2016 Annual Report

San Joaquin County & Delta
Water Quality Coalition

Irrigated Lands Regulatory Program
Central Valley Regional Water Quality Control Board

Submitted May 1, 2016
Revised June 8, 2016

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Ecosystems • Consulting

Table A. SJCDWQC 2016 Annual Report revisions.

Item #	Description of Items Revised	Date Submitted	Items Revised
1	Revisions were made to the management plan summary tables to indicate the *S. capricornutum* toxicity management plans for French Camp Slough @ Airport Way and Terminous Tract Drain @ Hwy 12 remain complete; the toxicities in February 2014 and February 2015, respectively, did not trigger a reinstated management plan.	June 8, 2016	Tables 55, and 58-59; Pages 138, and 141-142
2	Revisions were made to the verbiage in the Executive Summary (updated list of new and reinstated management plans), Discussion of Results (deleted Zone 3 verbiage indicating the management plans were reinstated), and Status of Special Projects (deleted verbiage indicating the *S. capricornutum* toxicity management plans were reinstated).	June 8, 2016	Verbiage; Pages 3, 106, 139, 142, and 213
3	Appendix I was updated to correct typos associated with reinstated management plans.	June 8, 2016	Tables 1, 3, IV-1, V-1, XII-1; Pages 1-4, 34, 36, 48-49, 121-123, 133-134.
4	The 2016 WY MPU monitoring schedule was updated to remove MPM for toxicity to *S. capricornutum* at French Camp Slough @ Airport Way and Terminous Tract Drain @ Hwy 12. Monitoring will occur at both sites monthly for toxicity to *S. capricornutum* as part of Core site monitoring.	June 8, 2016	Monitoring schedule Excel file

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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
GCC	MPEP Group Coordinating Committee
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
MPEP	Management Practice Evaluation Program
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-R1

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 described in the most recent Waste Discharge Requirements General Order (WDR or General Order) and approved Monitoring Plan Update (MPU) report.
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 and/or analyzing data for 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-R1)	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 Evaluations	Summary of Required Grower Submittals
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

EXECUTIVE SUMMARY

The San Joaquin County and Delta Water Quality Coalition (SJCDWQC or Coalition) is submitting the May 1, 2016 Annual Report for the previous Water Year (WY) to 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 and management plan implementation schedules and timelines as outlined in the SJCDWQC Surface Water Quality Management Plan (SQMP). 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 seven zones based on hydrology, crop types, land use, soil types, and precipitation. Zone names are based on the Core site 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) Walthall Slough @ Woodward Ave Zone, 6) Contra Costa Zone, and 7) Union Island Drain @ Bonetti Rd 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 Monitoring location.

As required by the WDR (Page 6, Attachment B), the Coalition monitors at Core and Represented sites in the Coalition boundary, to characterize discharge from irrigated agriculture. Core sites establish trends in water quality and are monitored monthly. The Coalition evaluates the potential risk for water quality impairments at Represented sites based on exceedances of Water Quality Trigger Limits (WQTLs) at the associated Core site. Sampling occurred from October 2014 through September 2015 at Core, Represented, Management Plan Monitoring (MPM) locations, and Total Maximum Daily Load locations (TMDL), including two storm events and two sediment monitoring events.

Monitoring Program Submittals Required by the WDR

The Coalition submitted multiple documents for approval to the Regional Board during the 2015 WY to meet the requirements of the WDR pertaining to Farm Evaluations (FEs), Nitrogen Management Plans (NMPs), Sediment and Erosion control Plans (SECPs), Management Practice Evaluation Program (MPEP), and the Groundwater Quality Trend Monitoring Program (GQTM).

Monitoring Program Objectives

During the 2015 WY, the Coalition monitored according to the strategy outlined in the Monitoring and reporting Program (MRP), Attachment B to the WDR (No. R5-2014-0029-R1) and according to the August 1, 2014 Monitoring Plan Update (MP) report for the 2015 WY (approved December 17, 2015). The primary objectives of the monitoring program are to characterize discharge from irrigated agriculture and to determine if implemented management practices are effective in reducing or eliminating discharge and impairments of beneficial uses. During the 2015 WY, the Coalition monitored 29 sites that included Normal Monitoring, MPM, and TMDL compliance monitoring; the 29 included six Core sites, 19 Represented sites, and 4 TMDL sites. Management Plan Monitoring was conducted for arsenic, chlorpyrifos, copper, dieldrin, diuron, HCH, malathion, and water column toxicity to *C. dubia*, *S. capricornutum*, *P. promelas*, and sediment toxicity to *Hyalella azteca*.

Monitoring Results

Monitoring during the 2015 WY resulted exceedances of WQTLs for DO (119), pH (11), SC (56), *E. coli* (21), ammonia (1), arsenic (4), chlorpyrifos (8), diuron (3), simazine (1), and water column toxicity to *C. dubia* (3) and *S. capricornutum* (20), and sediment toxicity to *H. azteca* (1). Overall, exceedances of WQTLs for field parameters and *E. coli* were more common than exceedances of WQTLs of pesticides.

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 2015 WY monitoring, several new site/constituent specific management plans including:

- Coyote Creek Tributary @ Jack Tone Rd (DO)
- Duck Creek @ Hwy 4 (SC)
- East Orwood Tract Drain (DO, SC, and toxicity to *S. capricornutum*)
- Jahant Slough @ Cherokee Ln (DO)
- Lone Tree Creek @ Jack Tone Rd (reinstated DO)
- Mosher Creek @ North Alpine Rd (DO)
- Pixley Slough @ Furry Rd (DO)
- Rindge Tract Drain (DO and SC)
- South McDonald Island Pump (DO, SC, and toxicity to *S. capricornutum*)
- Staten Island Drain @ Staten Island Rd (DO and SC)
- Terminous Tract Drain @ Hwy 12 (diuron)
- Union Island Drain @ Bonetti Rd (chlorpyrifos)
- Upper Roberts Island Drain (DO, SC, and toxicity to *C. dubia*)

Management Plan Strategy

When a management plan is developed for a site subwatershed, additional focused effort within the subwatershed is required. Coalition efforts include but are 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, and
6. Compliance with approved TMDLs.

The Coalition developed Performance Goals for its first through sixth sets of priority site subwatersheds; Performance Goals for these site subwatersheds are complete.

The Coalition's 2015 SQMP strategy (approved November 24, 2015) includes the following actions:

1. Identify members with the potential to discharge to surface waters causing exceedances of WQTLs of management plan constituents.
2. Review the member's FE from the year prior to initiation of Management Plan activities to determine number/type of management practices currently in place, and determine if additional practices are necessary.
3. Hold meetings as necessary to inform members of water quality problems and recommend additional practices.
4. Review the member's FE from the year following initiation of Management Plan activities to document number/type of new management practices implemented.
5. Evaluate effectiveness of new management practices.

The Coalition is in the process of initiating the 2016 Focused Outreach in the French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatersheds. Meetings with targeted members will take place during 2016 to discuss local water quality concerns and management practices effective at reducing water quality impairments; preliminary results from 2016 Focused Outreach will be included in the 2017 Annual Report.

Conclusions

Monitoring results from the 2015 WY indicate that although there are substantial improvements in water quality, all beneficial uses are not protected across the entire Coalition region.

Listed below are the conclusions from data provided in the Management Practice Effectiveness, Coalition Wide Evaluation, Status of TMDL Constituents, and Spatial Trends Analysis sections of this report:

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 Coalition 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. Some 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, *E. coli,* ammonia/nitrates, or pH.
6. The Coalition's focused outreach and tracking strategy is effective at improving water quality. The Coalition received approval on December 18, 2015 to complete 20 management plans in 10 site subwatersheds.
7. Continued improvements in water quality are expected in coming years based on results evident from past grower outreach efforts.
8. Future water quality results may be dependent on growers who are not yet members of the Coalition and do not comply with discharge requirements.

Based on the information provided in the response to the programmatic questions, the Coalition will pursue the following during the 2016 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 focused outreach and education efforts around constituents applied by agriculture.

