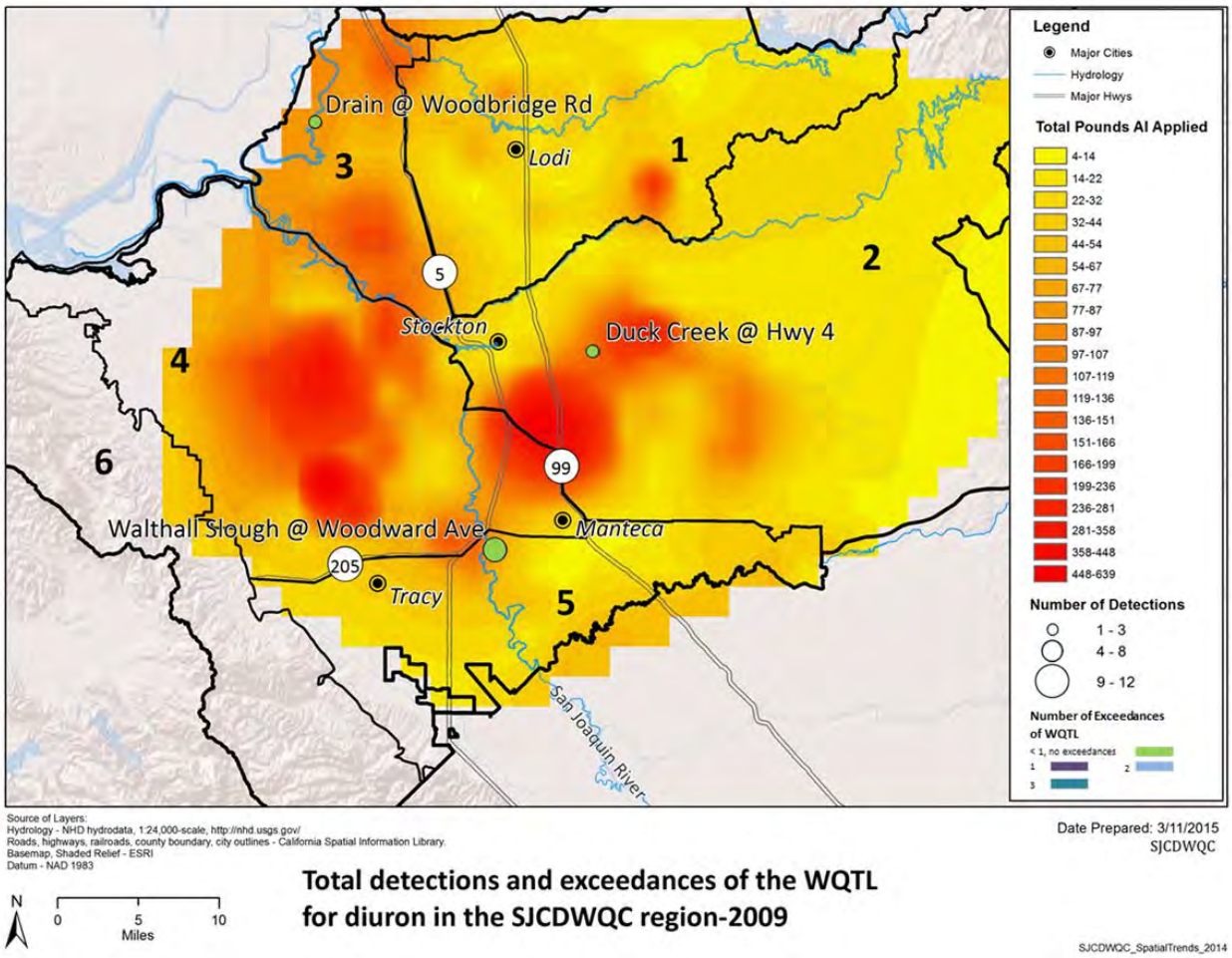
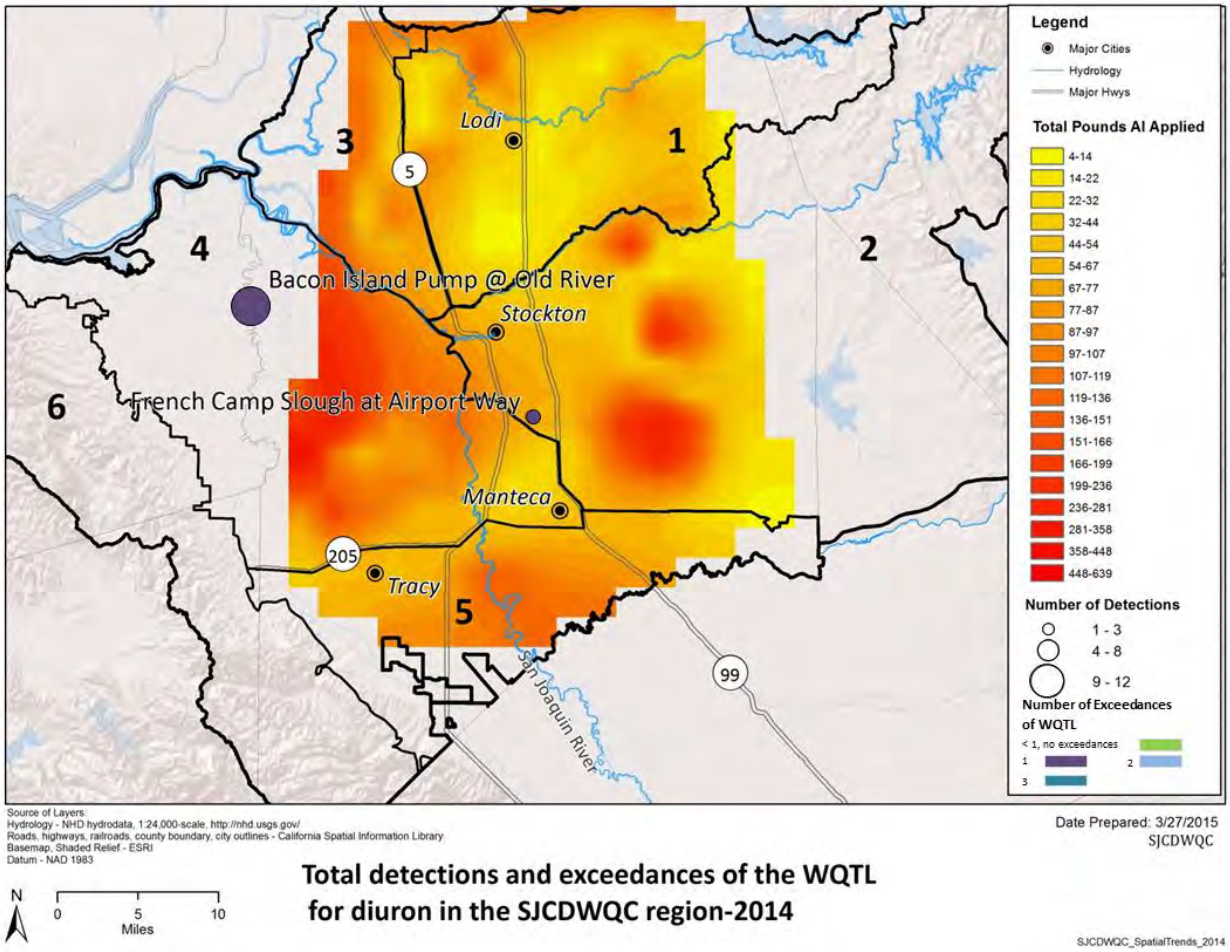


Figure 41. . Frequency of detections and total number of exceedances of the WQTLs for diuron at sites in the SJCDWQC region from January through September 2014.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for diuron corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of diuron applied in the SJCDWQC region.



Copper

Pesticides containing copper are applied to a variety of agricultural crops as a fungicide and can be applied to waterways as an algaecide. Copper is applied across the Coalition region and is one of the most heavily applied products. Sources of copper detections in receiving waterbodies in the SJCDWQC region can be due to: 1) recent agricultural applications moving to surface waters either through storm or irrigation runoff or spray drift, 2) copper used for algae and aquatic weed control in irrigation supply channels or 3) naturally occurring copper. The Coalition is evaluating dissolved copper for the spatial trends analysis because it is applied by irrigated agriculture. The trends focus on dissolved copper because it is bioavailable to aquatic organisms and is the only fraction analyzed as specified in the 2014 SJCDWQC MPU (approved January 5, 2015).

The total annual use of pesticides containing copper has remained consistently the same in 2014 compared to 2009 (Figure 43 and 44). In both years, the months in which pesticides containing copper were applied remained nearly identical, except that total lbs of AI increased in 2014 (Figure 43). The month of highest use was April in both years. In 2009, the highest number of detections for dissolved copper occurred from January through March. From January through September 2014, the highest number of dissolved copper detections occurred in May.

Dissolved copper detections occurred in samples collected from multiple sites in both 2009 and 2014. For sites that were rotated in Assessment Monitoring in 2009 (South Webb Tract Drain and Walthall Slough @ Woodward Ave) and 2014 (Bacon Island Pump @ Old River Rd, French Camp Slough @ Airport Way, Mokelumne River @ Bruella Rd, and Roberts Island @ Whiskey Slough Pump), detections occurred every month in samples analyzed (Table 87). In 2009, there were 40 detections of dissolved copper. Detections of dissolved copper occurred three times in Zone 1 (all at Bear Creek @ North Alpine Rd), 11 times in Zone 2, three times in Zone 3 (all at Drain @ Woodbridge Rd), 11 times in Zone 4 (all South Webb Tract Drain), and 12 times in Zone 5 (all at Walthall Slough @ Woodward Ave; Figure 46). From January through September 2014, there were 50 detections of dissolved copper. Detections of dissolved copper occurred nine times in Zone 1 (all at Mokelumne River @ Bruella Rd), 18 times in Zone 2, six times in Zone 3 (all at Empire Tract @ 8 Mile Rd), and 17 times in Zone 4. Samples for copper analysis were not collected from Zone 5 (Walthall Slough @ Woodward Ave 5) from January through September 2014 (Figure 47).

For the purpose of the copper spatial trends analysis, the Coalition focused on detections which occurred in samples collected from sites in Zone 2 (French Camp Slough @ Airport Way, Littlejohns Creek @ Jack Tone Rd, Lone Tree Creek @ Jack Tone Rd, ad Unnamed Drain to Lone Tree Creek @ Jack Tone Rd). Pesticide use trends were evaluated to determine if these factors played a role in the frequency of detections.

Applications of pesticides containing copper have changed among the top crops planted in Zone 2 (almonds, grapes, and walnuts; Table 85). Overall, applications to almonds and walnuts increased and applications to grapes decreased. However, there does not appear to be a temporal trend in dissolved copper detections and use in both years. Even when applications were low (June through September),

detections of dissolved copper still occurred in samples collected from Zone 2. Because of this, applications cannot be the reason for the frequency of dissolved copper detections alone. Since detections occur throughout the year and exceedances have not occurred, it is likely that the copper detections occurred from natural sources.

Focused outreach is complete in all Zone 2 site subwatersheds. Currently, only two site subwatersheds have copper in management plans.

Table 84. Magnitude of detections of copper in 2009 and January through September 2014.

Dissolved copper detections are provided only. Field duplicates not included unless exceedance occurred in the duplicate only.

Analyte	Zone	Site Subwatershed	Year	Sample Date	Result	WQTL[1] (ug/L)	Magnitude
Copper	1	Bear Creek @ North Alpine Rd	2009	1/13/2009	0.7	9.72	0.070
				2/10/2009	2.3	8.18	0.280
				3/10/2009	3.3	8.03	0.410
		Mokelumne River @ Bruella Rd	2014	1/28/2014	0.45	2.07	0.220
				2/11/2014	0.42	2.07	0.200
				3/3/2014	0.43	1.87	0.230
				4/15/2014	0.54	2.26	0.240
				5/20/2014	0.49	2.07	0.240
				6/17/2014	0.61	2.07	0.290
				7/15/2014	0.50	2.07	0.240
				8/19/2014	0.42	2.07	0.200
				9/16/2014	0.54	1.87	0.290
	2	Duck Creek @ Hwy 4	2009	1/13/2009	2.2	3.92	0.560
				2/10/2009	2.6	5.12	0.510
				3/10/2009	4.9	4.95	0.990
		Lone Tree Creek @ Jack Tone Rd	2009	7/14/2009	2.3	3.83	0.600
				8/11/2009	2.7	4.78	0.560
				9/15/2009	1.5	3.56	0.420
		Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2009	4/14/2009	4.3	9.72	0.440
				5/12/2009	5	8.03	0.620
				7/14/2009	1.5	3.56	0.420
				8/11/2009	1.5	3.92	0.380
				9/15/2009	2.5	5.46	0.460
		French Camp Slough at Airport Way	2014	1/28/2014	4.1	14.09	0.290
				2/11/2014	2.9	14.8	0.200
				3/3/2014	4.7	11.21	0.420
				4/15/2014	1.7	3.74	0.450
				5/20/2014	1.4	5.12	0.270
				6/17/2014	1.9	3.92	0.480
				7/15/2014	1.3	4.27	0.300
				8/19/2014	1.2	4.61	0.260
				9/16/2014	1.2	3.56	0.340
		Littlejohns Creek @ Jack Tone Rd	2014	2/11/2014	2.2	9.72	0.230
				5/20/2014	1.4	4.78	0.290
				6/17/2014	1.2	3.2	0.370
				9/16/2014	0.99	3.2	0.310
		Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2014	4/15/2014	2	9.72	0.210
				5/20/2014	2.1	3.92	0.540
				7/15/2014	1.4	4.09	0.340
				8/19/2014	0.97	4.44	0.220
				9/16/2014	1.2	3.56	0.340
	3	Drain @ Woodbridge Rd	2009	1/13/2009	0.9	27.39	0.030
				2/10/2009	0.46	29.9	0.020
				3/10/2009	0.44	43.75	0.010
		Empire Tract @ 8 Mile Rd	2014	1/28/2014	1.3	16.19	0.080
				2/11/2014	1.6	25.48	0.060
				3/3/2014	0.99	38.44	0.030
				4/15/2014	0.78	41.4	0.020
				5/20/2014	0.84	36.64	0.020
				6/17/2014	0.81	20.26	0.040
	4	South Webb Tract Drain	2009	1/14/2009	1.9	18.92	0.100
				2/10/2009	1.1	18.25	0.060
				3/10/2009	2.2	23.55	0.090
				4/14/2009	1.5	25.48	0.060
				5/12/2009	0.67	18.25	0.040

Analyte	Zone	Site Subwatershed	Year	Sample Date	Result	WQTL[1] (ug/L)	Magnitude
				6/9/2009	0.56	13.38	0.040
				7/14/2009	0.58	13.38	0.040
				8/11/2009	0.25	17.57	0.010
				9/15/2009	0.43	11.94	0.040
				11/10/2009	0.4	20.26	0.020
				12/8/2009	0.07	15.5	0.000
		Bacon Island Pump @ Old River	2014	1/28/2014	0.91	11.94	0.080
				2/11/2014	1.7	14.09	0.120
				3/3/2014	1.1	14.8	0.070
				4/15/2014	2.1	14.09	0.150
				5/20/2014	3.2	11.21	0.290
				6/17/2014	1.5	14.09	0.110
				7/15/2014	0.2	13.38	0.010
				9/16/2014	0.69	10.47	0.070
		Roberts Island @ Whiskey Slough Pump	2014	1/28/2014	1.2	18.25	0.070
				2/11/2014	1.2	24.84	0.050
				3/3/2014	0.91	26.12	0.030
				4/15/2014	0.7	24.2	0.030
				5/20/2014	0.47	18.92	0.020
				6/17/2014	1.5	18.25	0.080
				7/15/2014	1	15.5	0.060
				8/19/2014	1.2	16.88	0.070
				9/16/2014	0.9	22.24	0.040
	5	Walthall Slough @ Woodward Ave	2009	1/13/2009	1.3	21.59	0.060
				2/10/2009	0.79	19.59	0.040
				3/10/2009	0.16	22.24	0.010
				4/14/2009	0.8	7.95	0.100
				5/12/2009	0.63	8.11	0.080
				6/9/2009	0.35	8.49	0.040
				7/14/2009	0.62	11.94	0.050
				8/11/2009	0.51	7.4	0.070
				9/15/2009	0.54	12.66	0.040
				10/6/2009	0.72	6.84	0.110
				11/10/2009	0.53	18.25	0.030
				12/8/2009	0.54	18.25	0.030

[1]Copper WQTL is variable based on hardness.