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

1. Identify and regulate dairies in site subwatersheds that are using constituents of concern which may affect the BUs of downstream waterbodies.
2. 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.
3. Continue enforcement actions against non-members who have the potential to discharge.
4. Move forward with the processes to develop plans to study contamination of surface waters by *E. coli,* causes of elevated pH, and low dissolved oxygen.
5. 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.

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-R1), the San Joaquin County and Delta Water Quality Coalition (SJCDWQC or Coalition) is submitting an Annual Report for monitoring results from the 2015 Water Year (WY), which includes monitoring data from October 2014 through September 2015.

The 2016 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-R1) and Management Plan Progress Report (Appendix MRP-1). The Annual Report Requirements – Section Key (Page 1) lists the required components from both reports and in which section of this report they are found. The Annual Report includes monitoring results and activities from the previous WY, as well as the status of management plan implementation schedules and timelines (Attachment A to Order R5-2014-0029-R1, Pages 12-13).

SJCDWQC GEOGRAPHICAL AREA

The SJCDWQC area includes San Joaquin County as well as portions of Alameda, Alpine, Amador, Calaveras, Contra Costa, and Stanislaus Counties. There are three major rivers in the Coalition area other than the San Joaquin River: the Stanislaus River, the Calaveras River, and the Mokelumne River. Tributaries of the San Joaquin River flow from the Sierra Nevada Mountain Range from east to west. Drainage is determined using the California Watershed Boundary from the United States Geological Survey (USGS). The general boundary is defined by the San Joaquin Delta sub-basin to the west, the Stanislaus River to the south, the Mokelumne River watersheds to the north, and the Sierra Nevada Mountain Range to the east. Water is either exported from the Coalition region to San Francisco Bay through the Delta or conveyed southward through State (California Aqueduct) and Federal Water Projects (Delta Mendota Canal).

IRRIGATED LAND

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area includes approximately 1,478,985 acres of which 608,914 acres (41%) are considered irrigated agriculture (Table 1). 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.

The Coalition used Agricultural Land and Water Use data (DWR, www.water.ca.gov/landwateruse/analgwu.cfm) to estimate the acreages of irrigated crops for each county. The Coalition also used Land Use Survey data (DWR, www.water.ca.gov/landwateruse/lusrvymain.cfm), which includes more detailed information regarding specific crop use (both irrigated and non-irrigated); however, is updated less often. Since Land Use Survey data were available in GIS shape files, the geographical information data was mapped to the Coalition area and used for estimates of irrigated crop acreage. The data source utilized 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 1) only sections of these counties were included in the Coalition boundary, or 2) the data were more current. For San Joaquin County, data from Agricultural Land and Water Use were used because for those data, all of San Joaquin County was encompassed in the Coalition boundary (Table 1). Calculations of total acreage measurements were made using ArcGIS.

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	46,563	1,063		2006
Calaveras	663,313	4,300		2000
Contra Costa	184,548	48,456		1995
San Joaquin	889,505	541,310	2010	
Stanislaus	108,246	22,089		2004
Alpine	95,585	0		
Amador	135,309	39		
Total	**2,123,069**	**617,256**		

[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

GEOGRAPHICAL CHARACTERISTICS AND LAND USE

The Coalition area is divided into seven zones to facilitate the implementation of a comprehensive monitoring program (Figure 1). These zones were designated 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 Zone, 6) Contra Costa Zone, and 7) Union Island Drain @ Bonetti Rd Zone. Land use maps for each zone are included in Figures 2 through 8.

Figure 1. SJCDWQC zone boundaries and Core sites.

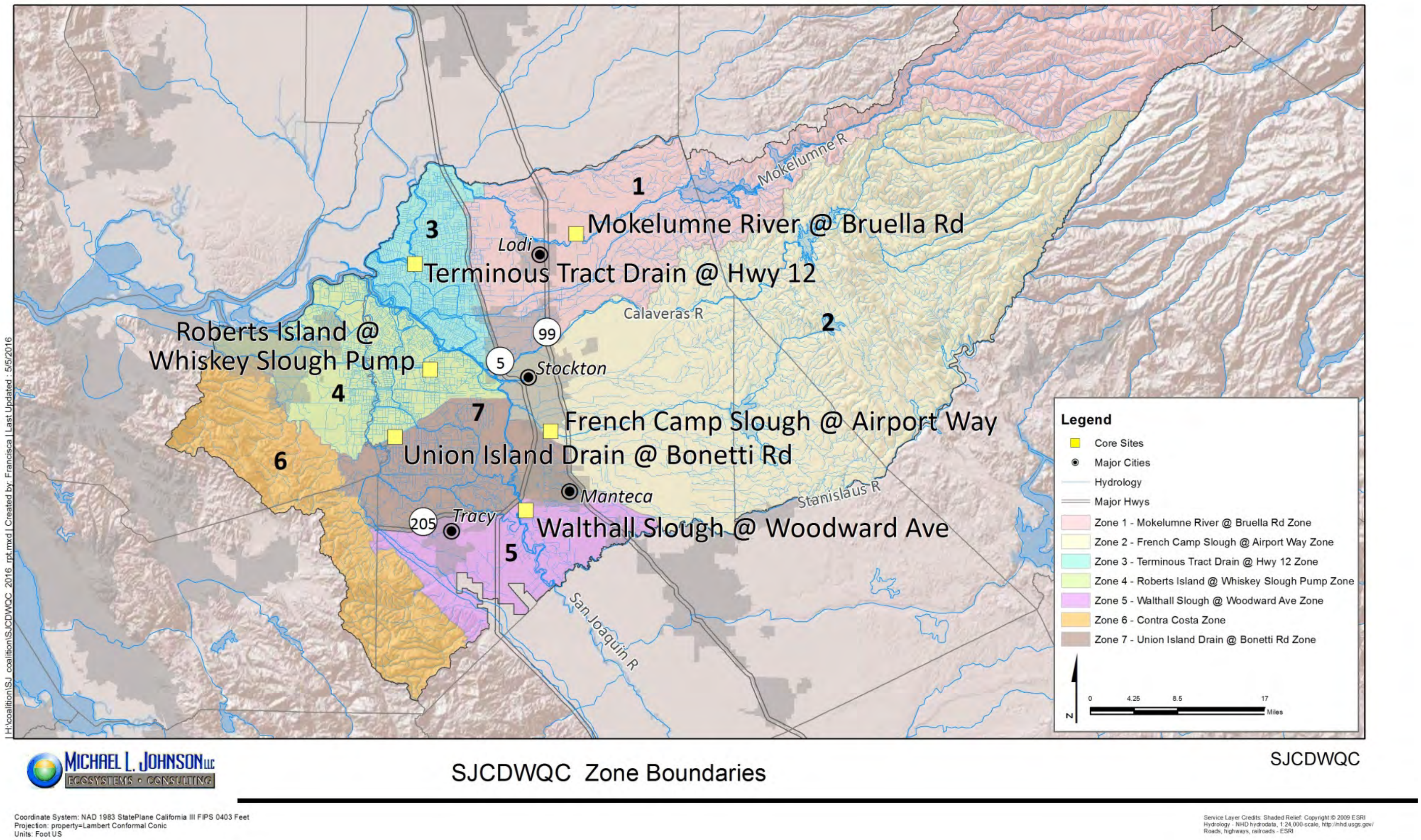


Table 2. SJCDWQC 2015 total and irrigated acreages for Zones 1-7.

ZONES	TOTAL ACRES[1] (FROM ARCGIS)	IRRIGATED ACRES[2] (FROM LAND USE)
Zone 1: Mokelumne River @ Bruella Rd Zone	641,489	107,478
Zone 2: French Camp Slough @ Airport Way Zone	824,498	195,226
Zone 3: Terminous Tract Drain @ Hwy 12 Zone	87,583	70,717
Zone 4: Roberts Island @ Whiskey Slough Pump Zone	154,756	92,370
Zone 5: Walthall Slough @ Woodward Ave Zone	115,873	76,861
Zone 6: Contra Costa Zone	174,869	423
Zone 7: Union Island Drain @ Bonetti Rd Zone	125,654	94,172
Total	**2,124,722**	**637,246**

[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.