Table 85. Applications of pesticides containing copper in total Lbs and Lbs per acre to commodities in 2009 and January through September 2014.

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
2	Duck Creek @ Hwy 4	Almond	2009	January	17.5	4	70.04	0%	195%
			2014	January	152	5.44	206.61	1%	
		Grapes	2009	March	106	1.08	114.06	0%	1060%
				April	43	0.6	25.77	0%	
			2014	April	2661.28	29.44	1,621.71	6%	
		Walnut	2009	March	701	76.26	5,246.60	15%	-23%
				April	3270.9	393.22	17,497.11	49%	
				May	1646.5	136.45	8,805.93	25%	
			2014	January	204	4.53	231.08	1%	
				March	1777.1	125.45	4,840.86	19%	
				April	6200.4	264.31	15,797.69	61%	
				May	995.6	69.96	3,308.10	13%	
2	French Camp Slough @ Airport Way	Almond	2009	January	1903.5	182.03	8,671.68	14%	4%
				February	980	28.52	1,518.06	2%	
				March	16	0.61	9.82	0%	
				July	18	6.16	110.88	0%	
				December	256	10.67	910.08	1%	
			2014	January	1932	151.5	8,189.77	13%	
				February	2917.5	64.52	3,513.32	6%	
		Cherry	2009	February	14	1.84	25.82	0%	-93%
				March	52	10.01	218.68	0%	
				November	44	5.33	234.63	0%	
				December	290.55	57.22	1,712.35	3%	
			2014	January	53	12.22	126.8	0%	
				February	16	1.84	29.5	0%	
		Grapes	2009	March	38	2.15	40.89	0%	-29%
				April	2823.4	38.98	1,994.40	3%	
				May	19	1.08	20.44	0%	
				July	50	10.37	132.35	0%	
			2014	March	409	3.38	383.5	1%	
				April	2498.5	33.42	1,405.65	2%	
				May	67	1.08	72.09	0%	
				June	485	12.42	342.11	1%	
		Peaches	2009	January	48	28.06	266.41	0%	-93%
				February	4.2	1.83	7.7	0%	
				December	124	63.33	921.4	1%	
			2014	January	16	10.49	83.9	0%	
		Rice	2009	May	1388.04	386.25	17,910.98	29%	-92%
			2014	May	92	44.95	1,381.05	2%	

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
		Walnut	2009	March	495.8	83.14	4,172.57	7%	85%
				April	3442.1	407.26	15,922.90	26%	
				May	1023.5	102.95	4,658.02	8%	
				December	9	24.75	222.75	0%	
			2014	January	204	4.53	231.08	0%	
				March	3268	272.99	9,992.84	16%	
				April	7997	783.77	28,071.35	45%	
				May	2001.2	163.14	7,966.63	13%	
				June	15	0.54	8.07	0%	
2	Littlejohns Creek @ Jack Tone Rd	Almond	2009	January	378.5	8.2	1,584.43	8%	31%
				February	210	2.59	259.54	1%	
			2014	January	482	11.08	2,067.81	7%	
				February	390	2.69	348.62	1%	
		Grapes	2009	April	1496.5	9.43	1,023.11	5%	-8%
			2014	March	34	0.46	15.67	0%	
				April	1940	13.91	894.5	3%	
				June	65	0.54	34.97	0%	
		Walnut	2009	March	329.8	63.84	3,509.97	17%	52%
				April	1924.4	155.46	9,743.51	49%	
				May	664	46.01	3,105.92	15%	
				December	9	24.75	222.75	1%	
			2014	January	204	4.53	231.08	1%	
				March	2098.5	138.51	5,914.93	21%	
				April	4683.4	286.9	14,327.79	50%	
				May	1196.2	55.59	4,727.75	17%	
2	Lone Tree Creek @ Jack Tone Rd	Almond	2009	January	1366	145.91	6,242.97	25%	-23%
				February	634	18.51	915.82	4%	
				March	16	0.61	9.82	0%	
				December	256	10.67	910.08	4%	
			2014	January	1059	95.42	4,472.30	16%	
				February	2026.5	33.45	1,735.93	6%	
		Cherry	2009	December	243.55	45.37	1,441.71	6%	-97%
			2014	January	27	1.84	49.79	0%	
		Grapes	2009	April	315	8.11	232.95	1%	-11%
			2014	March	58	1.84	26.74	0%	
				April	332	7.2	181.46	1%	
		Peaches	2009	January	24	10.49	125.85	1%	-89%
				February	4.2	1.83	7.7	0%	
				December	85	36.52	653.02	3%	
			2014	January	16	10.49	83.9	0%	
		Rice	2009	May	740.5	257.53	10,167.30	41%	-86%

Zone	Site Subwatershed	Crop	Year	Month	Acres	Total Lbs per acre	Total Lbs AI	Percent of total lbs applied	Percent change in total lbs applied per crop
			2014	May	92	44.95	1,381.05	5%	
		Walnut	2009	March	166	19.3	662.6	3%	97%
				April	635.7	131.39	2,847.97	11%	
				May	187.5	47.12	707.24	3%	
			2014	March	268.5	69.64	1,327.48	5%	
				April	986	284.21	5,389.26	19%	
				May	276	63.08	1,581.17	6%	
2	Unnamed Drain To Lone Tree Creek @ Jack Tone Rd	Almond	2009	January	88	9.44	406.92	2%	224%
				February	261	3.85	309.65	1%	
			2014	January	350	9.91	1,946.52	8%	
				February	422	3.48	373.93	2%	
		Grapes	2009	April	1621.4	12.12	1,189.97	5%	37%
			2014	March	351	1.54	356.77	1%	
				April	2064	15.59	996.8	4%	
				May	67	1.08	72.09	0%	
				June	382	1.08	205.52	1%	
		Rice	2009	May	1128.04	297.15	14,049.98	56%	-93%
			2014	May	64	30.1	965.25	4%	
		Walnut	2009	March	219.8	24.64	1,353.97	5%	149%
				April	1094	110.14	5,563.67	22%	
				May	183	31.1	861.85	3%	
				December	9	24.75	222.75	1%	
			2014	March	1889.5	105.74	4,709.81	19%	
				April	4223.5	265.73	12,252.69	49%	
				May	759	42.4	2,926.78	12%	

Figure 42. Pesticides containing copper use between 2009 and January through September 2014.

A tally of the number of exceedances of the hardness based WQTL for coppers during the months of the years is provided. NA- Not applicable.

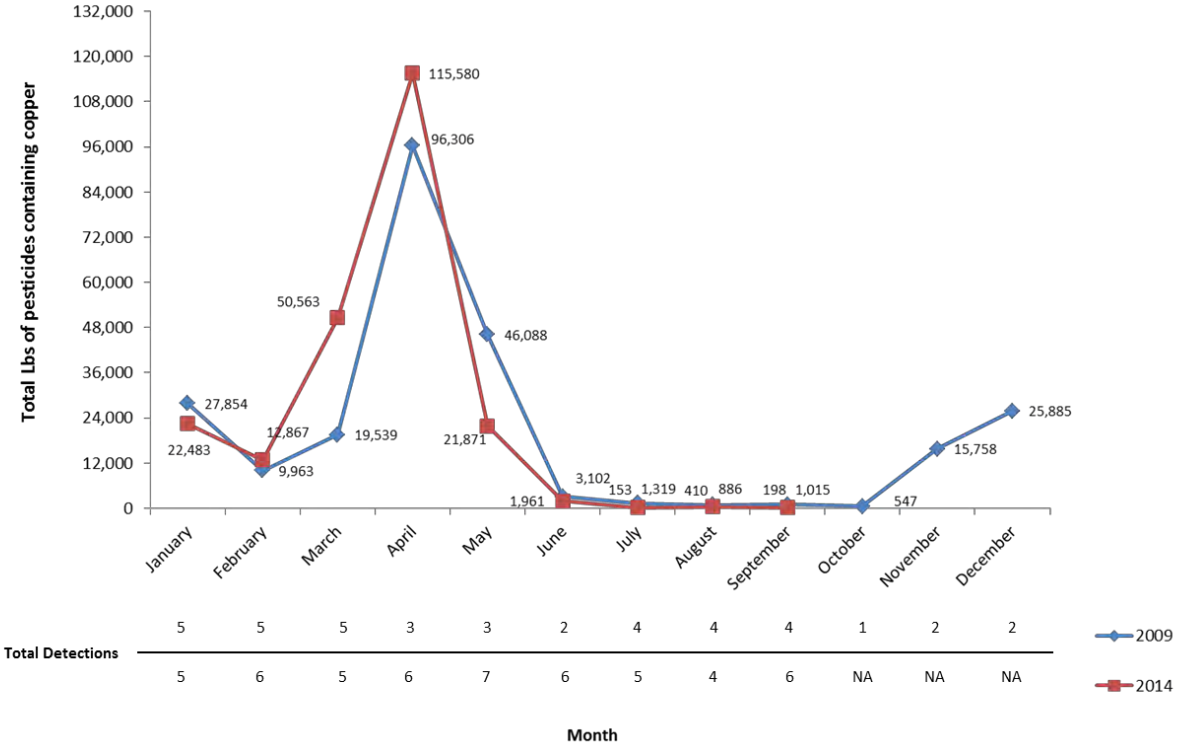


Figure 43. Change in use of pesticides containing copper in the SJCDWQC region in 2009 compared to 2014.

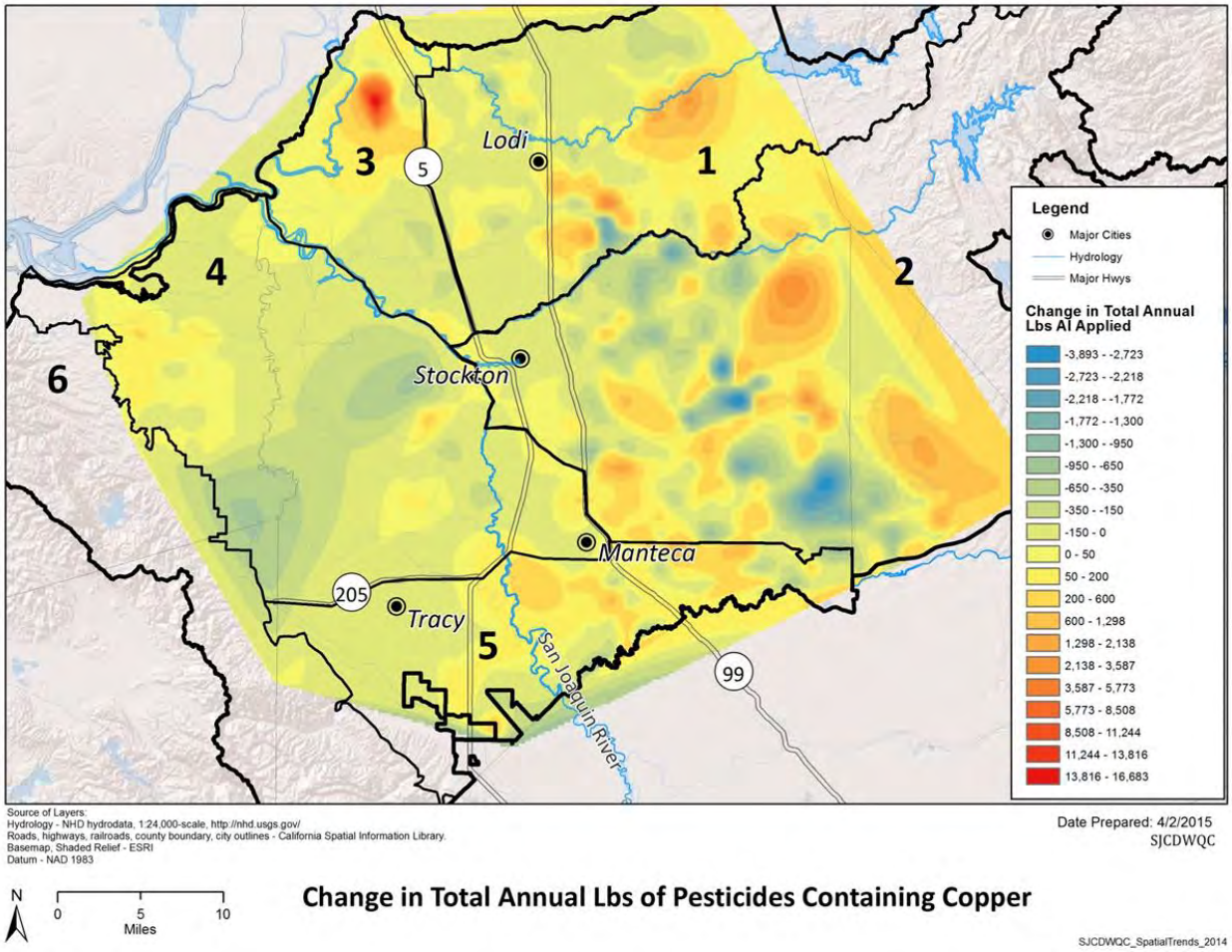


Figure 44. Frequency of detections and total number of exceedances of the WQTLs for dissolved copper at sites in the SJCDWQC region during 2009.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for dissolved copper corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of copper applied in the SJCDWQC region.

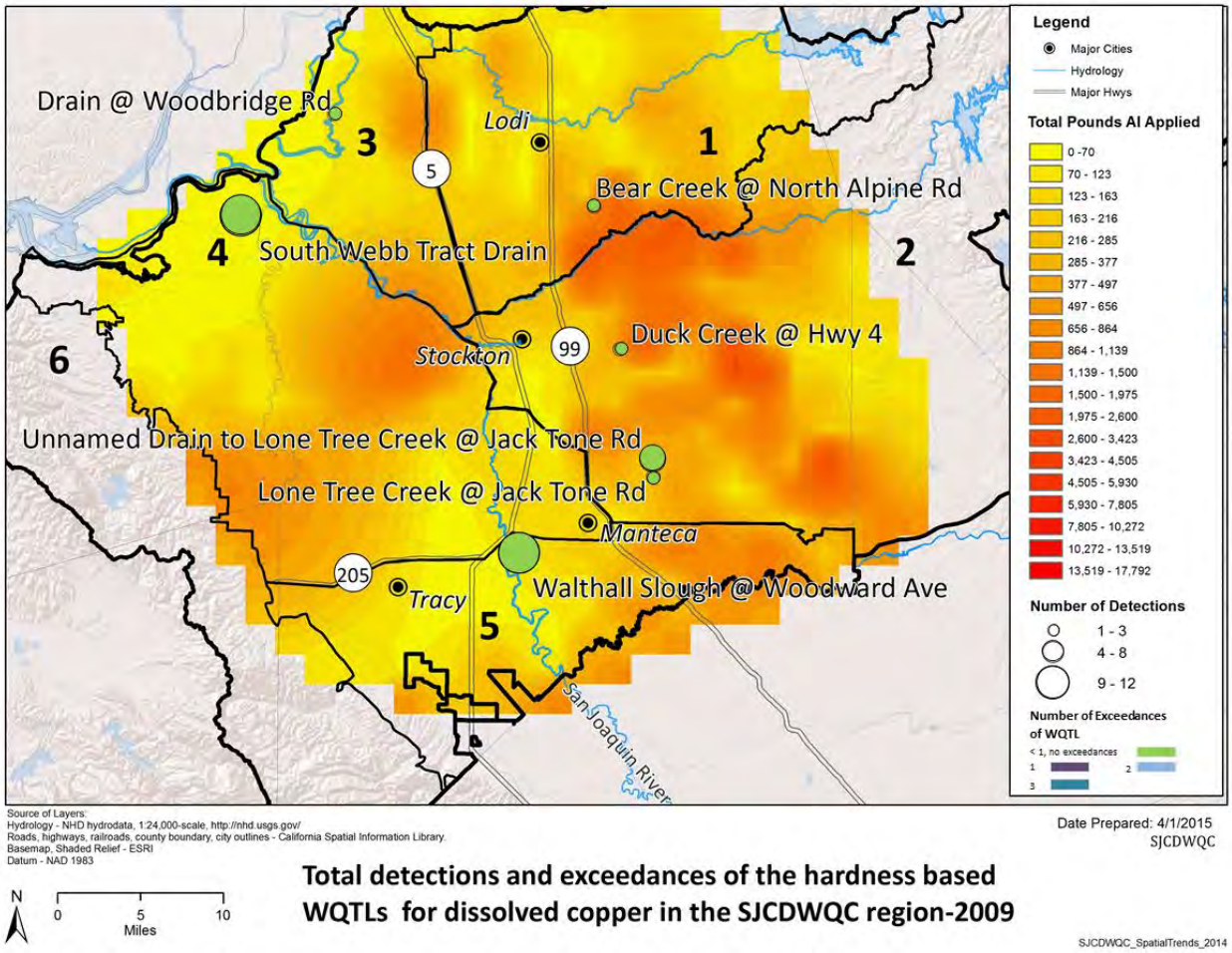
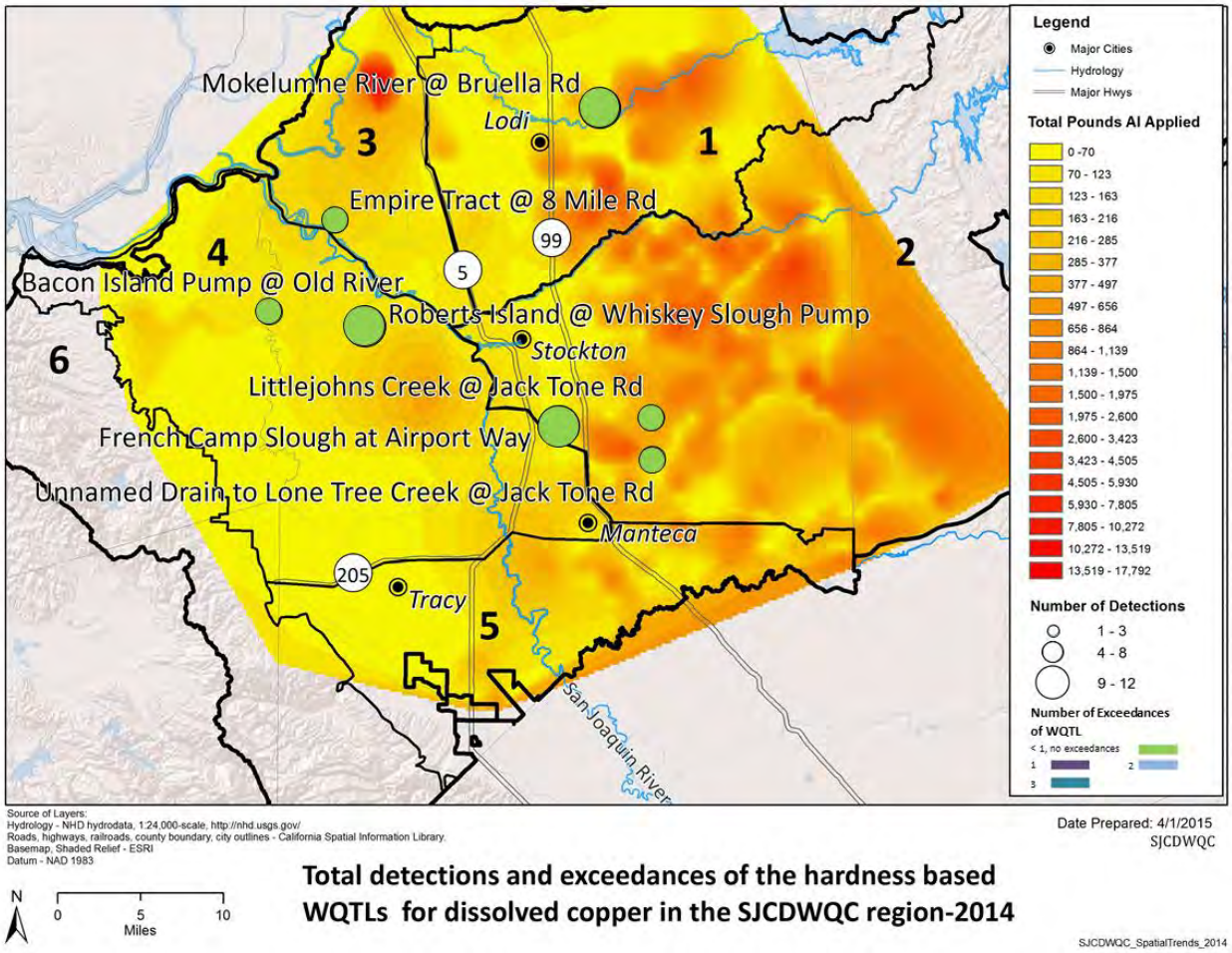


Figure 45. Frequency of detections and total number of exceedances of the WQTLs for dissolved copper at sites in the SJCDWQC region from January through September 2014.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for dissolved copper corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of copper applied in the SJCDWQC region



I. A. i. b. *Nutrients, Bacteria, and Field Parameters*

The Coalition conducted a spatial trends analysis for constituents not applied by agriculture: DO, SC, and *E. coli*. A similar analysis was performed for ammonia/nitrates which are constituents applied by agriculture but are not tracked through any reporting system. The spatial trends analysis was conducted to identify if exceedances of the WQTL for non-applied constituents occurred more frequently at a specific site, specific Zone, or a period of time. These analyses include a comparison between the percent frequency of exceedances in samples collected during all seasons (fall, winter, storm, and irrigation) in 2009 and January through September 2014 (Table 86 through 89). Storm events are included in the counts for the monitoring event it replaced. Storm events occurred on February 11, 2014 and March 3, 2014; no storm monitoring took place in the Coalition region in 2009.

The purpose of the comparison for all seasons is to determine if exceedances of the WQTLs for these constituents occur more frequently during a particular time of year. Discharge and water temperature are used to demonstrate how environmental factors play a role in the occurrence of exceedances of WQTLs for these constituents. Cow density and depth of groundwater data are utilized to evaluate how these factors influence water quality as they relate to exceedances of the WQTL of ammonia, *E. coli*, and nitrates (cow density), and SC (groundwater depth; Figure 48 through 55).

In the Coalition's May 1, 2015 SQMP, a timetable for addressing difficult to source constituents (DO, SC, and *E. coli*) is provided. Those constituents will be the subject of source identification studies conducted by the Coalition over the next several years. If irrigated agriculture is identified as a potential source, the Coalition will then determine which management practices could be effective in reducing discharges and will conduct outreach with growers to review appropriate practices.

Dissolved Oxygen

The Coalition measures DO at all sites during every monitoring event. Dissolved oxygen is essential to aquatic organisms and sites within the SJCDWQC are assigned beneficial uses to protect aquatic habitats. Dissolved oxygen is a non-conserved constituent meaning that it can increase or decrease as water moves downstream. Natural instream processes generate or remove DO from the waterbody without external inputs of agricultural constituents and therefore trying to assess the role of agricultural discharges on DO dynamics is an involved and expensive task. Processes occurring on land, in the water column, and in the sediment can reduce DO to levels below the WQTL. Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, as well as excessive nutrients. The Coalition evaluated the frequency of exceedances of the WQTL for DO during the designated seasons: fall (October through December), winter (January through March), and irrigation (April through September).

The frequency of exceedances of the WQTL for DO during all seasons increased in 2014 compared to 2009; there were 49 exceedances in 2009 and 72 exceedances in 2014 (Table 79). Exceedances of the WQTL for DO are more common during the irrigation season for both years (Figure 48 and 49). Nine and 16 exceedances of the WQTL for DO occurred during the irrigation season in 2009 and 2014, respectively. During the irrigation season in 2009, the average water temperature was 19.5°C. During the irrigation season in 2014, the average water temperature was 15.6°C. Water can be saturated at approximately 9.85 mg/L when water reaches a temperature of 16°C and 9.07 mg/L when water reaches a temperature of 20°C. The irrigation season months are consistently warm throughout the SJCDWQC region and when water temperatures increase, DO concentrations decrease. Factors such as biological oxygen demand and low flow may inhibit DO from reaching the saturation point in a waterbody. Discharge measurements during the irrigation season at several of the sites were recorded as zero or extremely low flow conditions. Without significant flow to replenish DO in the water column, DO may be depleted to concentrations that fall below the 7 mg/L WQTL.

It is also possible that management practices implemented by growers to reduce irrigation runoff or tailwater and/or stormwater runoff subsequently reduce DO. During education and outreach, Coalition representatives discuss with growers management practices designed to prevent the offsite movement of constituents and sediment into the waterway by reducing irrigation tailwater and stormwater runoff. Management practices such as using less water for irrigation or grass center rows are commonly implemented by growers. These practices can also reduce the volume of runoff entering receiving waterbodies. As the volume of water moving to surface waters decreases, flows in Coalition tributaries also decrease.

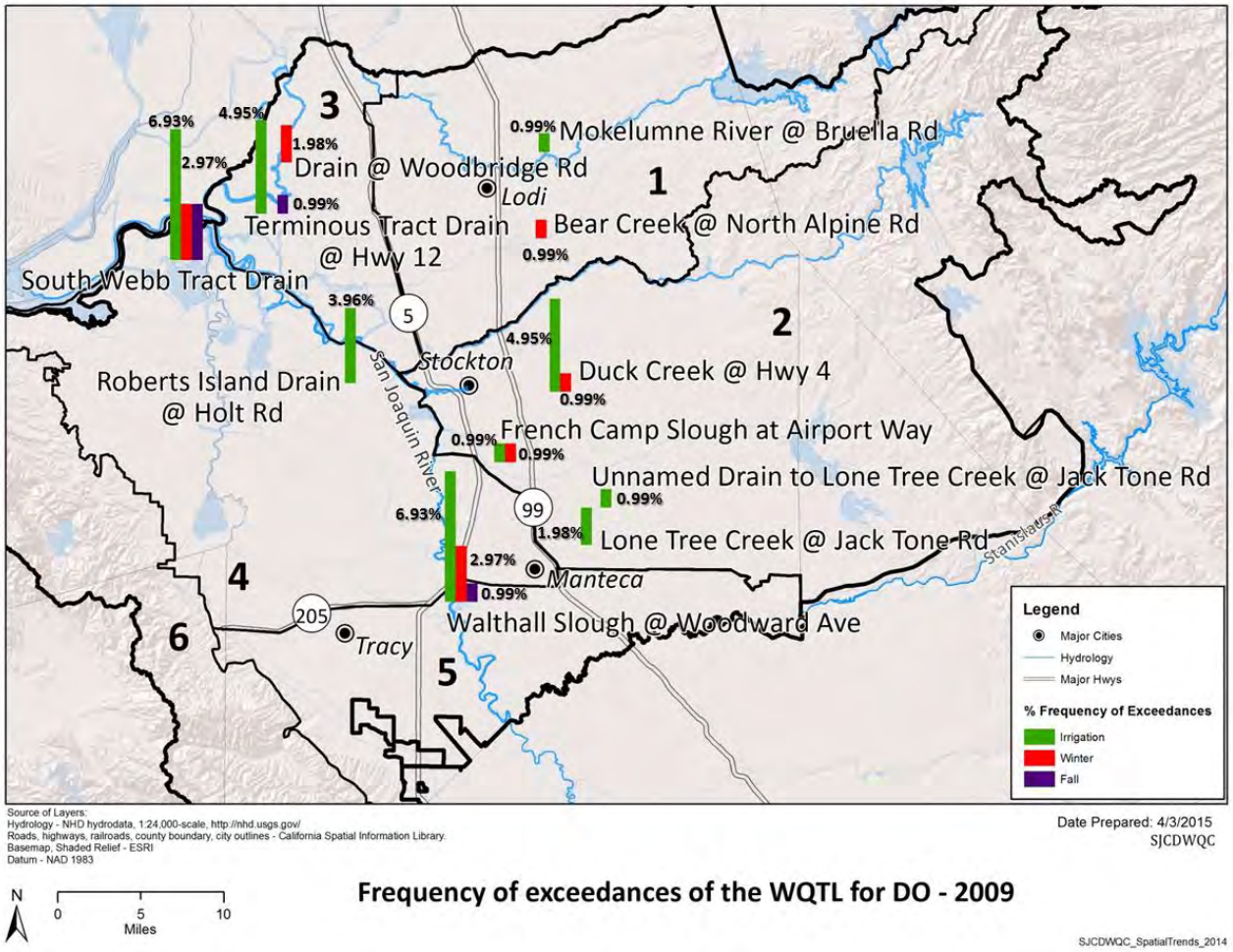
Trends in DO concentrations in the water column of sites in the SJCDWQC region do not demonstrate a spatial trend. However, a temporal trend on an annual basis is apparent and DO levels are strongly influenced by flow. Since, most waterways in the Coalition region are used for agricultural purposes only, inputs from water leaving the fields are necessary to maintain Do levels at 7 mg/L.

Table 86. Frequency of exceedances the WQTL for DO during all seasons for 2009 and January through September 2014.

Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site subwatershed	Year	Season	Total exceedances	Total collected	% Frequency of exceedance
DO	1	Bear Creek @ North Alpine Rd	2009	Winter	1	101	0.99%
			2014	Irrigation	2	121	1.65%
		Mokelumne River @ Bruella Rd	2009	Irrigation	1	101	0.99%
	2	Duck Creek @ Hwy 4	2009	Irrigation	5	101	4.95%
				Winter	1	101	0.99%
			2014	Irrigation	3	121	2.48%
				Winter	1	121	0.83%
		French Camp Slough at Airport Way	2009	Irrigation	1	101	0.99%
				Winter	1	101	0.99%
			2014	Winter	2	121	1.65%
		Littlejohns Creek @ Jack Tone Rd	2014	Irrigation	4	121	3.31%
		Lone Tree Creek @ Jack Tone Rd	2009	Irrigation	2	101	1.98%
			2014	Irrigation	1	121	0.83%
		Mormon Slough @ Jack Tone Rd	2014	Irrigation	2	121	1.65%
		Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2009	Irrigation	1	101	0.99%
			2014	Irrigation	1	121	0.83%
	3	Drain @ Woodbridge Rd	2009	Winter	2	101	1.98%
			2014	Irrigation	1	121	0.83%
		Empire Tract @ 8 Mile Rd	2014	Irrigation	2	121	1.65%
				Winter	3	121	2.48%
		Terminous Tract Drain @ Hwy 12	2009	Irrigation	5	101	4.95%
			2009	Fall	1	101	0.99%
			2014	Irrigation	6	121	4.96%
				Winter	2	121	1.65%
	4	Bacon Island Pump @ Old River	2014	Irrigation	6	121	4.96%
				Winter	2	121	1.65%
		Grant Line Canal @ Clifton Court Rd	2014	Irrigation	2	121	1.65%
				Winter	3	121	2.48%
		Grant Line Canal near Calpack Rd	2014	Irrigation	4	121	3.31%
				Winter	2	121	1.65%
		Kellogg Creek along Hoffman Ln	2014	Irrigation	1	121	0.83%
		Roberts Island Drain @ Holt Rd	2009	Irrigation	4	101	3.96%
		Roberts Island @ Whiskey Slough Pump	2014	Irrigation	6	121	4.96%
			2014	Winter	3	121	2.48%
		South Webb Tract Drain	2009	Irrigation	7	101	6.93%
				Fall	3	101	2.97%
				Winter	3	101	2.97%
	5	Walthall Slough @ Woodward Ave	2009	Irrigation	7	101	6.93%
				Fall	1	101	0.99%
				Winter	3	101	2.97%
			2014	Irrigation	5	121	4.13%
				Winter	4	121	3.31%
	6	Sand Creek @ Hwy 4 Bypass	2014	Irrigation	5	121	4.13%
				Winter	1	121	0.83%

Figure 46. Frequency of 2009 exceedances of the WQTL for DO during all seasons.



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.
Basemap, Shaded Relief - ESRI
Datum - NAD 1983

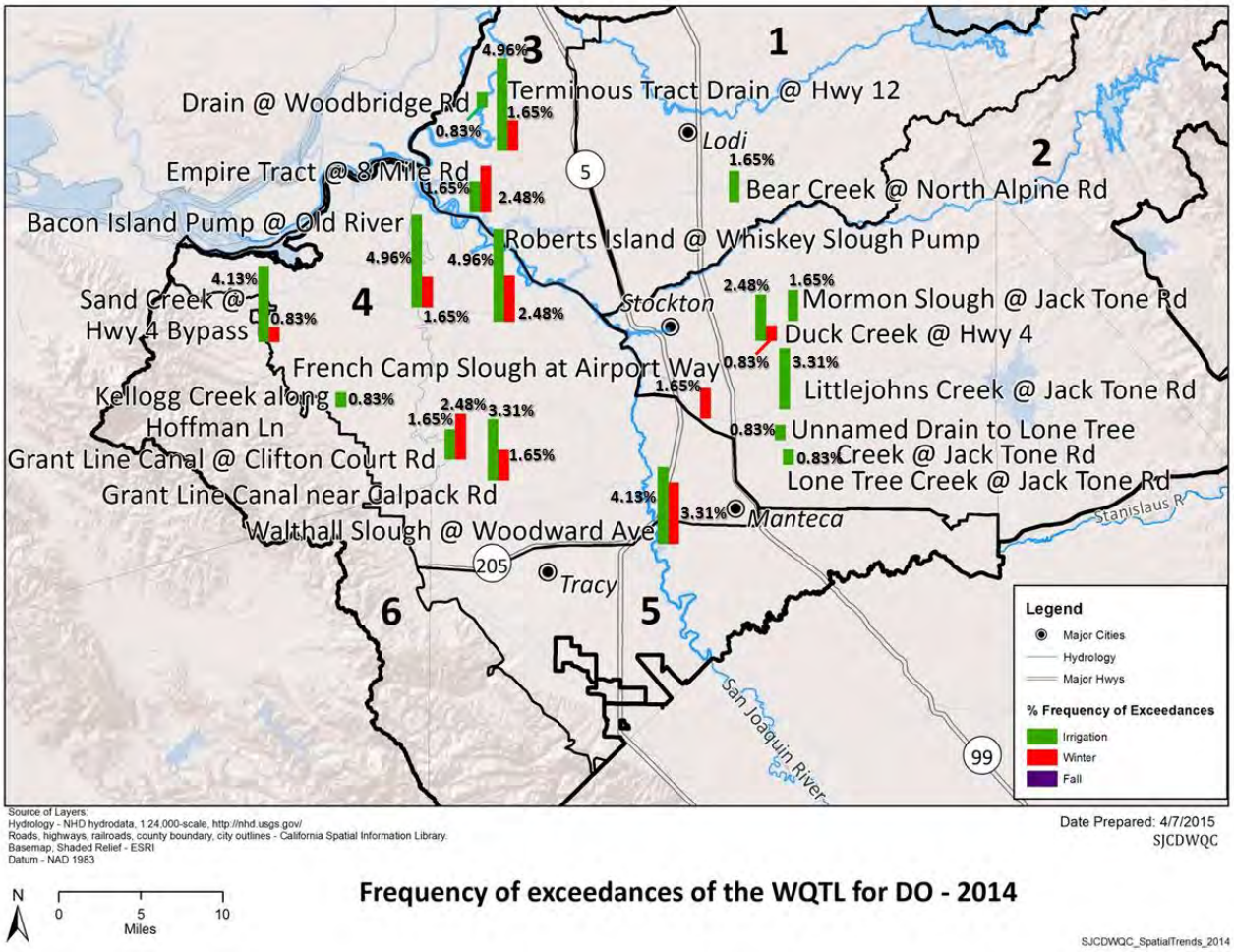
Date Prepared: 4/3/2015
SJCDWQC

N
0 5 10
Miles

Frequency of exceedances of the WQTL for DO - 2009

SJCDWQC_SpatialTrends_2014

Figure 47. Frequency of January through September 2013 exceedances of the WQTL for DO during all seasons.



Specific Conductance

The Coalition monitors SC because it is a measurement of salts and elevated salinity can affect crop productivity. Geological and geographical factors influencing salts in the waterways are outside the scope of what the Coalition is capable of improving through modified agricultural practices and are the focus of the Central Valley-wide CV-SALTS process. In 2006, the State Water Board, Regional Board and stakeholders initiated CV-SALTS, which is a collaborative effort to develop and implement a salinity and nitrate management program and Basin Plan Amendment. The Central Valley Salinity Coalition (CVSC) formed in July 2008 to organize, facilitate and fund efforts needed to fulfill the goals of CV-SALTS, including coordinating meetings of the CV-SALTS committees. The Lower San Joaquin River Committee of CV-SALTS is tasked with reviewing relevant studies and developing the science and policy needed to justify a Basin Plan amendment for salt and boron in the San Joaquin River upstream of Vernalis. The Coalition continues to monitor SC until the CV-SALTS process is finalized. High salinity levels resulting in exceedances of the WQTLs for SC are common in the Delta islands due to 1) tidal influence in the area, 2) hydrostatic pressure moving Delta water to the interior of the islands and/or the use of Delta water for irrigation, and 3) elevated concentrations of SC delivered to the Delta from the Lower San Joaquin River.

The occurrence of exceedances of the WQTL for SC has increased from a total of 27 in 2009 to 46 in 2014 (Table 87). Specific conductance levels exceeded the 700 µs/cm WQTL most frequently during the winter season in 2009 and the irrigation season in 2014 (Figure 50 and 51). The site subwatersheds in Zone 4 are comprised of agricultural drains within the Delta islands and pumping is required to remove water from the drains. In most cases there is no flow in the drains unless the pumps are activated.

Geographically, the west side of the Coalition region, where Zone 4 is located, has poor subsurface drainage and salty groundwater intrusion can elevate SC levels above the 700 µs/cm WQTL. Management of subsurface drainage is necessary to cope with shallow groundwater conditions which result in the accumulation of salts in the root zones of agricultural crops (http://www.water.ca.gov/drainage/index.cfm). As site subwatersheds in Zone 4 use groundwater for irrigation, more salty groundwater is pumped into the drains. To combat drought conditions, groundwater was potentially used at a higher rate than in previous years. The higher use of groundwater with little to no recharge of the Central Valley aquifer may have led to 24 exceedances of the WQTL for SC that occurred during the irrigation season in 2014 compared to eight exceedances in 2009.

Table 87. Frequency of exceedances the WQTL for SC during all seasons for 2009 and January through September 2014.

Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site subwatershed	Year	Season	Total exceedances	Total collected	% Frequency of exceedance
SC	3	Drain @ Woodbridge Rd	2009	Winter	3	101	2.97%
			2014	Irrigation	1	128	0.78%
		Empire Tract @ 8 Mile Rd	2014	Irrigation	2	128	1.56%
				Winter	3	128	2.34%
		Terminous Tract Drain @ Hwy 12	2009	Irrigation	1	101	0.99%
				Fall	2	101	1.98%
				Winter	3	101	2.97%
			2014	Irrigation	1	128	0.78%
				Winter	2	128	1.56%
	4	Bacon Island Pump @ Old River	2014	Irrigation	1	128	0.78%
				Winter	1	128	0.78%
		Grant Line Canal @ Clifton Court Rd	2014	Irrigation	2	128	1.56%
				Winter	4	128	3.13%
		Grant Line Canal near Calpack Rd	2014	Irrigation	5	128	3.91%
			2014	Winter	4	128	3.13%
		Kellogg Creek along Hoffman Ln	2014	Winter	1	128	0.78%
		Roberts Island Drain @ Holt Rd	2009	Irrigation	5	101	4.95%
			2009	Fall	3	101	2.97%
			2009	Winter	2	101	1.98%
		Roberts Island @ Whiskey Slough Pump	2014	Irrigation	6	128	4.69%
			2014	Winter	4	128	3.13%
		South Webb Tract Drain	2009	Irrigation	2	101	1.98%
			2009	Winter	3	101	2.97%
	5	Walthall Slough @ Woodward Ave	2009	Fall	1	101	0.99%
			2009	Winter	2	101	1.98%
			2014	Irrigation	1	128	0.78%
			2014	Winter	2	128	1.56%
	6	Sand Creek @ Hwy 4 Bypass	2014	Irrigation	5	128	3.91%
			2014	Winter	1	128	0.78%

Figure 48. Frequency of 2009 exceedances of the WQTL for SC during all seasons with depth to groundwater.

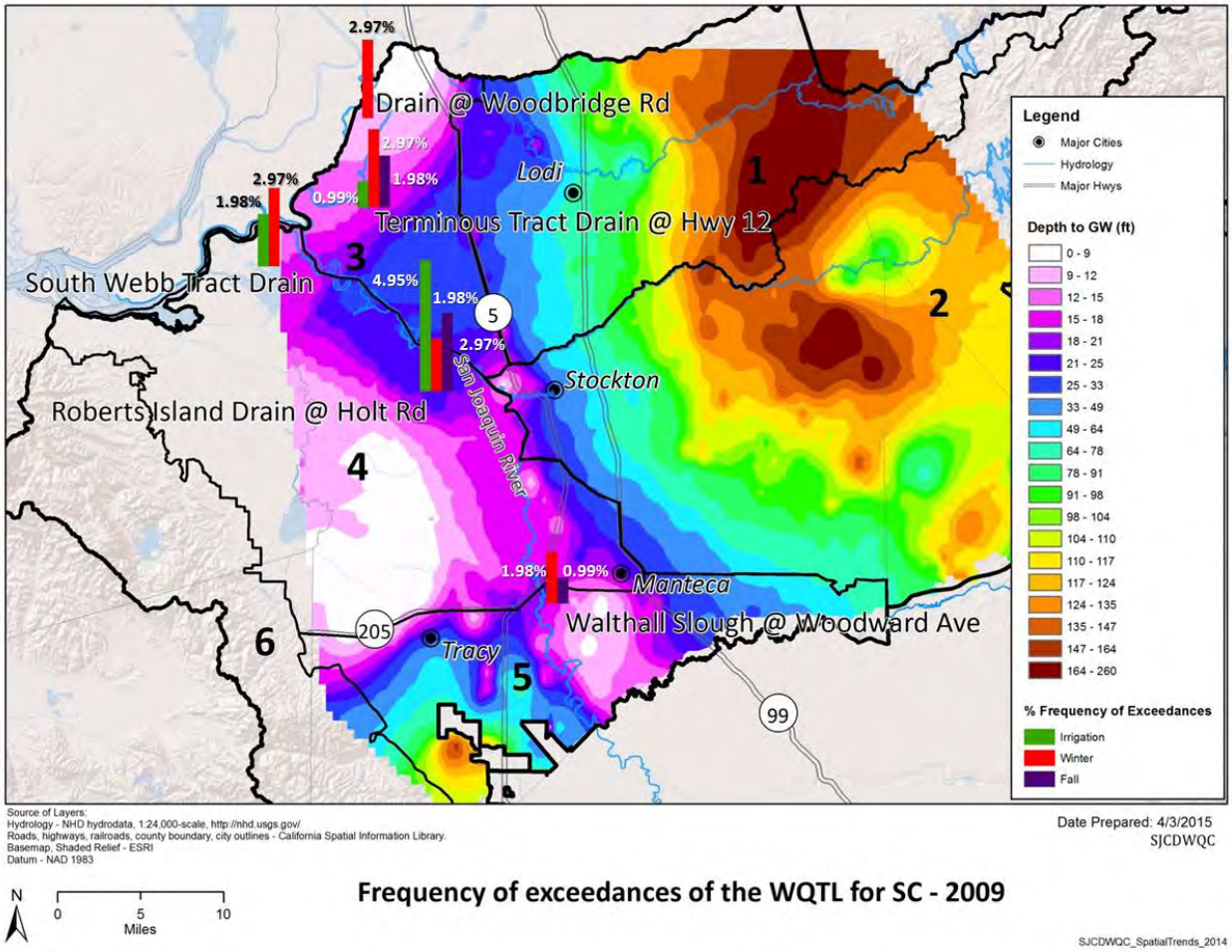
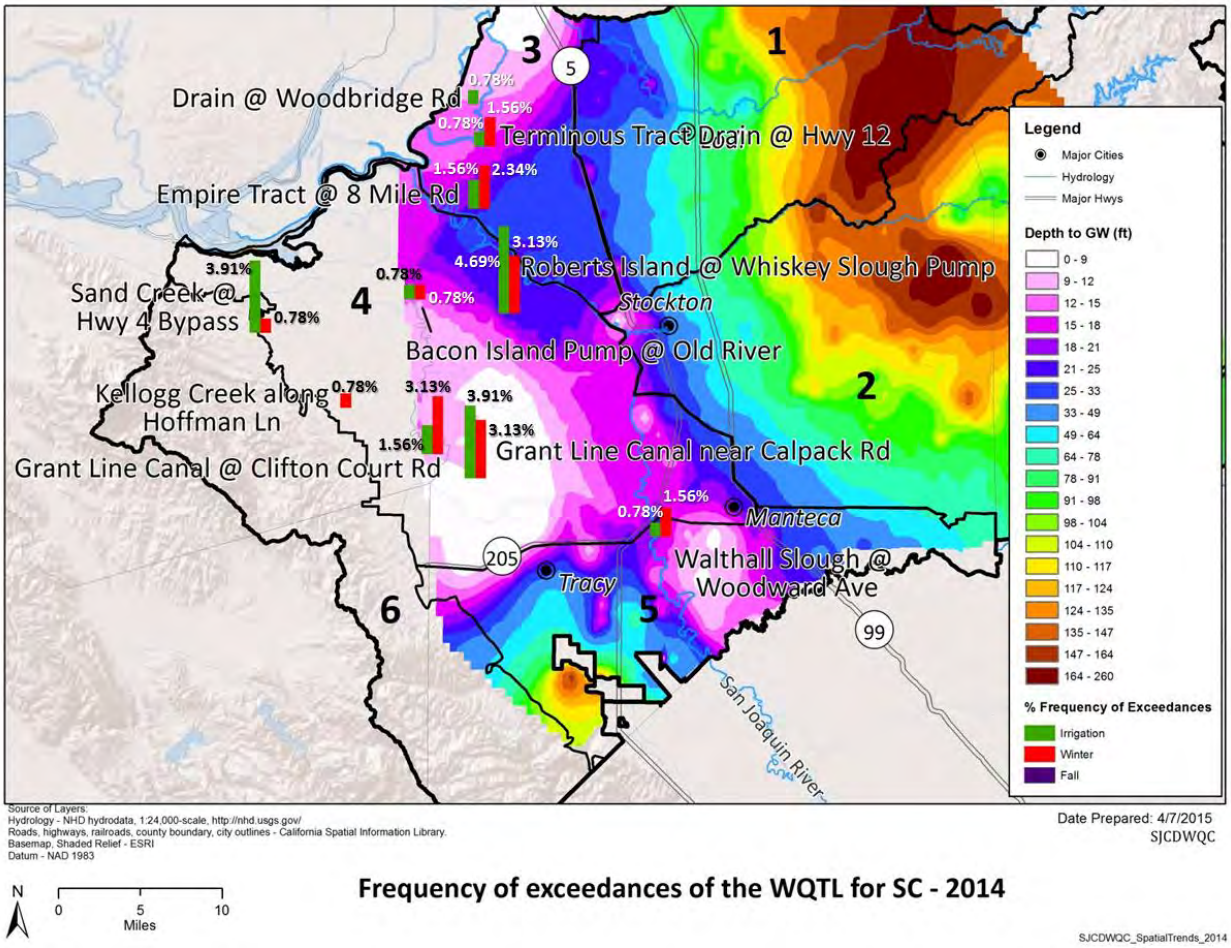


Figure 49. Frequency of exceedances of the WQTL for SC during all seasons from January through September 2014 with depth to groundwater.