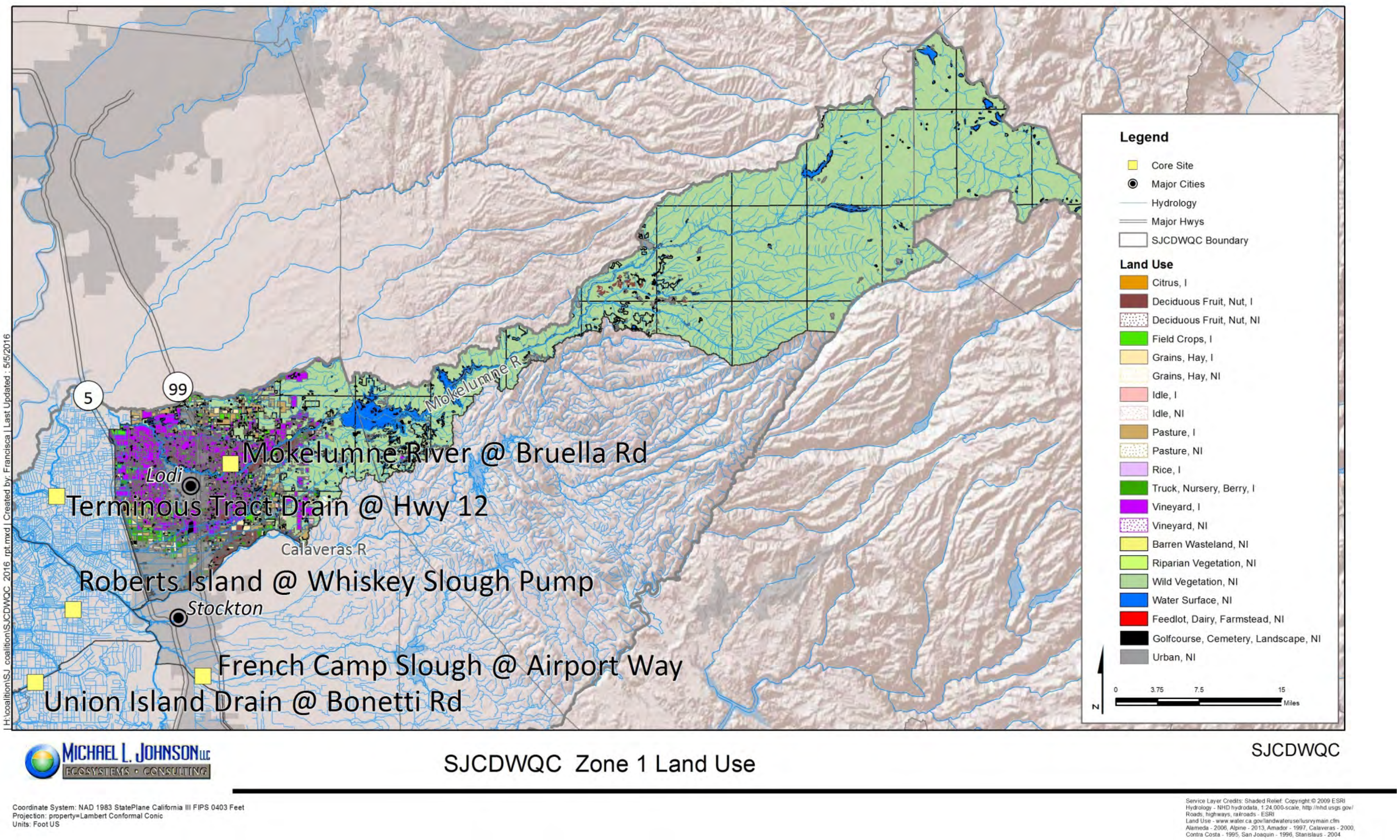


Figure 3. French Camp Slough @ Airport Way Zone (Zone 2) Land Use.

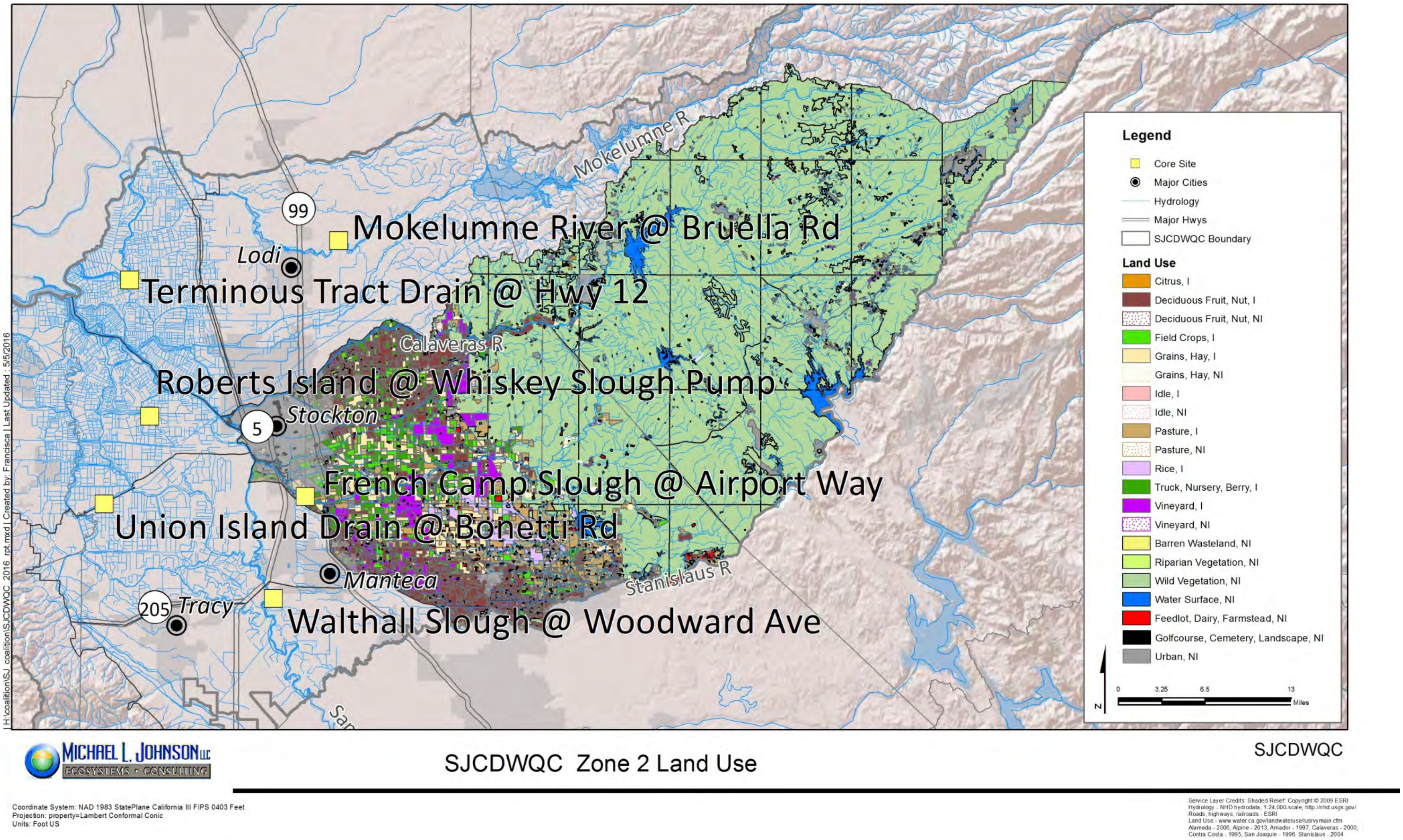


Figure 4. Terminous Tract @ Hwy 12 Zone (Zone 3) Land Use.

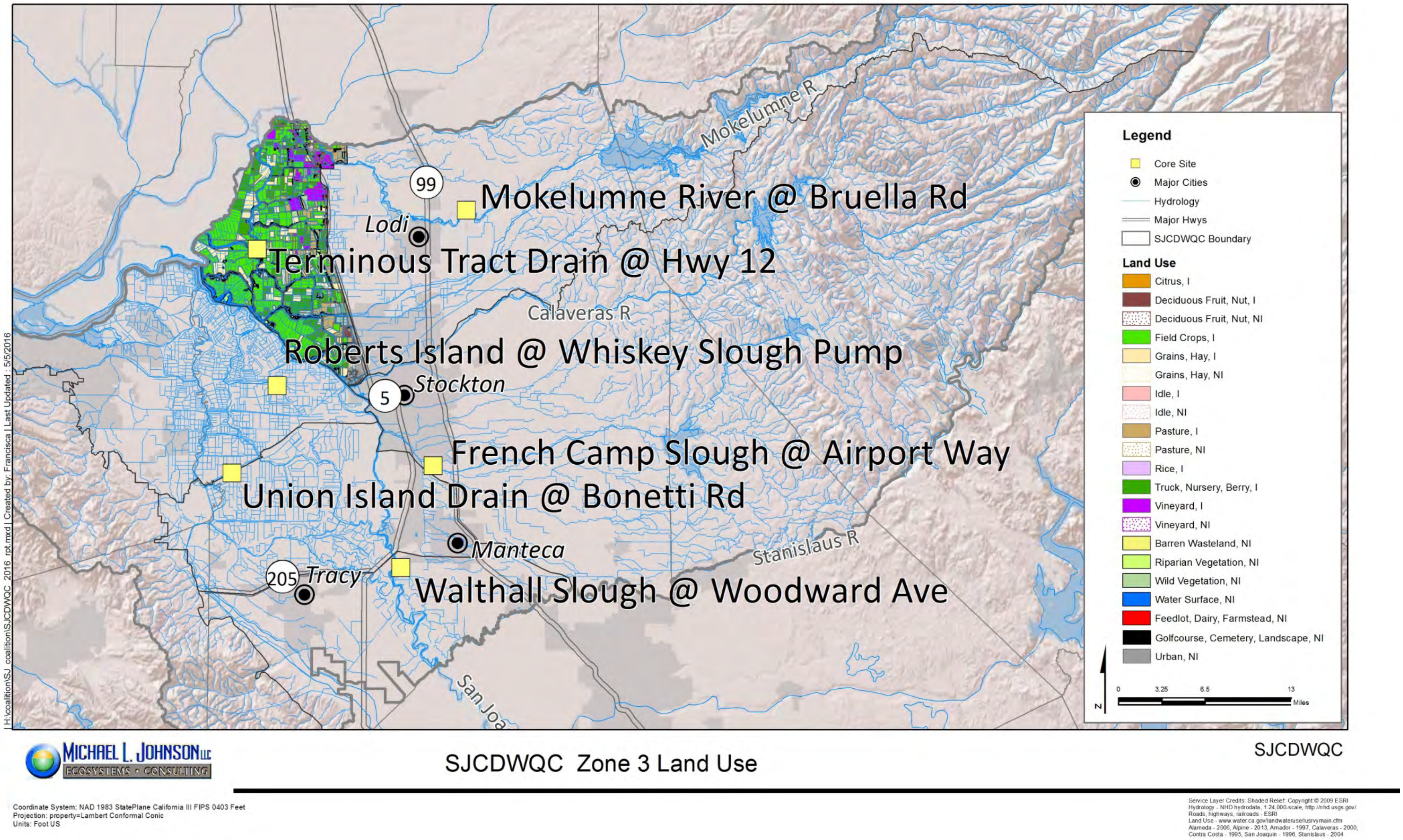


Figure 5. Roberts Island @ Whiskey Slough Pump Zone (Zone 4) Land Use.

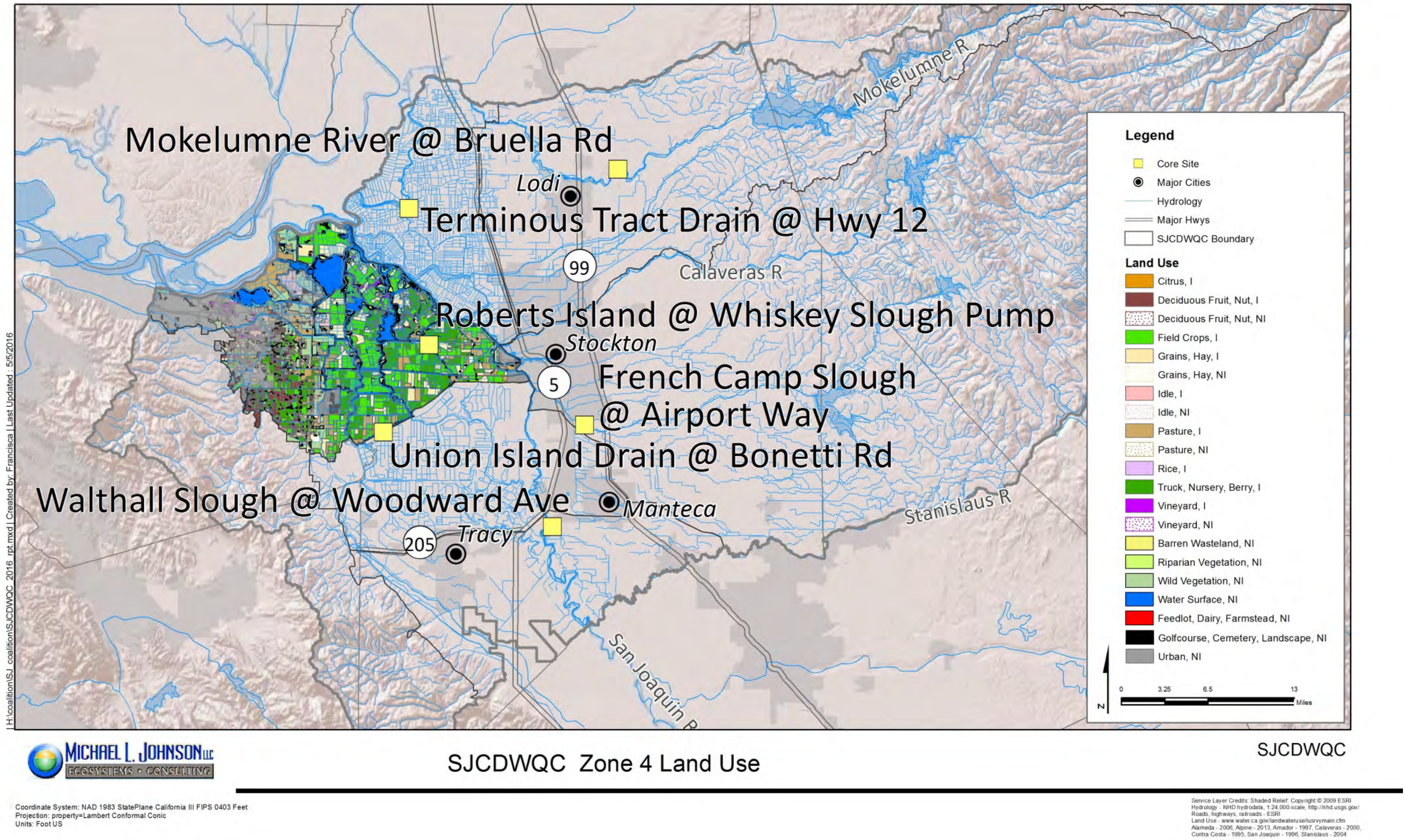


Figure 6. Walthall Slough @ Woodward Zone (Zone 5) Land Use.