E. coli

E. coli are bacteria that exist naturally in ecosystems, manure improperly composted by dairies and used by growers, intestinal tracts of domesticated and wild animals, which can be voided in or around a site location. *E. coli* naturally exists in soils and sediments throughout the Coalition region. When in a waterbody, *E. coli* can exist in warm water environments with sufficient sources of TOC in water to allow it to proliferate. In stagnant conditions, *E. coli* can be measured above the WQTL in water samples. Manure application practices are intended to keep manure from reaching waterways and proliferating bacteria. Even though landowners and operators are required to follow crop specific manure application practices and guidelines, contamination may occur. Although dairies are not allowed to discharge into the waterways, there have been noted instances of illegal discharges in the Coalition area. Any species of vertebrate can contribute *E. coli* in surface waters, including humans, domesticated animals such as cattle or chicken, companion animals such as dogs and cats, wildlife such as waterfowl, feral pigs, and in some locations, deer. Humans can contribute to *E. coli* in surface waters from illegal discharges from septic or portable lavatory companies and discharges from adjacent home properties. Sources of *E. coli* from domesticated, companion, or wild animals can occur in surface waters when these animals void fecal material while using a waterbody to bath or drink from. After being voided, the bacteria may persist and proliferate in the environment when conditions are adequate for the bacteria to grow. The Coalition cannot source and monitor the contributions of each of these sources.

Exceedances of the WQTL for *E. coli* declined from 10 in 2009 to 9 from January through September 2014. From January through September 2014, samples for *E. coli* analyses were collected monthly for both Assessment and Core Monitoring sites. Due to the nine month timeframe for the 2014 reporting year, the sample size for *E. coli* is smaller compared to the sample size in 2009. As a result, percent frequencies of exceedances for *E. coli* for some sites appear to have increased, even though the total number of exceedances is essentially the same. For example, samples collected from Walthall Slough @ Woodward Ave resulted in an exceedance of the WQTL for *E. coli* once during the winter in both 2009 and 2014. However, the percent frequency during the winter increased from 1.23% in 2009 to 1.67% in 2014, when in fact the total number of exceedances stayed the same (Table 88).

Although exceedances have occurred in areas where cow density is moderate, exceedances of the WQTL for *E. coli* occurred most frequently at sites that are not located near areas with any cow densities (Figure 52 and 53). Exceedances of the WQTL for *E. coli* occurred most often in samples collected from South Webb Tract Drain in 2009 (3.70%) and Bacon Island Pump @ Old River Rd (5.00%) in 2014 (Table 88). Sources contributing to the occurrence of exceedances the WQTL for *E. coli* at those sites could be from strains existing in soils or sediments, fecal material voided wildlife using the water at the site locations. Although it is difficult to source, improperly composted manure applications on fields near the site locations may also contribute the levels of *E. coli* measured in samples. Samples collected from the Delta islands often exceeded the WQTL for *E. coli* most likely because of conditions of the waterbody at the locations support the proliferation of *E. coli*. During the irrigation season in 2009, TOC concentrations ranged between 15 and 60 mg/L in water samples collected at South Webb Tract Drain. Further, no observed flow was noted by the sampling crews on the field sheets for the site. Similarly in 2014, TOC concentrations in water samples collected from Bacon Island Pump @ Old River Rd ranged between 8 and 22 mg/L and no measurable flow was noted by sampling crews throughout the irrigation

season. Even if cattle density is not contributing to the frequency of *E. coli* exceedances, the sources, in addition the conditions at these sites are ideal environments for *E. coli* to proliferate. Without much flow and sources of TOC available for the bacteria, exceedances of the WQTL for *E. coli* will likely continue to occur at these sites.

Lower percent frequencies of exceedances of the WQTL for *E. coli* possibly occurred at the other seven locations because TOC concentrations were lower and flow conditions. In 2009, TOC concentrations ranged between 1.5-3.5 mg/L (Mokelumne River @ Bruella Rd), 6.6-14 mg/L (Roberts Island @ Holt Rd), and 2.6-15 mg/L (Walthall Slough @ Woodward Ave) and flow conditions (>1 cfs) were measured at each of the sites. Similarly, TOC concentrations ranged between 3.2-17 mg/L (French Camp Slough @ Airport Way), 4.3-14 mg/L (Terminous Tract Drain @ Hwy 12), 2.9-11 mg/L (Walthall Slough @ Woodward Ave and flow was measured at the each of the sites in 2014. All possible sources of *E. coli* could have contributed to measurements that exceeded the WQTL in samples collected from these sites. However, the measureable flow replenishes the receiving waterbody and lower concentrations of TOC prevent the bacteria from existing in the water column at levels that exceed the WQTL.

Table 88. Frequency of exceedances the WQTL for *E. coli* during all seasons for 2009 and January through September 2014.

Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site subwatershed	Year	Season	Total exceedances	Total collected	% Frequency of exceedance
E. coli	1	Mokelumne River @ Bruella Rd	2009	Fall	1	81	1.23%
	2	French Camp Slough at Airport Way	2009	Irrigation	1	81	1.23%
			2014	Winter	1	60	1.67%
	3	Empire Tract @ 8 Mile Rd	2014	Irrigation	1	60	1.67%
		Terminous Tract Drain @ Hwy 12	2009	Irrigation	2	81	2.47%
			2014	Irrigation	2	60	3.33%
	4	Bacon Island Pump @ Old River	2014	Irrigation	3	60	5.00%
		Roberts Island Drain @ Holt Rd	2009	Fall	1	81	1.23%
		Roberts Island @ Whiskey Slough Pump	2014	Irrigation	1	60	1.67%
		South Webb Tract Drain	2009	Irrigation	3	81	3.70%
	5	Walthall Slough @ Woodward Ave	2009	Fall	1	81	1.23%
				Winter	1	81	1.23%
			2014	Winter	1	60	1.67%

Figure 50. Frequency of 2009 exceedances of the WQTL for *E. coli* during all seasons with cattle densities.

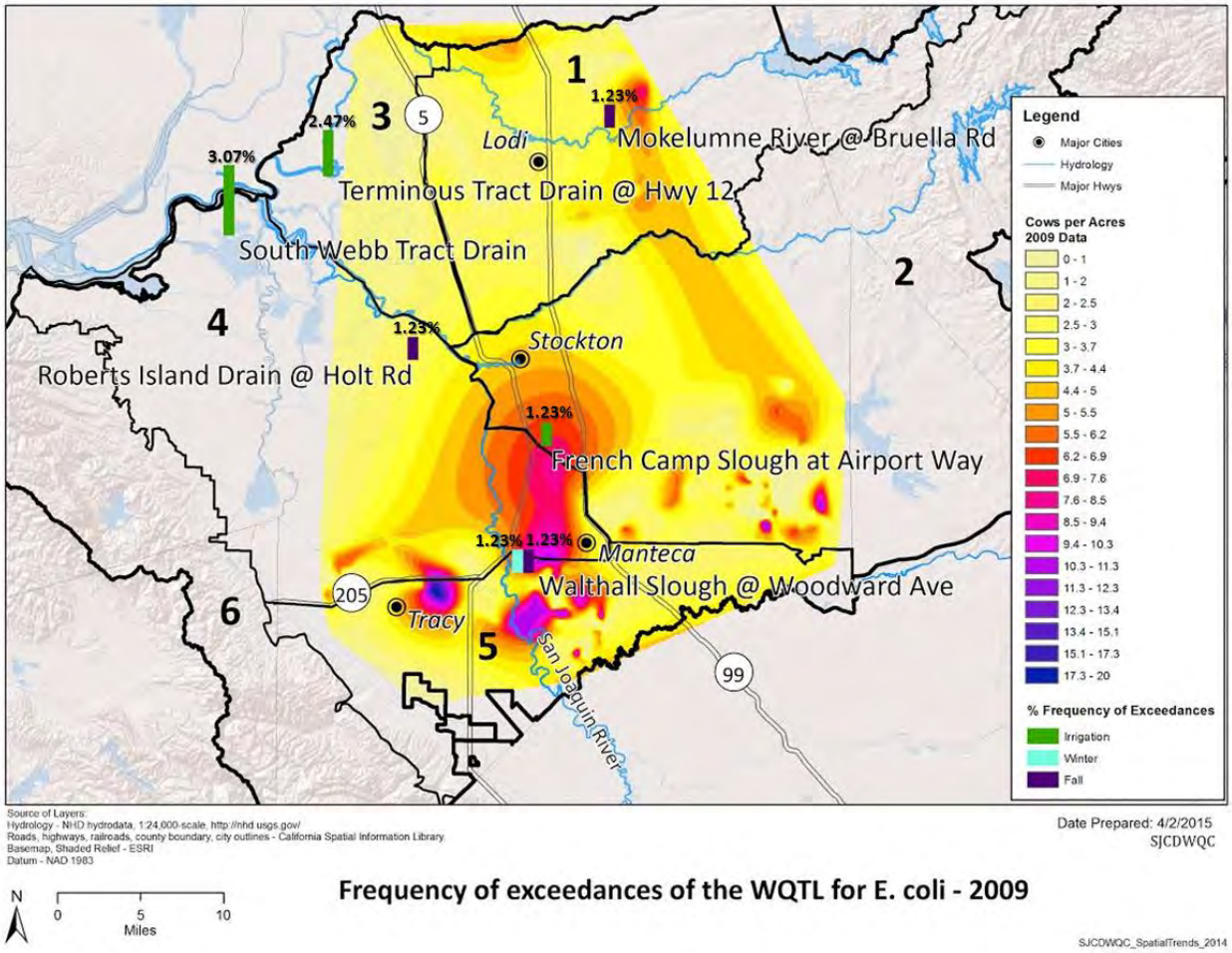
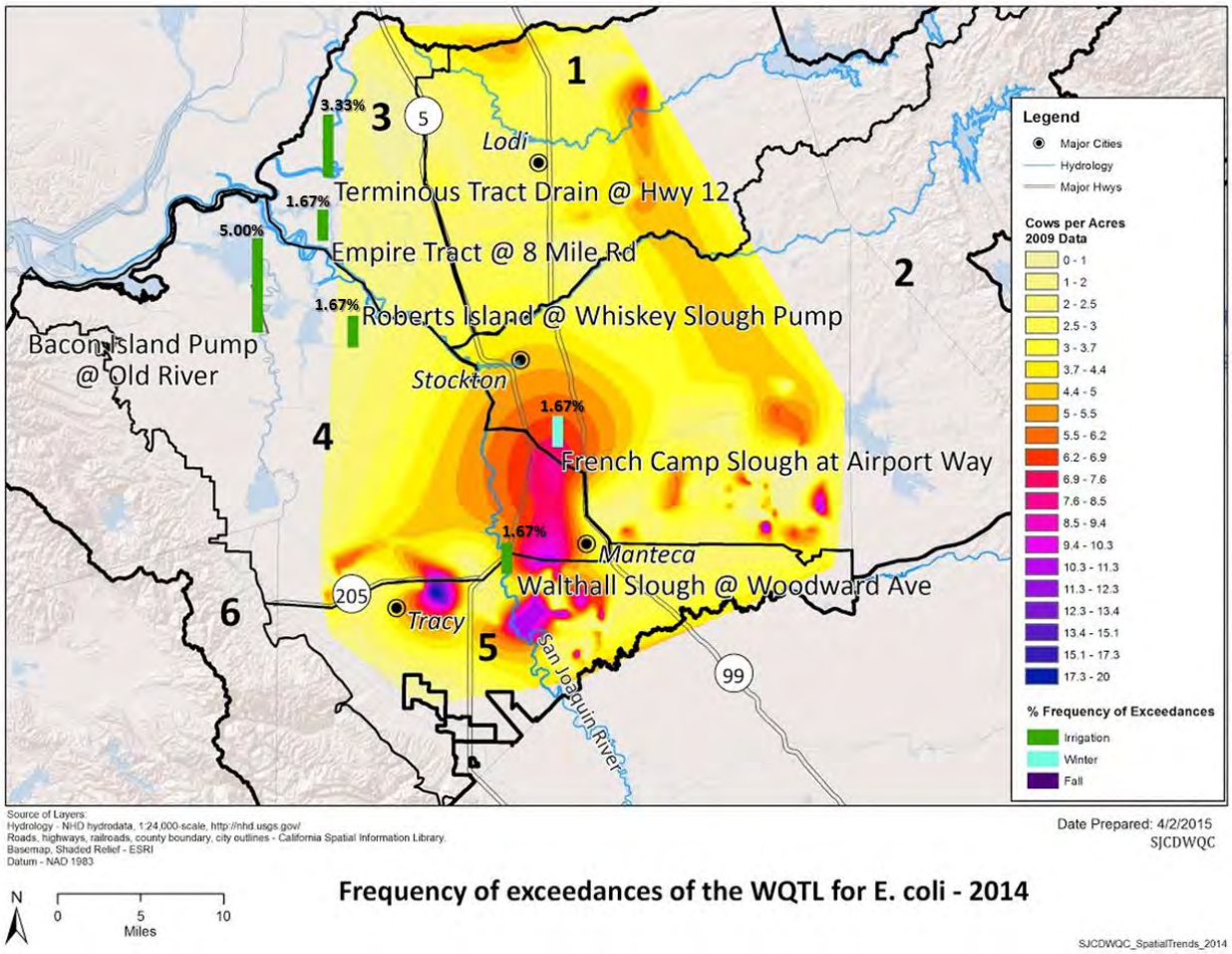


Figure 51. Frequency of exceedances of the WQTL for *E.coli* during all seasons January through September 2014 with cattle densities.