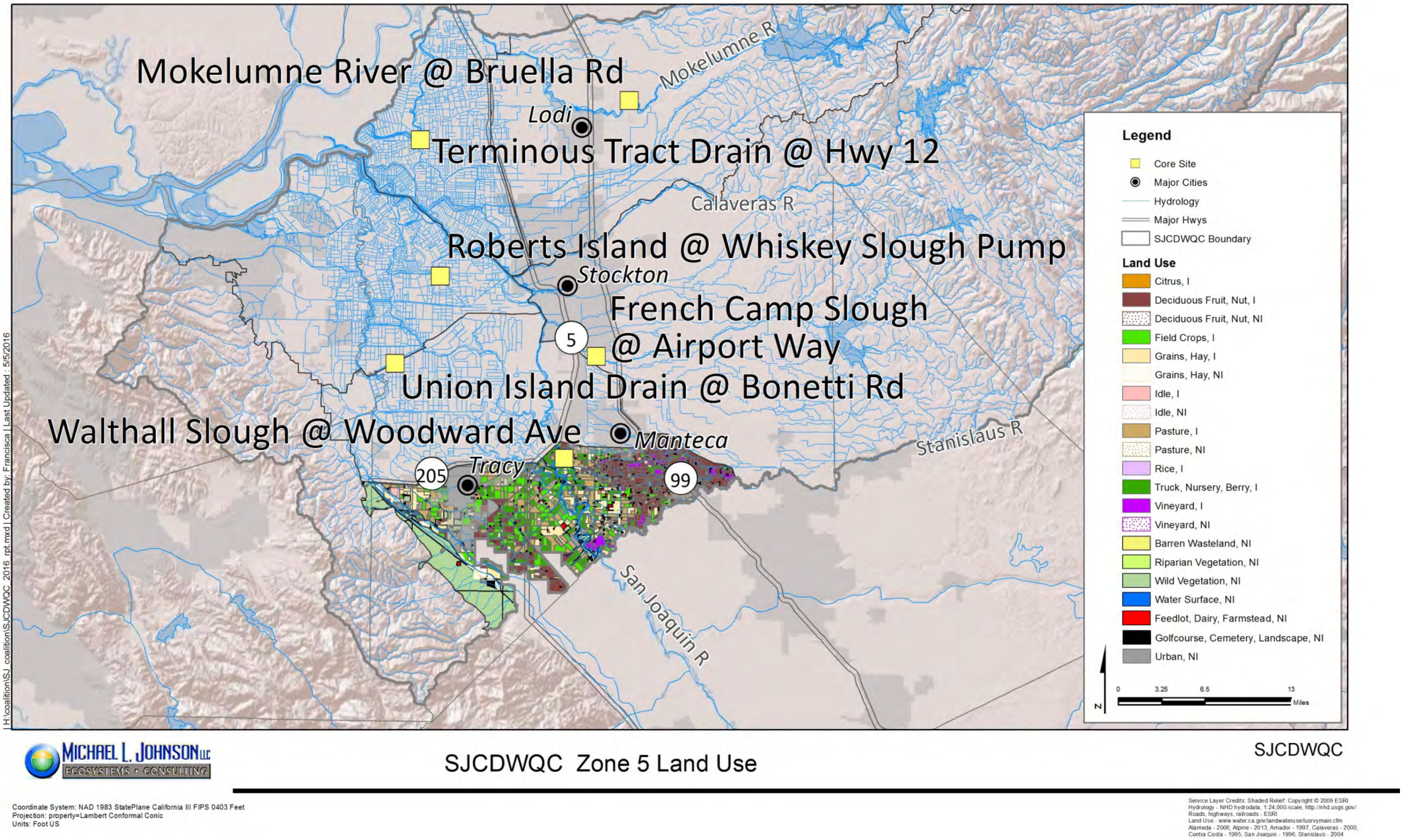


Figure 7. Contra Costa Zone (Zone 6) Land Use.

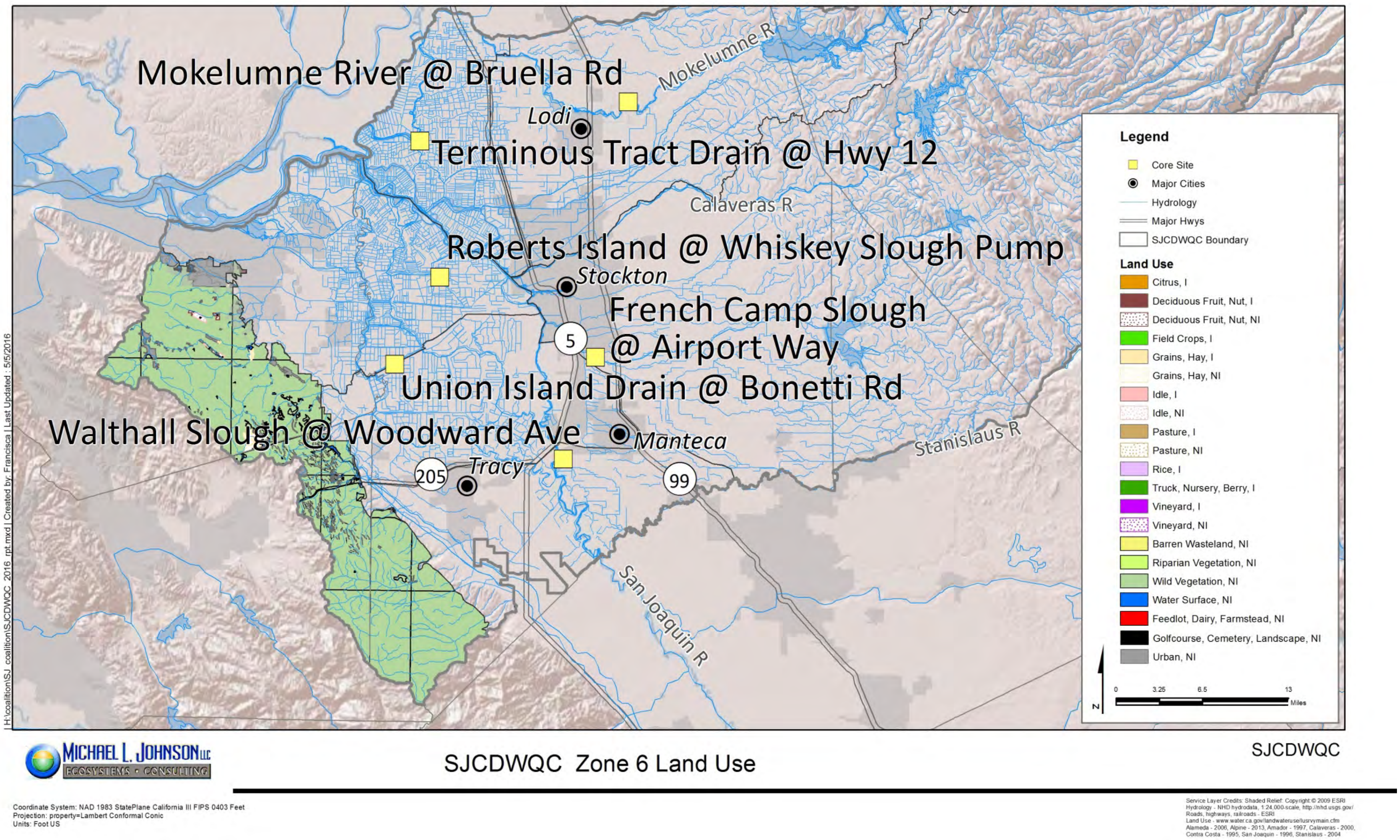
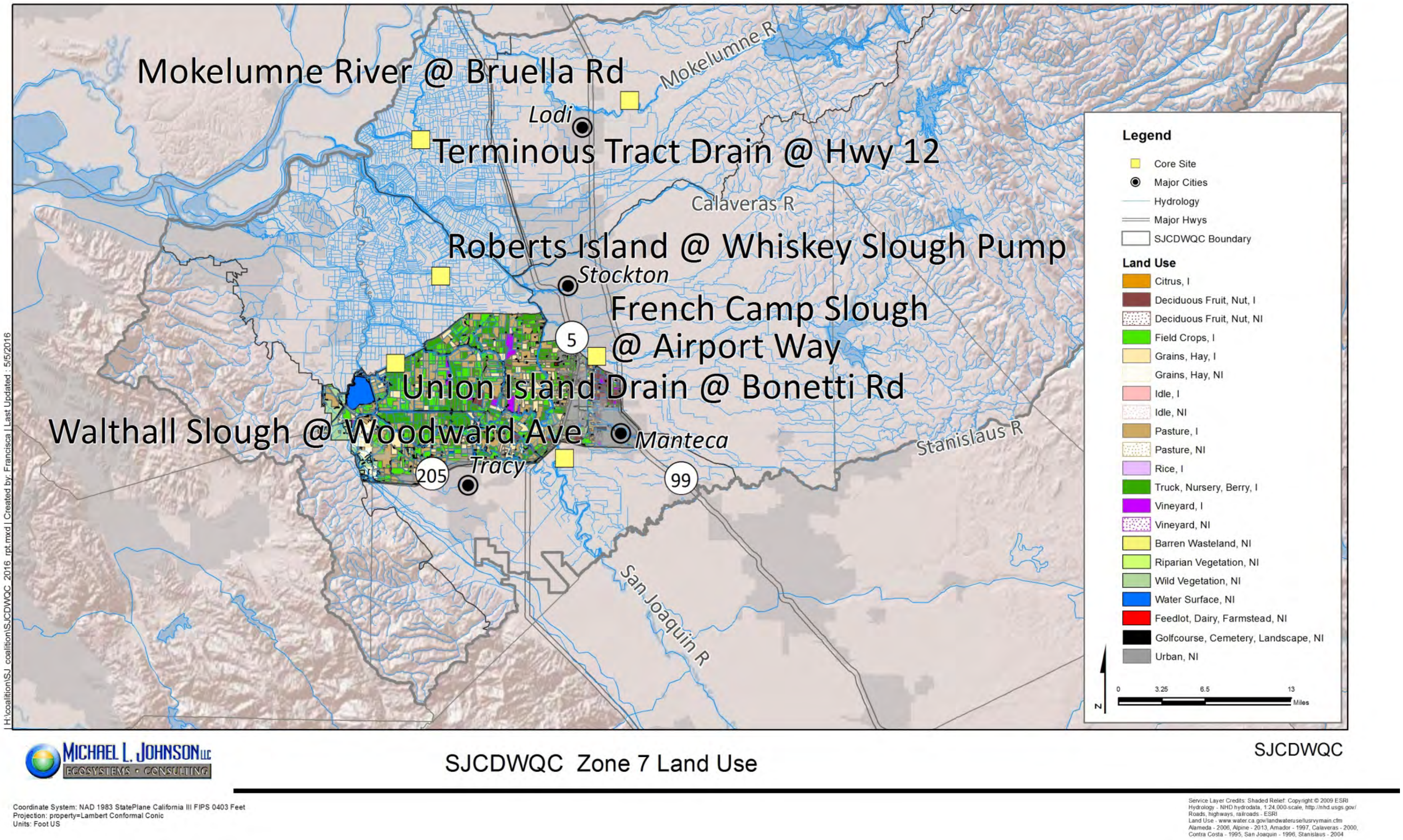


Figure 8.Union Island Drain @ Bonetti Rd Zone (Zone 7) Land Use.



SAMPLE SITE DESCRIPTIONS

The site names, zones, sample types, station codes, and locations of all sites monitored during the 2015 WY are provided in Table 3. Land use for each site subwatershed monitored during the 2015 WY is listed in Table 4.

The section below includes a narrative description of each site subwatershed with respect to hydrology and agricultural production. Location maps of sampling sites, crops, and land use are provided in the Land Use Maps Appendix VIII.

Rainfall data for the SJCDWQC region during the 2015 WY are presented in the “Rainfall Records” section of this report.

SAMPLE SITE LOCATIONS

All site subwatersheds (Core and Represented sites) monitored during the 2015 WY with zone boundaries are included in Figure 9. The map in Figure 10 includes the four SJCDWQC Chlorpyrifos and Diazinon TMDL compliance monitoring locations.

Table 3. SJCDWQC 2015 WY monitoring locations.

Zone	Site Type	Management Plan Monitoring	Site Name	Station Code	Latitude	Longitude
Zone 1	Core	X	Mokelumne River @ Bruella Rd	531XMRABR	38.16022	-121.20643
	Represented	X	Bear Creek @ North Alpine Rd	531BCANAR	38.07386	-121.21215
	Represented		Coyote Creek Tributary @ Jack Tone Rd	531CCTALR	38.24082	-121.15200
	Represented		Jahant Slough @ Cherokee Ln	531XJSACL	38.21035	-121.26200
	Represented		Mokelumne River Drain @ North Lower Sacramento Rd[1]	531MRDNLS	38.19557	-121.29400
	Represented		Mosher Creek @ North Alpine Rd	531MCANAR	38.06088	-121.20900
	Represented		Pixley Slough @ Furry Rd	531XPSAFR	38.08256	-121.24100
Zone 2	Core	X	French Camp Slough @ Airport Way	531SJC504	37.88172	-121.24933
	Represented	X	Duck Creek @ Highway 4	531XDCAHF	37.94949	-121.18208
	Represented	X	Littlejohns Creek @ Jack Tone Rd	531XLCAJR	37.88958	-121.14727
	Represented	X	Lone Tree Creek @ Jack Tone Rd	531XLTCJR	37.83754	-121.14460
	Represented	X	Mormon Slough @ Jack Tone Road	544MSAJTR	37.96470	-121.14880
	Represented	X	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	531UDLTAJ	37.85360	-121.14570
Zone 3	Core	X	Terminous Tract Drain @ Hwy 12	544XTTHWT	38.11558	-121.49380
	Represented	X	Drain @ Woodbridge Rd	544DAWRXX	38.15256	-121.50095
	Represented		Empire Tract @ 8 Mile Rd	544ETAEMR	38.06012	-121.49912
	Represented		Rindge Tract Drain	544RDGTRD	38.04553	-121.46933
	Represented		Staten Island Drain @ Staten Island Rd	544SIDSIR	38.13297	-121.52225
Zone 4	Core	X	Roberts Island @ Whiskey Slough Pump[2]	544RIAWSP	37.96737	-121.46434
	Represented		Bacon Island Pump @ Old River	544BIPAOR	37.97916	-121.57023
	Represented	X	Kellogg Creek along Hoffman Lane	544XKCAHL	37.88188	-121.65221
	Represented		South McDonald Island Pump	544SMCDIP	37.98928	-121.46285
	Represented		East Orwood Tract Drain	544EOWDTD	37.92857	-121.56067
Zone 5	Core	X	Walthall Slough @ Woodward Ave	544WSAWAV	37.77046	-121.29227
Zone 6	NA	X	Sand Creek @ Hwy 4 Bypass	544SCAHFB	37.94750	-121.74300
Zone 7	Core	X	Union Island Drain @ Bonetti Rd	544UIDABR	37.87170	-121.52551
Zone 7	Represented		Upper Roberts Island Drain	544UPRRID	37.81893	-121.35830
NA	TMDL		San Joaquin River @ West Neugerbauer Rd	544SJCAWN	37.99493	-121.44173
NA	TMDL		Old River @ the West End of Clifton Court Rd	544ORAWCC	37.84195	-121.53721
NA	TMDL		Light House Restaurant @ West Brannon Island Rd	510LHRWBI	38.10487	-121.59299

[1]No monitoring occurred at Mokelumne River Drain @ North Lower Sacramento Rd in the 2015 WY. Monitoring at Mokelumne River @ Bruella Rd is representative of Mokelumne River Drain @ North Lower Sacramento Rd.

[2]Roberts Island @ Whiskey Slough Pump represents water quality in both Zones 4 and 6.

CSM- Core Site Monitoring.

RSM- Represented Site Monitoring.

MPM- Management Plan Monitoring.

NA- Not Applicable; site is not a Core Site and Core Site Monitoring takes place in the zone.

TMDL- Total Maximum Daily Load monitoring.