Ammonia and Nitrates

Excessive nutrients can cause eutrophication of surface waters resulting in low DO and an inability of the waterbody to support healthy aquatic communities. Sources of nutrients, organic carbon, and low DO are difficult to identify. Ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers such as anhydrous ammonia to surface waters, 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. The most common method of anhydrous ammonium applications to fertilize agricultural field is injection into the soil. Ammonia is transformed to nitrate by nitrifying bacteria over a short period of time. The method of application argues against the idea that direct discharge to a receiving waterbody is a possible major contributor to exceedances of the WQTLs for ammonia. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen, which is naturally occurring although the conditions under which this process takes place argues against this as a major contributor to the ammonium found in surface waters in the Coalition region. If nitrogen fertilizer is applied as a nitrate compound, irrigation tailwater could mobilize the nitrate and move it to surface waters.

In 2009, ammonia was detected 59 times and nitrates were detected 70 times; 20 of those detections (for each constituent) occurred in samples collected from sites located in Zone 4. In 2009, there were two exceedances of the WQTL for ammonia and none for nitrates (Table 89). From January through September 2014, ammonia was detected 56 times and nitrates were detected 54 times; 18 of the ammonia detections and 17 of the nitrate detections occurred in samples from Zone 4. During 2014, only one exceedance of the WQTL for ammonia occurred and none for nitrates. In both years, exceedances of the WQTL for ammonia occurred most frequently during the irrigation season and in each year the exceedance occurred in samples collected from a site in Zone 4 (Figures 52 and 53).

Ammonia and nitrates move easily through water, but nitrates are detected more commonly in groundwater. Ammonia is not detected as often in groundwater because it is an intermediate step in the oxidation of ammonium which forms nitrates and therefore, only it exists in nature temporarily. Nitrates are detected more frequently in groundwater than ammonia because of how quickly ammonia can be broken down to nitrates. Detections of ammonia and nitrates often occur in samples collected from subwatersheds in Zone 4, which is located on the west side of the Coalition region and has a shallow groundwater table. Fertilizers are usually applied during the spring prior to irrigation and due to the extreme solubility, nitrates in fertilizer could move to surface waters immediately after applications. However, it is unlikely that applications in the spring would result in exceedances of the WQTL throughout the irrigation season. Nitrates in shallow groundwater originating from dairies and fertilizer applications may be intercepted by the field and surface drains and transported to surface waters resulting in exceedances of the WQTL for nitrate. Any nitrate applications during the growing season are potentially moving through the drains throughout the year. Applications further away from the drains take longer to reach the drain and it could be months or even years before nitrate from a specific application is detected. Unless sophisticated isotopic analytical analyses are performed, it is not possible to distinguish nitrates originating from inorganic fertilizers applied to agricultural land from nitrates originating from dairies and feedlot operations.

Table 89. Frequency of exceedances the WQTL for ammonia/nitrates during all seasons for 2009 and January through September 2014.

Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site subwatershed	Year	Season	Total exceedances	Total collected	% Frequency of exceedances
Ammonia	4	Bacon Island Pump @ Old River	2014	Irrigation	1	60	1.67%
		South Webb Tract Drain	2009	Irrigation	1	81	1.23%
	5	Walthall Slough @ Woodward Ave	2009	Winter	1	81	1.23%

Figure 52. Frequency of exceedances of the WQTL for ammonia and nitrates during all seasons in 2009 with cow densities.

The frequencies of exceedances represent exceedances of WQTL for ammonia only because there were no exceedances of the WQTL for nitrates in 2009.

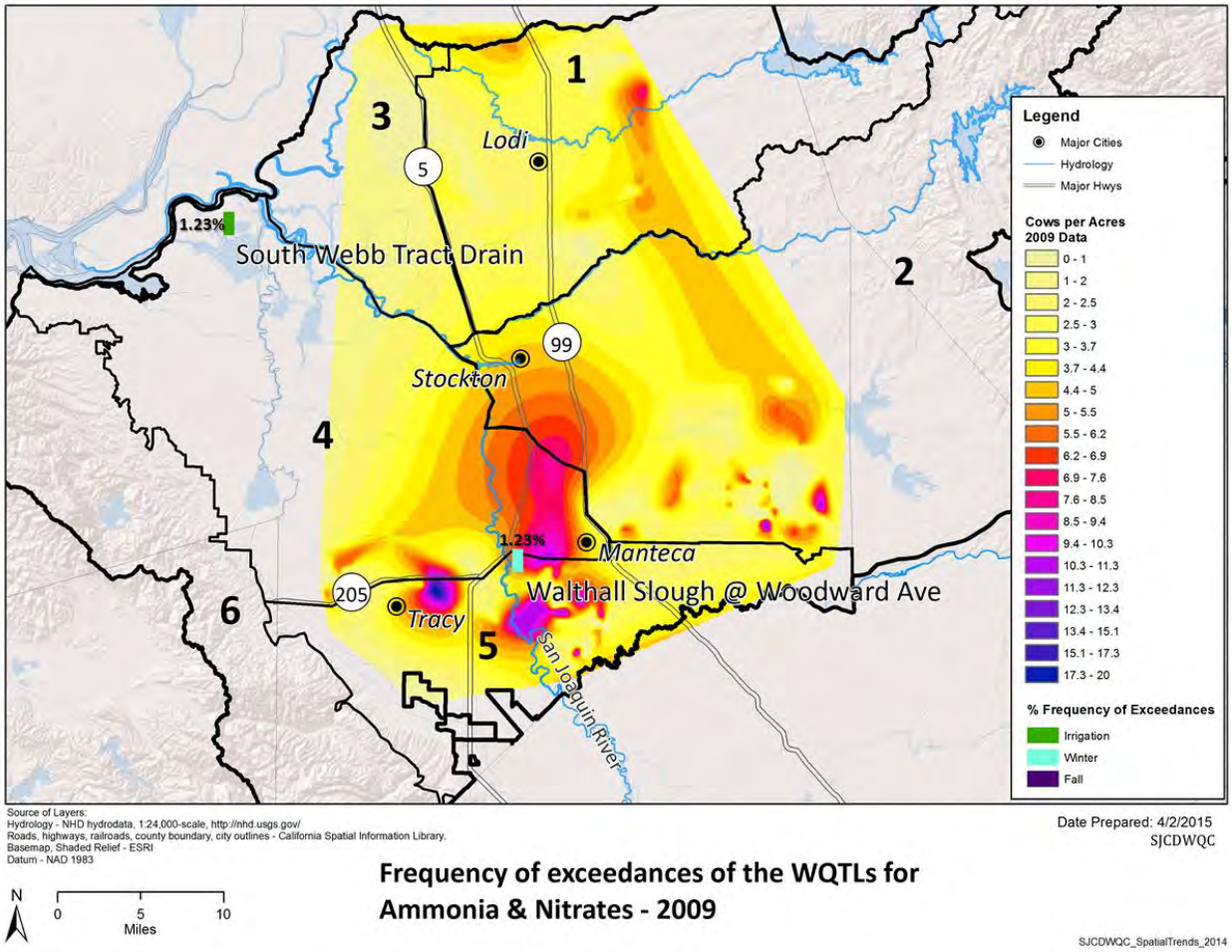
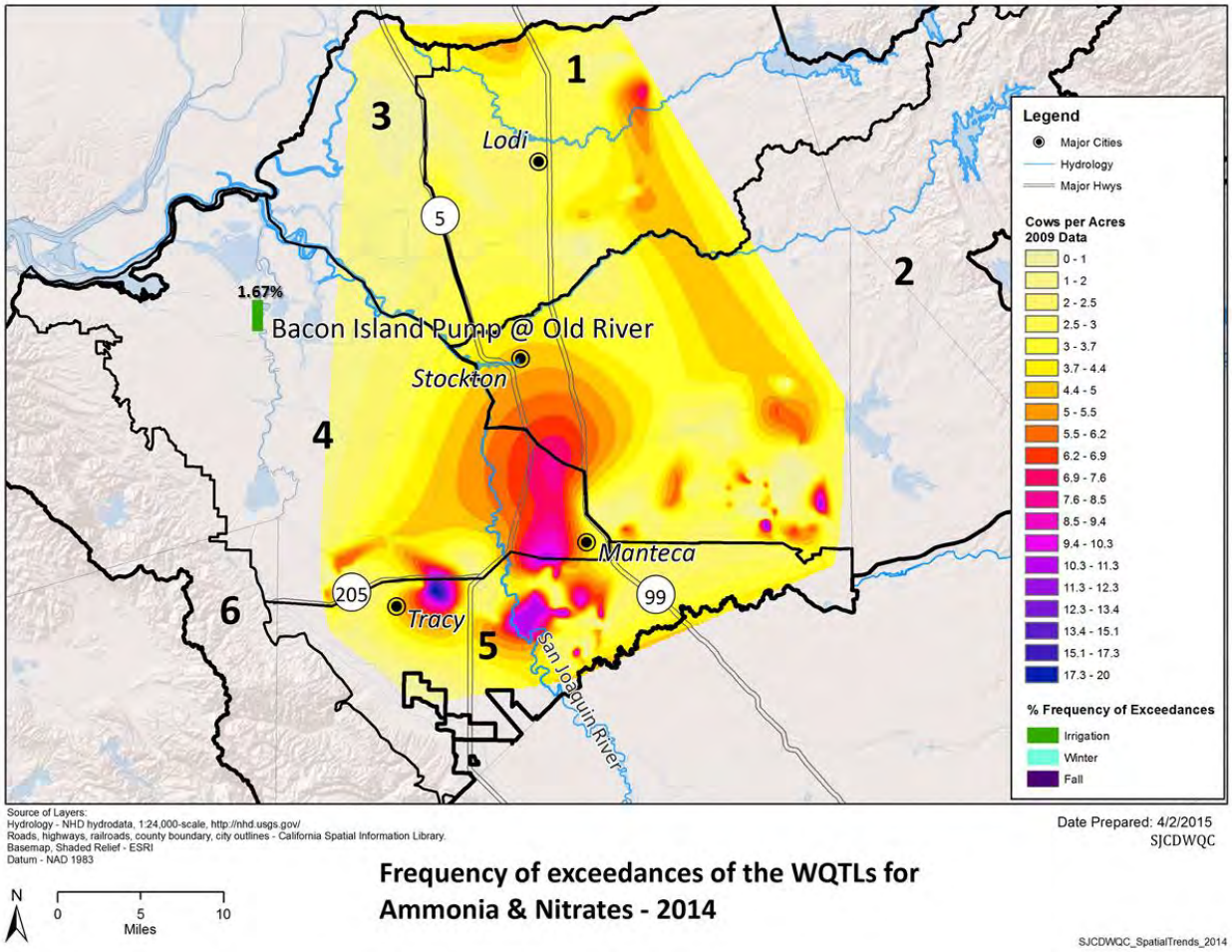


Figure 53. Frequency of exceedances of the WQTL for SC during Coalition seasons from January through September 2014 with cow densities.

The frequencies of exceedances represent exceedances of WQTL for ammonia only because there were no exceedances of the WQTL for nitrates in 2014.



XV. D. QUESTION 4: WHAT ARE THE MANAGEMENT PRACTICES THAT ARE BEING IMPLEMENTED TO REDUCE THE IMPACTS OF IRRIGATED AGRICULTURE ON WATERS OF THE STATE WITHIN THE COALITION GROUP BOUNDARIES AND WHERE ARE THEY BEING APPLIED?

The Coalition identified six general classifications of management practices that are effective at reducing the impacts of agricultural discharges on water quality including:

1) Reduction in application rates (including using low risk products)
2) Installation of sprinkler, drip, or microspray (all pressurized) irrigation
3) Retention pond/holding basin
4) Irrigation management
5) Grass waterways or grass filter strips
6) Polyacrylamide (PAM)

The Coalition conducted meetings with targeted growers to document current management practices in the first through fifth priority subwatersheds. Follow-up contacts with targeted growers to document newly implemented management practices occurred in the first through fifth priority subwatersheds. The Management Practices section in this report included summaries for the first through fifth priority subwatershed implemented management practices and a preliminary (pending follow-ups) analysis of management practices in the sixth priority site subwatershed, Drain @ Woodbridge. The 2016 Annual Report will feature a complete analysis of implemented management practices in the Drain @ Woodbridge site subwatershed.

The Coalition provided an accounting of the acres associated with newly implemented management practices designed to reduce the impacts of irrigated agriculture on waters of the State in the SJCDWQC for the first, through fifth priority subwatersheds (Table 57). When evaluating management practices and the associated acreage, a parcel may be included under multiple management practices. Therefore, the acreages in Table 57 cannot be summed together across management practices for each subwatershed; however, acreages can be used to evaluate number of acres with a particular practice within the overall targeted drainage acreage of the subwatershed.

Growers in the first through fifth priority subwatersheds implemented additional management practices as a result of Coalition outreach and education. Of the acreage within first through fifth priority subwatersheds targeted for outreach, newly implemented management practices associated with the most targeted acres are 1) reducing or eliminating the use of pesticides such as chlorpyrifos, that have caused exceedances of WQTLs (66%), 2) reducing runoff volumes by using irrigation management (59%), 3) reducing irrigation tailwater by installing sprinkler/micro irrigation (32%), 4) using grass rows/waterways/filter strips (21%), 5) treating runoff water with PAM (7%), and 6) installing a retention pond, holding basin and/or return system (3%, Table 57).

XV. E. QUESTION 5: ARE IMPLEMENTED MANAGEMENT PRACTICES EFFECTIVE IN MEETING APPLICABLE RECEIVING WATER LIMITATIONS?

The Coalition completed two years of its focused outreach strategy in all first through fifth priority site subwatersheds including documenting management practices. MPM occurred during years of focused outreach and continues until the site/constituent is removed from a management plan (Table 70). The Coalition analyzes the results of all monitoring (Assessment, Core, and MPM) to evaluate the effectiveness of current and newly implemented management practices. Across the 15 site subwatersheds, 149 members implemented new management practices from 2009 through 2014 (Table 56 and 57). The most common implemented practices included reducing the use of pesticide types found in exceedances and reducing runoff water volumes using irrigation management (Table 57). Implemented management practices have been effective at improving water quality as indicated by the significant decrease of exceedances of the WQTLs for high priority constituents throughout the first through fifth site subwatersheds.

Due to improved water quality, the Coalition received approval to remove multiple constituents from first through fifth site subwatershed management plans: chlorpyrifos was removed from four management plans, diazinon was removed from all management plans, diuron was removed from one management plans, and copper was removed from five management plans. Exceedances of the WQTL for diuron, and water and sediment toxicities are still occurring in site subwatersheds across the Coalition region (Appendix III, Table III-2A).

A complete evaluation of management practice effectiveness based on water quality results in the first through fifth priority site subwatersheds is provided in the Evaluation of Management Practices section of this report.

Non-members do not receive focused outreach and could be contributing to exceedances. Until the Coalition has 100% membership, effective management practices implemented by members of the Coalition may not be enough to improve water quality due to discharges by non-members who have not implemented similar practices. In addition, managing constituents that are naturally occurring in the environment (salts, metals) may be beyond the scope of what the Coalition can achieve through management practice implementation alone.

XV. F. QUESTION 6: ARE THE APPLICABLE SURFACE WATER QUALITY MANAGEMENT PLANS EFFECTIVE IN ADDRESSING IDENTIFIED WATER QUALITY PROBLEMS?

The Coalition's management plan strategy effectively addressed water quality impairments. Coalition members implemented additional management practices as a result from outreach conducted through annual grower meetings and one on one farm visits. The Coalition demonstrated improved water quality, and effectiveness of management practices, by consistently receiving approval to remove constituents from site subwatershed management plans. Growers took steps to prevent the offsite movement of agricultural constituents, including implementing additional management practices. A complete evaluation of the Coalition's management plans and effectiveness of outreach and management practices is included in the Management Plan section of this report.