Table 4. SJCDWQC 2015 WY land use acreage of site subwatershed and TMDL compliance locations.
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	Coyote Creek Tributary @ Jack Tone Rd	Drain @ Woodbridge Rd	Duck Creek @ Hwy 4	East Orwood Tract Drain	Empire Tract @ 8 Mile Rd	French Camp Slough @ Airport Way	Jahant Slough @ Cherokee Ln	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	Mokelumne River Drain @ North @ North Lower Sacramento Rd	Mormon Slough @ Jack Tone Rd	Mosher Creek @ North Alpine Rd	Old River @ the West End of Clifton Rd	Pixley Slough @ Furry Rd	Rindge Tract Drain	Roberts Island @ Whiskey Slough Pump	San Joaquin river @ west Neugerbauer Rd	Sand Creek @ Hwy 4 Bypass	South McDonald Island Pump	Staten Island Drain @ Staten Island Rd	Terminous Tract @ Hwy 12	Union Island Drain @ Bonetti Rd	Unnamed Drain to Lone Creek @ Jack Tone Rd	Upper Roberts Island Drain	Walthall Slough @ Woodward Ave
Citrus	I		63						11	3	4	39		5	5	5	234					39	421						6		
Citrus	NI		18														33						33								
Deciduous Nut And Fruit	I		3217		5	1871			13049	105	902	12	2587	6949	2532	511	11687	1339	969	613		13	88914	39	12				1350		835
Deciduous Nut And Fruit	NI		19												4		2						85	5							
Field Crop	I	3149	1282		2309	2336	1307	2234	8627	637	225	32823	2220	1887	518	200	1290	246	14021	57	4493	4357	30016		984	3496	5032	1415	3279	35	1311
Grain And Hay	I	852	1277		761	3428		664	14292	389		13904	3589	2698	84		2159	389	8214	100	320	2297	35139	70	508	1124	2051	652	4866	151	2552
Grain And Hay	NI		480			44			1332				977	272	43		138	4	2083				2031	12					122		
Idle	I	14	756			91			697	78	161	1051	85	245	457	172	453	285	474	16	26	18	4190	9			34		329		57
Idle	NI		102						42														104						42		
Barren Wasteland	NI	13										60			11		710						741		39						
Riparian Vegetation	NI		92					53	261	20	5	3381	235	6	311		56	12	324		3	65	1661				23	1	19		37
Wild Vegetation	NI	358	45773	1441	229	17757	91	136	103529	1407	5329	9270	92625	2016	26513	1418	70931	1946	6836	234	175	611	565749	7010	380	30	272	47	13994	22	437
Water Surface	NI	7	501			67	6	52	1694		16	15420	183	95	7892	10	617	11	2120		103	362	16896		120		221	24	1456	3	190
Pasture	I		6005	770	650	1698	217		25648	1364	52	5372	3047	11071	885	480	2351	1140	17070	187		2159	50637		281		988	866	9076	484	2706
Pasture	NI		6						126				46	120			21						284						26		
Rice	I								7017			13	244	1577									7020						5176		
Feedlot, Dairy, Farmstead	NI	23	445	4	10	228	31		3431	132	45	269	492	1200	149	116	429	34	904	62	15	90	7552	2	2	2	20	27	1378	15	370
Truck, Nursery, Berry	I	1097	824		306	2017	633	490	5176	10	486	17192	1690	257	342	82	3062	364	9334	42	1677	2832	27974		1709	989	1273	1477	864	14	941
Urban	NI	14	1586	1	7	113	17	3	3186	91	151	1410	600	1171	916	189	3689	22	7288	65	9	868	69239	204	47		139		410		95
Golf Course, Cemetery, Landscape	I																							284							
Golf Course, Cemetery, Landscape	NI		170			18			260	5		356	100	51	14	3	123		63				2373								
Vineyard	I		6219	241	508	1516			8447	656		878	2705	1098	5091	5268	3378	562	750	2114			20351		1		351		3560	301	24
Vineyard	NI		26																												
Total Acres		5528	68861	2457	4785	31185	2302	3631	196825	4897	7377	104952	111425	30720	45768	8454	101364	6354	70451	3489	6821	13711	931411	7635	4083	5640	10403	4509	45952	1025	9555
Irrigated Acres		5112	19642	1011	4540	12958	2157	3388	82964	3241	1831	74785	16167	25789	9913	6719	24615	4325	50833	3128	6516	11716	264662	402	3495	5608	9728	4410	28505	985	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.

Figure 9. SJCDWQC 2015 WY monitoring sites and zone boundaries.

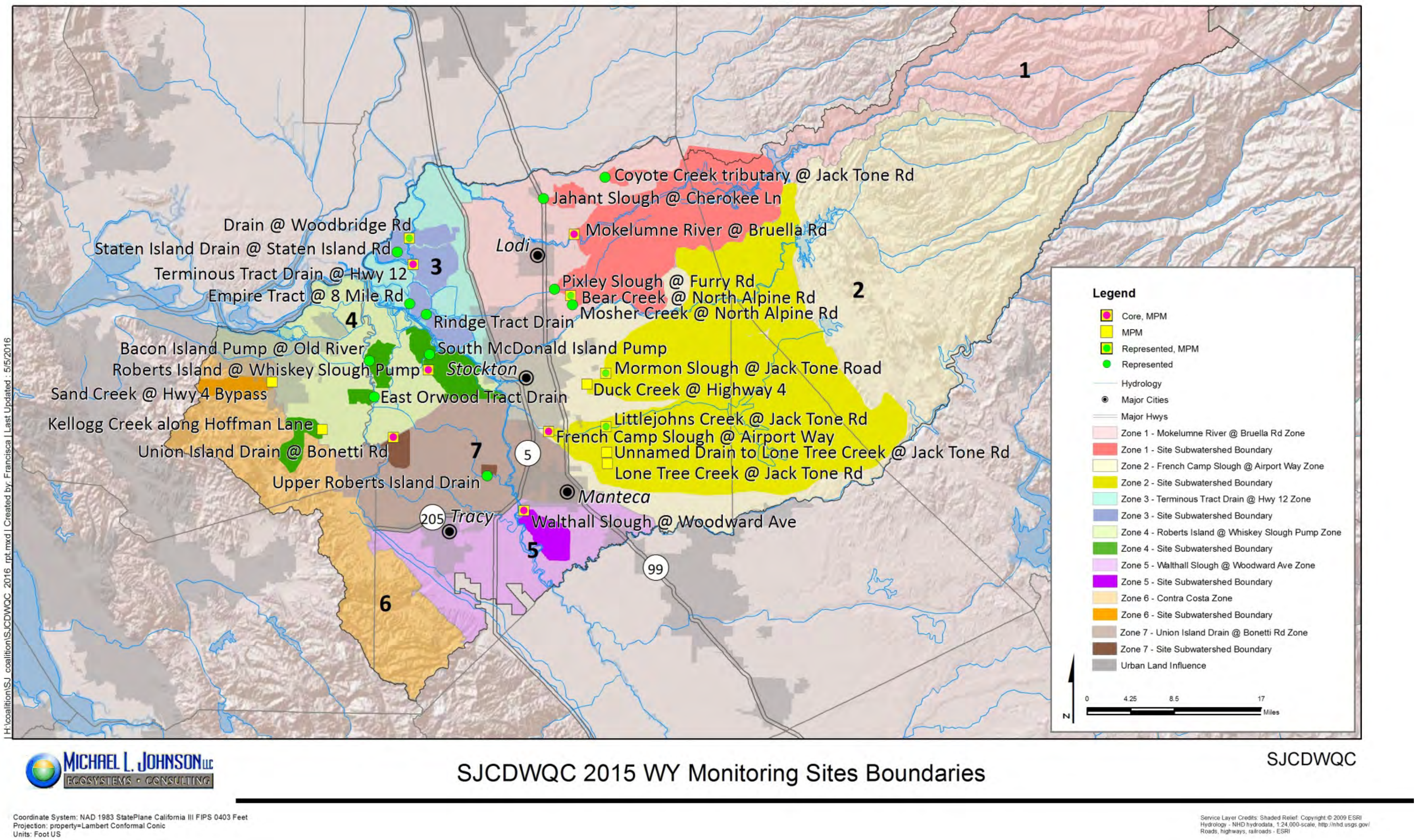
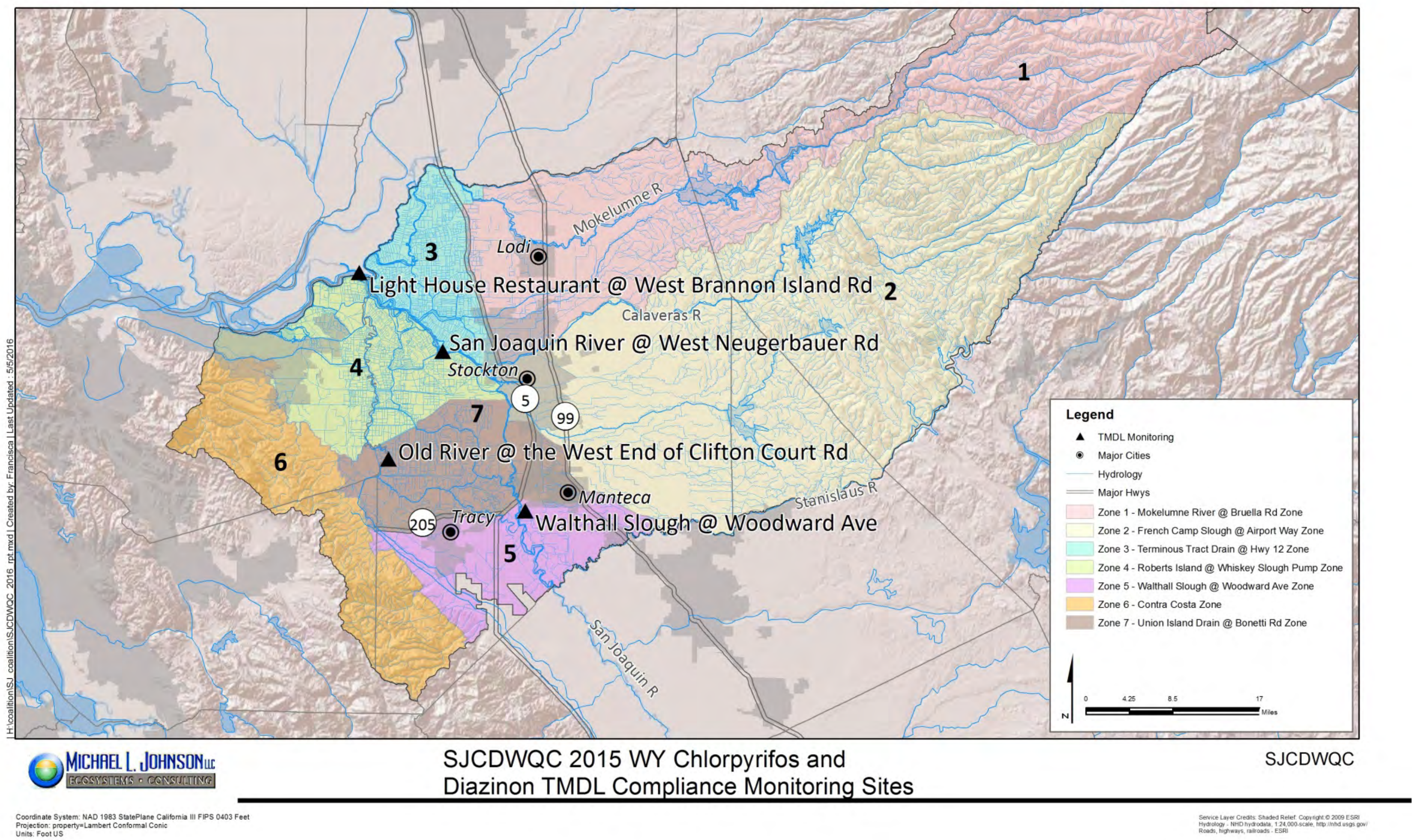