XV. F. i. Coalition Wide Evaluation

From January through September 2014, the Coalition conducted monitoring at 18 sites within the SJCDWQC region. Core monitoring, Assessment monitoring, and MPM occurred at assigned sites (Table 3). The Coalition also monitored at four sites for chlorpyrifos and diazinon TMDL compliance monitoring).

Coalition wide management practices were documented in 2007 for practices growers were implementing in 2006. Focused outreach in the first set of high priority site subwatersheds began in 2008; however the first meetings were held in 2009. Since then, focused outreach occurred at 16 of the 18 site subwatersheds monitored in 2014 (Table 3). Growers in the Empire Tract @ 8 Mile Rd site subwatershed are scheduled for focused outreach in 2015. The priority years for management plan site subwatersheds is not based on where they are located (e.g. zones) but rather on number and magnitude of exceedances. Growers across all zones recognize the effect of management practices on water quality and are implementing new management practices as a result of, and in some cases prior to, focused outreach. As a result, water quality across the entire SJCWQC region has improved. Table 78 demonstrates an overall decreasing trend in the number of exceedances of the WQTLs for chlorpyrifos, diazinon, and copper across the SJCDWQC region.

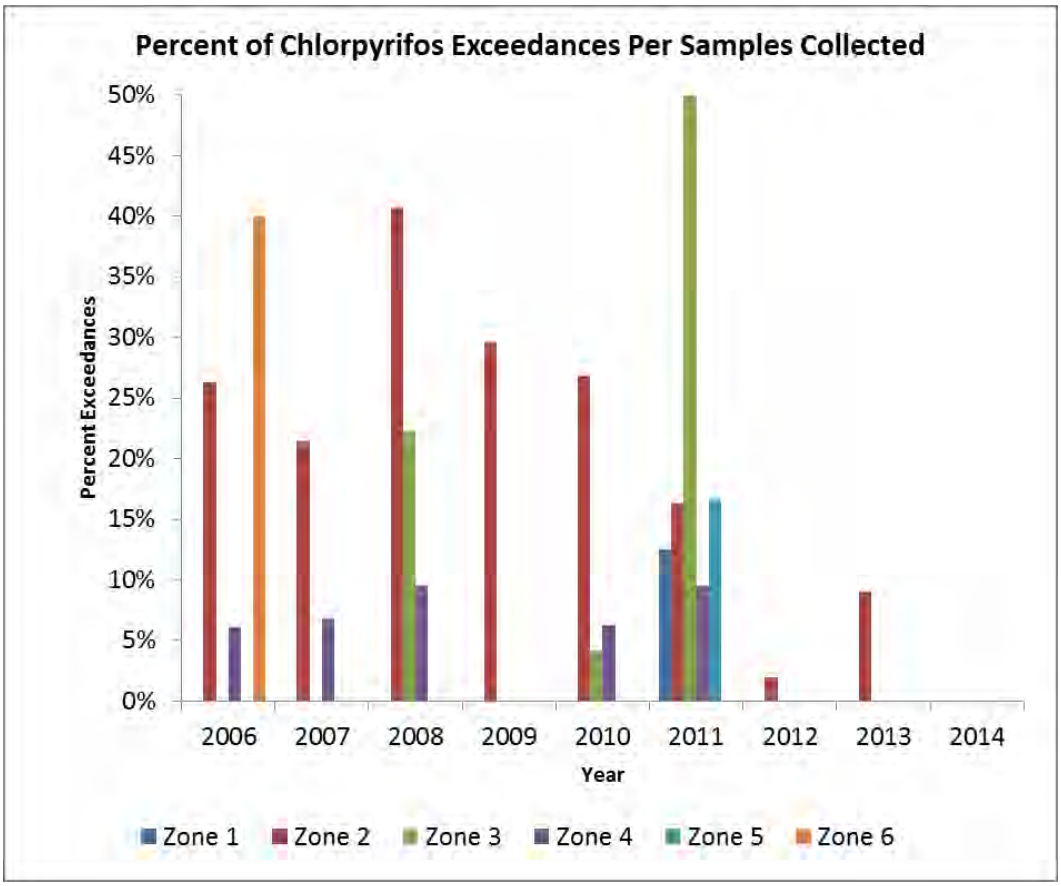
Monitoring results from recent years indicated that water quality improved in most SJCDWQC high priority management plan site subwatersheds. Monitoring results in 12 site subwatersheds demonstrated two or more consecutive years without exceedances for several management plan constituents. The Coalition submitted letters to the Regional Board on January 6, 2012, November 13, 2012, and June 9, 2014 petitioning for the removal of constituents from the management plans of these high priority site subwatersheds. To date, the Coalition has received approval for the removal of 40 constituents from 12 high priority site subwatersheds (approved on March 22, April 17, May 21, 2012, February 27, 2013, and August 22, 2014).

The percentage of chlorpyrifos, diazinon, and copper WQTL exceedances by zone and year were evaluated for trends in water quality across the entire SJCDWQC region. The Coalition focuses on these three constituents because they are widely applied and the most common pesticides requiring management plans. The SJCDWQC developed site subwatershed management plans and implemented focused outreach for chlorpyrifos (15), diazinon (5) and copper (7). As a result of improved water quality, the Coalition eliminated four chlorpyrifos, five diazinon, and five copper site subwatershed management plans. Not all zones were monitored for chlorpyrifos, diazinon, or copper every year; the zones with years of no monitoring are noted in Figure 54 through 56. The number of samples collected changes from year to year as a result of rotating Assessment Monitoring and MPM schedules. Years with only MPM may result in a higher percentage of exceedances due to 1) monitoring in areas with known water quality impairments and 2) fewer samples being collected based on monitoring during only months of past exceedances.

XV.A.i.a.1. Chlorpyrifos

On August 22, 2014 the Coalition received approval from the Regional Board to remove chlorpyrifos from the Grant Line Canal @ Clifton Court Rd management plan. From January through September 2014, there were no exceedances of the WQTL for chlorpyrifos out of 95 samples collected during Assessment and MPM monitoring in the Coalition region (Table 78 and Figure 54).

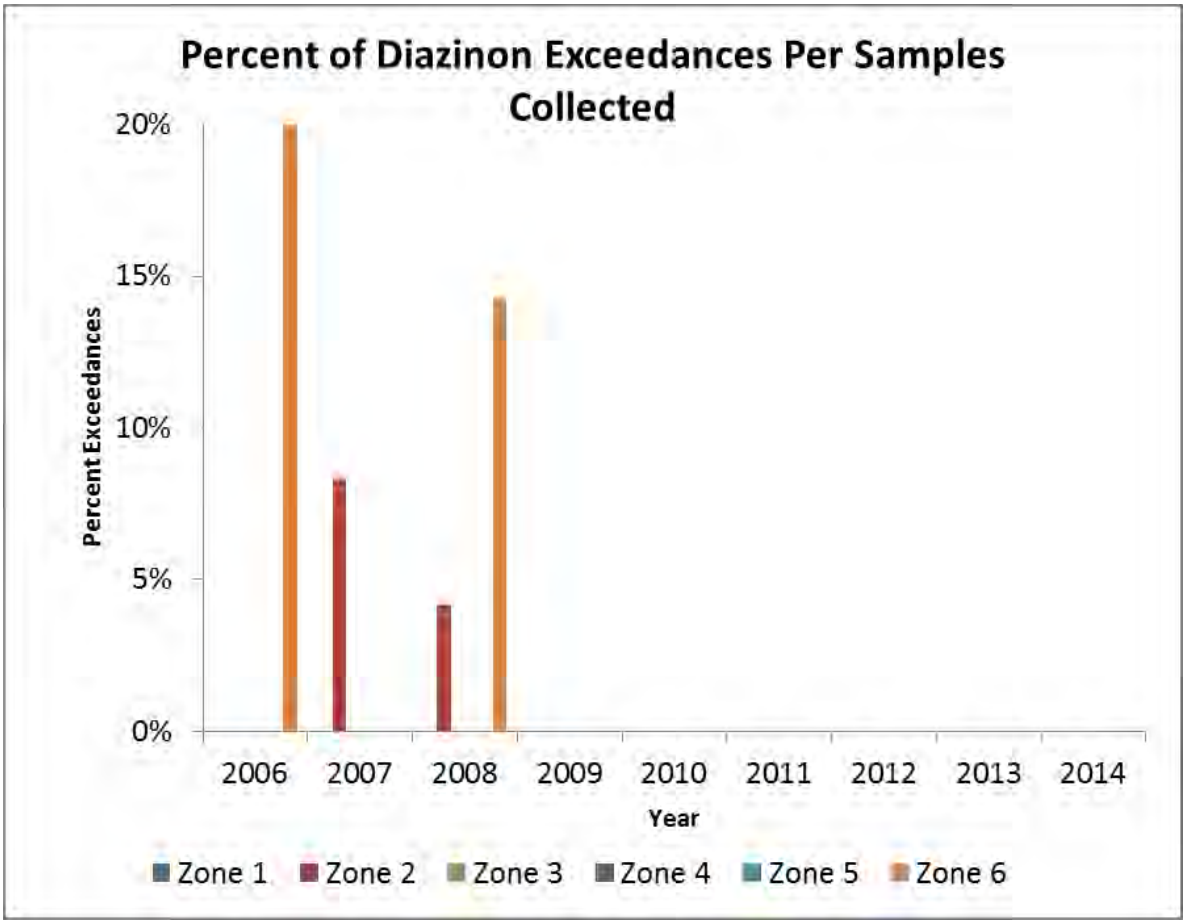
Figure 54. SJCDWQC 2006-September 2014 percentage of exceedances of WQTL for chlorpyrifos in Zones 1-6.
Zone 5 was not sampled for chlorpyrifos from 2006-2008; Zone 6 from 2009-2010. Assessment and MPM results included.



XV.A.i.a.1. Diazinon

Only eight exceedances of the WQTL for diazinon occurred within the SJCDWQC region from 2006 through September 2014; none since early 2008 (Table 78 and Figure 55). All five sites that have required a management plan for diazinon also have a management plan for chlorpyrifos. The PUR data indicate that throughout the Coalition region, the pounds of diazinon applied yearly is much less than chlorpyrifos and use has declined in recent years (Table 78). In addition, focused outreach occurred at all of these areas and the growers implemented management practices to reduce the amount of chlorpyrifos and diazinon discharged into the waterway. The Coalition was approved to remove diazinon from the management plan of two site subwatersheds 2012. The Coalition received approval to remove diazinon from the three remaining site subwatersheds on February 27, 2013 and diazinon is no longer a high priority constituent in the SJCDWQC region.

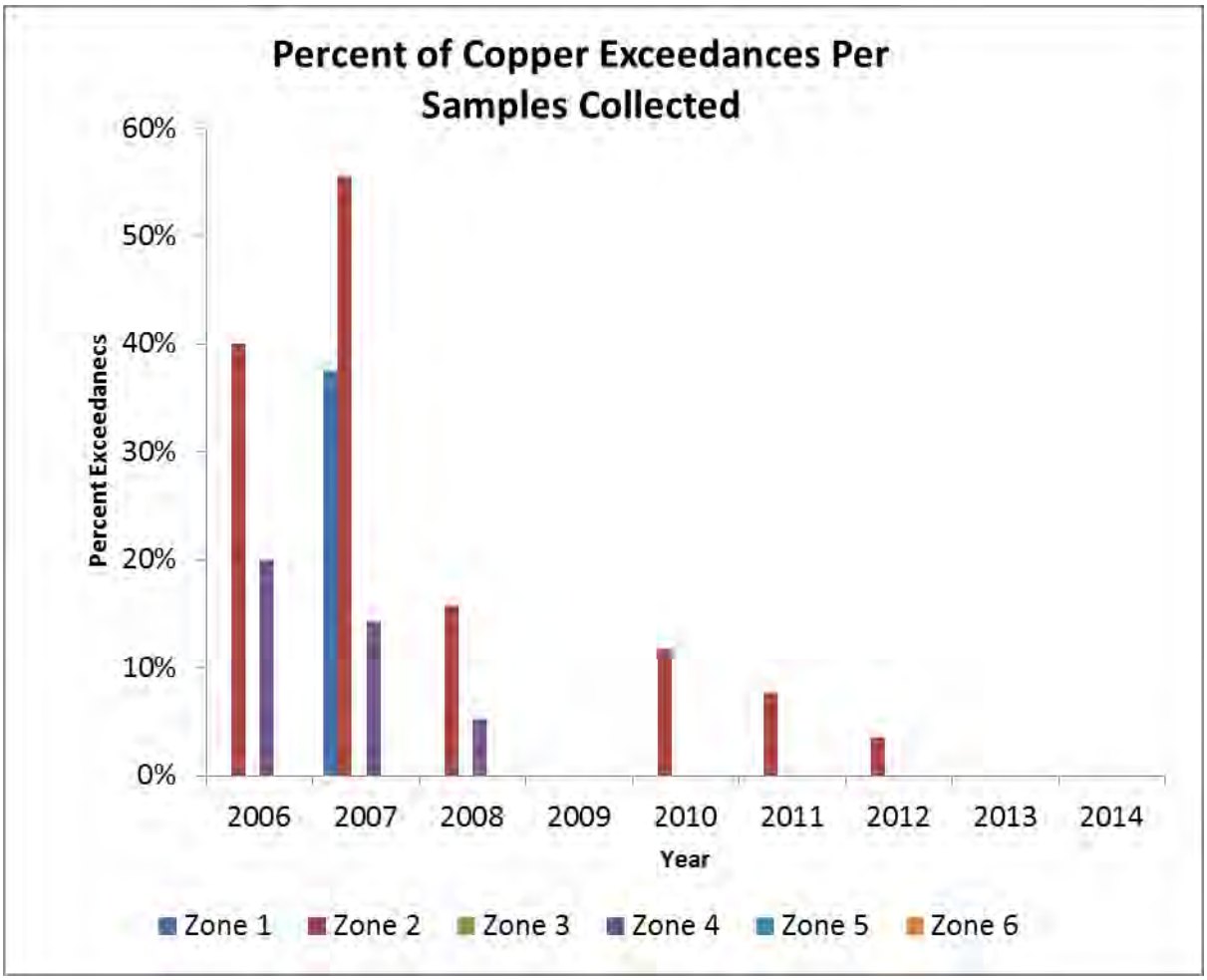
Figure 55. SJCDWQC 2006- September 2014 percentage of exceedances of the WQTL for diazinon in Zones 1-6. Zone 1 was not sampled for diazinon in 2010, 2012 or 2013; Zone 3 in 2011-2012; Zone 5 from 2006-2008; Zone 6 from 2009-2010. Assessment and MPM results included.



Copper

From January through September 2014, there were 51 samples analyzed for copper and no exceedance of the copper WQTL occurred (Table 78). Focused outreach first began in 2008 and expanded to new subwatersheds every year since. Copper applications have remained relatively steady in the region, but exceedances have decreased (Table 78 and Figure 56). When monitoring began in 2012, copper was listed in seven site subwatershed management plans. The Regional Board approved the removal of copper from three site subwatersheds in 2012 and two more site subwatersheds in 2013. Copper remains in the management plans for Littlejohns Creek @ Jack Tone Rd and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (last exceedance occurred at both sites in May 2011).

Figure 56. SJCDWQC 2006-2014 percentage of exceedances of the WQTL for copper in Zones 1-6. Zone 1 was not sampled for copper in 2012, 2013; Zone 3 from 2011-2012; Zone 5 from 2006-2008 and 2011-2012; Zone 6 from 2006-2007 and 2009-2013. Assessment and MPM results included.



Monitoring data from 2014 indicate the Coalition's outreach efforts have improved water quality in the first through sixth high priority subwatersheds. The number and percentage of exceedances of WQTLs have decreased, especially since the beginning of focused outreach. While chlorpyrifos remains a constituent of concern in waterways in the Coalition region, the number of samples resulting in exceedances of the WQTL for chlorpyrifos has drastically decreased from a high of 30 in 2008 to zero exceedances in 2014. Likewise, exceedances of the hardness based WQTL for copper have decreased from a high of 22 in 2007 to zero exceedances in 2014. Based on monitoring data from the past several years, the Coalition received approval on August 22, 2014 to remove specific site/constituent pairs from active management plans based on two years of monitoring with no exceedances; diazinon was completely removed from active SJCDWQC management plans (Table 52). The Coalition anticipates further improvement of water quality in 2015 when the sixth and seventh priority subwatersheds enter Year 2 and Year 1, respectively, of monitoring and focused outreach.

Table 90. Count of exceedances and samples collected for high priority pesticides (chlorpyrifos, diazinon and copper) across SJCDWQC region.

	Chlorpyrifos				Diazinon				Copper[1]			
Year	Exceedance Count	Samples[2]	% Exceedance	Lbs Applied	Exceedance Count	Samples[2]	% Exceedance	Lbs Applied	Exceedance Count	Samples[2]	% Exceedance	Lbs Applied
2006	14	94	15%	92,672	1	94	1%	10,257	9	40	23%	460,834
2007	15	125	12%	81,123	4	114	4%	9,561	22	71	31%	387,484
2008	30	129	23%	50,150	3	116	3%	6,520	11	123	9%	238,364
2009	8	61	13%	78,791	0	49	0%	5,826	0	41	0%	263,895
2010	13	93	14%	63,848	0	79	3%	17,576	2	61	3%	314,325
2011	15	104	14%	46,957	0	70	0%	5,198	2	69	3%	286,749
2012	1	80	1%	32,085	0	43	0%	5,280	1	60	2%	330,346
2013	3	102	3%	33,967[3]	0	64	0%	5,659[3]	0	44	0%	246,465[3]
2014	0	95	0	68,064	0	62	0%	6,403	0	51	0%	624,309

[1]Since October 2008, the Coalition analyzes for both the total and dissolved fraction of copper in every event. For counting exceedances and samples scheduled for copper analysis, this table ignores fraction (e.g. if site A is scheduled for copper total and copper dissolved analysis in Event 1, the table counts only one sample for copper). There has never been an exceedance of both the total and dissolved copper WQTLs at any one site.

[2] Refers to all samples collected for constituent analysis (dry sites not included).

[3]PUR data only available through May 2013 for San Joaquin County.

XV. F. ii. Funding Resources

In addition to focused outreach, the Coalition strives to secure unique opportunities to assist growers in achieving their goal of reducing the impact of agricultural discharge on water quality. The Coalition reviewed funding data provided by organizations managing the distribution of financial support to growers for the implementation of management practices. The two main organizations are the Coalition for Urban/Rural Environmental Stewardship (CURES) and the Natural Resource Conservation Service (NRCS). The NRCS offices manage the distribution of the Agricultural Water Enhancement Program (AWEP) and the Environmental Quality Incentives Program (EQIP) funding cost share programs and CURES manages the distribution of Proposition 84 funds and the associated cost share program. Data from CURES and NRCS (from Contra Costa, San Joaquin, and Stanislaus Counties) provide insight to the type of management practices growers are implementing in the SJCDWQC region.

Growers in Contra Costa County were awarded Proposition 84 funds for implementation of micro irrigation systems. Proposition 84 data obtained from CURES are reported by fiscal year. Table 91 reflects contracts awarded during the 2013-2014 funding cycle. Growers in the SJCDWQC region implemented micro irrigation systems across 650 acres of agricultural land with the assistance of Proposition 84 funding (Table 91).

Table 91. Acres of Proposition 84 funded management practices in Contra Costa and San Joaquin Counties during 2013-2014 funding cycles.

County	Practice Name	Funded Project Watershed Area	Total Contract Acreage
Contra Costa	Microirrigation	Kellogg Creek	**19**
		East Contra Costa Canal	**15**
San Joaquin		San Joaquin River/Delta	**106**
		San Joaquin River/Airport Bridge	**320**
		Beaver Slough/Mokelumne River	**165**
		Mormon Slough	**25**
		Total	**650**

The NRCS offices for the three counties (Contra Costa, San Joaquin, and Stanislaus) in the SJCDWQC region award 100% of their appropriated AWEP and EQIP funds and always have more applicants than available funds. Table 92 summarizes total acreage associated with AWEP and EQIP management practices awarded funds by the NRCS offices in Contra Costa, Stanislaus, and San Joaquin Counties. Growers from counties in the SJCDWQC region received funding to implement management practices designed to improve water quality across 109,734 acres of land (Table 92).

Table 92. AWEP and EQIP funding and associated acreage in SJCDWQC counties for 2013-2014 funding cycle.

Data provided to the Coalition are considered preliminary since counties may still be updating funding award records.

Practice Group	Practice Name	Contra Costa	San Joaquin	Stanislaus		Total Acres
		EQIP	EQIP	AWEP	EQIP	
Irrigation System	Microirrigation	268	2146	592	1707	4713
	Sprinkler		229			229
	Tailwater Recovery				39	39
	Spring Development		4			4
	Sprinkler System				106	106
	Surface Flooding of Organic Soils		529			529
					Total Irrigation System Acreage	**5619**
Irrigation Water Conveyance	Irrigation Pipeline	134		8	401	543
	Irrigation Water Conveyance	14806				14806
	Pipeline, High-Pressure/Low-Pressure, Underground, Plastic		46769	268	88	47125
	Pumping Plant		4	15	239	257
	Structure for Water Control		8		199	207
	Water Well		4			4
	Watering Facility		21			21
					Total Irrigation Water Conveyance Acreage	**62964**
Irrigation Water Management	Hedgerow Planting/Irrigation Water Management	246				246
	Irrigation Land Leveling		112		141	254
	Irrigation Storage Reservoir/ Water Management		93		385	478
					Total Irrigation Water Management Acreage	**977**
Nutrient Management	Comprehensive Nutrient Management Plan - Written		12			12
	Conservation Crop Rotation	19				19
Nutrient Management	Cover Crop	51	22		59	132
	Nutrient Management		61		1224	1285
	Waste Storage Facility		4			4
	Waste Transfer			27	45	72
					Total Nutrient Management Acreage	**1524**
Pest Management	Precision Pest Control Application				421	421
					Total Pest Management Acreage	**421**
Residue and Tillage Management	Mulch-Till	21	1480			1501
	No-Till				360	360
	Reduce-Till				1026	1026
	Woody Residue Treatment/ Forest Treatment/ Fence		35319		23	35342
					Total Residue and Tillage Management Acreage	**38228**
	Total Acres Per County	**15544**	**86817**	**910**	**6463**	**109734**

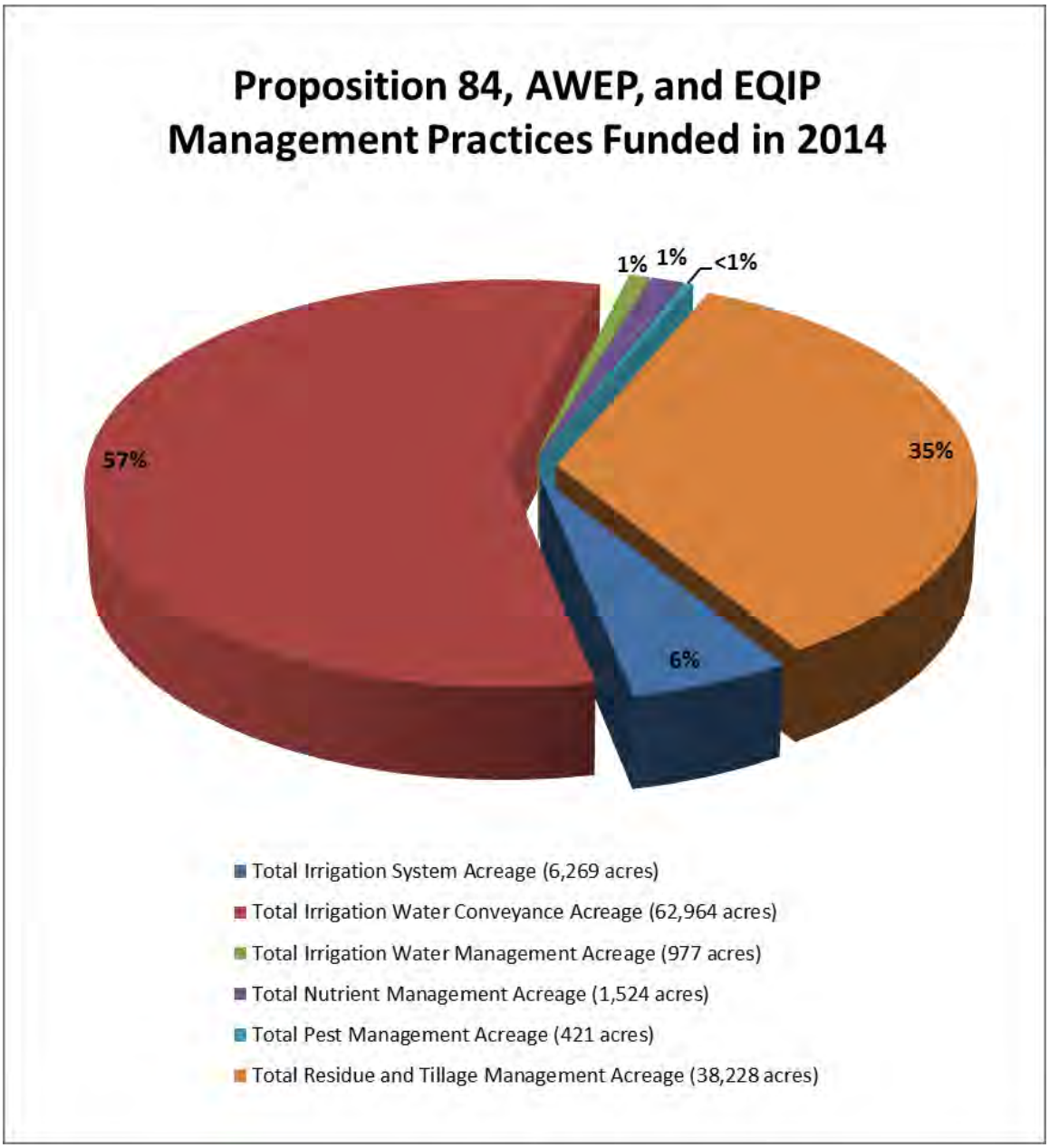
Between AWEP, EQIP, and Proposition 84 programs, over 110,384 acres were awarded funding for the implementation of management practices designed to improve water quality (Tables 91 and 92). Figure 57 provides the percentage of funds that were awarded to develop specific management practices in the Coalition region. Of the management practices funded in the Coalition region, irrigation water conveyance was associated with the most acreage (62,964 acres; 57%) followed by Residue and Tillage Management (38,228 acres; 35%), and Irrigation Systems (6,269 acres or 6%; Tables 91, 92, and Figure 57). Funding awarded for other management practice categories (such as Irrigation Water Management, Nutrient Management and Pest Management) represents 2,922 acres of total acreage funded (less than 3%; Figure 57).

The practices funded by Proposition 84, AWEP and EQIP programs to date include several of the practices discussed with growers during focused outreach. These data indicate that growers in the

Coalition region are taking steps to implement additional management practices. Growers in the SJCDWQC region have options for obtaining financial resources to aid in implementing management practices designed to improve water quality.

Figure 57. Acres awarded AWEP, EQIP, and Proposition 84 funding in SJCDWQC counties during 2013-2014 funding cycle.

Refer to Tables 78 and 79 for all management practice categories.



XVI. CONCLUSIONS AND RECOMMENDATIONS

Monitoring results from January through September 2014 indicate that although there are substantial improvements in water quality in many areas, water quality is still not protective of all beneficial uses across the entire Coalition region. The most common exceedances of WQTLs involved field and physical parameters (such as DO and salts) resulting in impaired Agricultural and Aquatic Life beneficial uses (BUs). Impairment to the Municipal and Domestic Supply BU occurred as a result of elevated concentrations of arsenic, dichlorvos, diuron, and simazine. Numerous exceedances of the WQTL for *E. coli* resulted in impaired Recreational BU in many waterbodies.

The most common exceedances involved constituents for which irrigated agriculture may not be the driving factor despite the fact that the landscape consists primarily of irrigated agriculture. For many parameters, it is not clear to what extent WQTL exceedances result from agricultural activities. Source identification is difficult especially for non-conserved constituents such as DO and pH. Many although not all pesticide detections are the result of agricultural applications that enter surface waters from spray drift or surface water runoff. In the event of exceedances of pesticide WQTLs or the occurrence of toxicity, the Coalition identifies sources through the analysis of preliminary PUR data, assessment of water quality data and evaluation of current management practices of targeted growers.

Conclusions from data provided in the Management Practice Effectiveness, Coalition Wide Evaluation, Status of TMDL Constituents, and Spatial Trends analysis sections of this report include:

1. Grower group meetings continue to be an effective method of communicating with members.
2. Implementation of management practices continues to improve water quality in the Coalition region.
3. Growers across the SJCDWQC region are aware of water quality impairments and are implementing management practices designed to address these impairments even if the Coalition has yet to conduct focused outreach in the site subwatershed.
4. Growers in the SJCDWQC region are taking advantage of available funding resources to implement management practices that improve water quality.
5. Results from January through September 2014 monitoring indicate fewer exceedances in high priority site subwatersheds where both general and focused outreach occurred, as well as in site subwatersheds where only general outreach occurred.
6. Remaining exceedances may be difficult to eliminate because the cause/source of the problems may not be irrigated agriculture and if they are, management practices that are very effective in eliminating exceedances of pesticides are not effective in reducing exceedances of WQTLs for parameters such as DO, SC (salts), *E. coli*, ammonia/nitrates, or pH.
7. Agriculture may not be the only cause of water quality impairments that are the result of elevated concentrations of copper in the Coalition region.

8. The Coalition's focused management practice outreach and tracking strategy is effective at improving water quality. The Coalition received approval on August 22, 2014 to remove five constituents from the active management plans of four site subwatersheds.
9. Continued improvements in water quality are expected based on past grower outreach efforts and upcoming focused outreach in new priority subwatersheds.
10. In the future, lack of improvement of water quality may result if there remain growers in the Coalition region who do not have to comply with discharge requirements.

Based on the information provided in the response to the programmatic questions, the Coalition will pursue the following during the 2015 WY:

1. Monitor according to the WDR adopted in March 2014 and the monitoring outline in the Monitoring Plan Update (MPU).
2. Continue to document and assess management practices implemented by Coalition growers.
3. Continue to focus outreach and education efforts around constituents applied by agriculture while also educating growers about non-conserved constituents such as dissolved oxygen and salinity.

The Coalition identified several areas in which Regional Board involvement could result in improvement in water quality in the Coalition region:

4. Identify and regulate dairies within priority subwatersheds that are using chlorpyrifos and/or copper which may be affecting downstream beneficial uses.
5. Develop and deploy methods to monitor illegal dairy discharges and notify the Coalition of any known dairy discharges that may result in water quality impairments including nutrient and *E. coli* exceedances.
6. Continue enforcement actions against non-members who have the potential to discharge.
7. Move forward with the processes to develop plans to study difficult issues such as contamination of surface waters by *E. coli*, causes of elevated pH, and low dissolved oxygen.
8. Continue to work with the CV-SALTS process to develop a better understanding of the sources and sinks of salt in surface and groundwater and potential practices that can be effective in preventing exceedances.

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