Figure 10. SJCDWQC 2015 WY Chlorpyrifos and Diazinon TMDL compliance monitoring locations.



SITE SUBWATERSHED DESCRIPTIONS

Site descriptions, irrigated acreages, and the monitoring history of SJCDWQC sites monitored during the 2015 WY are presented alphabetically below. 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 VII.

Bacon Island Pump @ Old River (5,112 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, 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 northeastern 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, deciduous orchards, field crops, grains, and hay.

Coyote Creek Tributary @ Jack Tone Rd (1,011 irrigated acres) – This site subwatershed is located in the northeastern region of San Joaquin County. Coyote Creek Tributary flows into Coyote Creek which drains to Dry Creek. Land use in the subwatershed consists of pasture, vineyards, and native vegetation.

Drain @ Woodbridge Rd (4,540 irrigated acres) – This site subwatershed 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 /nursery/berry crops, irrigated pasture, and vineyards in this site subwatershed.

East Orwood Tract Drain (2,157 irrigated acres) – This site subwatershed is located on the eastern border of Contra Costa County and borders Discovery Bay to the south. The sample site, located on the eastern side of the island, drains into Old River. Land use is primarily field crops, pasture, and truck/ nursery /berry crops.

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 (82,964 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 to Lone Tree Creek @ 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.

Jahant Slough @ Cherokee Ln (3,241 irrigated acres) **–** This site subwatershed is located in the northeastern region of San Joaquin County just south of Dry Creek. Jahant Slough flows into Tracy Lake which is fed by overflows from Mokelumne River and Dry Creek. Tracy Lake is used for irrigation by local farmers. The agriculture in the Jahant Slough subwatershed consists mainly of pasture, field crops, vineyards, 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 (74,785 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, truck/nursery/berry crops, 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 (9,913 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 field crops.

Mokelumne River Drain @ North Lower Sacramento Rd (6,718 irrigated acres) – This site subwatershed is located in the north eastern region of San Juaquin County just south of Jahant Slough. Mokelumne River Drain drains into Mokelumne River just north of Lodi. The main agriculture in the subwatershed is vines, deciduous fruits, and pasture.

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), truck farm/nursery, berry crops, and vineyards.

Mosher Creek @ North Alpine Rd (4,325 irrigated acres) – This site subwatershed lies between Bear Creek to the north and Calaveras River to the south. It flows through the northern portion of Stockton before merging with Bear Creek and flowing into San Joaquin River. The subwatershed lies east of Stockton and the primary crops are deciduous fruits, nuts, pasture, vines, grains, truck and berry crops, and field crops.

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.

Pixley Slough @ Furry Rd (3,128 irrigated acres) – This site subwatershed is located in the northeastern portion of San Joaquin County just north of Bear Creek. Downstream of the subwatershed boundary, Pixley Slough and Bear Creek merge into Disappointment Slough which then flows into San Joaquin River. This small subwatershed consists mainly of vines, deciduous fruits, and nuts.

Rindge Tract Drain (6,516 irrigated acres) – This site subwatershed is bordered by the San Joaquin River on the west and Disappointment Slough on the north. Disappointment Slough receives water from Bear Creek and Pixley Slough. The sample location on Rindge Tract is the pumping station located on the northwestern portion of the island, just upstream of where Disappointment Slough flows into San Joaquin River.

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 (264,662 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.

South McDonald Island Pump (3,495 irrigated acres) – This site subwatershed is bordered on the east by the San Joaquin River and located north of Hwy 4. The sample site is located at the pumping station on the southeast side of the island draining into Turner Cut which flows into the San Joaquin River. The primary agriculture is truck/nursery/berry crops, field crops, and grains.

Staten Island Drain @ Staten Island Rd (5,608 irrigated acres) – This site subwatershed is located on the northwest region of San Joaquin County and is bordered by the North and South Mokelumne Rivers. The sample location is located on the southern portion of the island draining the lower half of the island. Over 60% of the agriculture in the subwatershed is field crops with the remaining 40% split between grains and truck/nursery/ berry crops.

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.

Union Island Drain @ Bonetti Rd (4,410 irrigated acres) – This site subwatershed is located east of Clifton Court Forebay and is bordered by North Canal to the north and Grant Line Canal on the south. The sample location is the pumping station located on the north side and drains into the North Canal. The irrigated agriculture is primarily field crops, truck/nursery/ berry, grains, and pasture.

Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (28,505 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.

Upper Roberts Island Drain (985 irrigated acres)—This site subwatershed is located west of I-5 and north of I-205. The sample location is on the pumps located on the southern portion of the island and drain into Old River. The agriculture in this site subwatershed consists primarily of pasture and vines.

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.

RAINFALL RECORDS

In the SJCDWQC region, a “storm monitoring event” is defined as monitoring within three days of a rainfall event that exceeds 0.5 inches within 24 hours. 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 moves the scheduled sampling date to capture the storm. Storm monitoring events must be captured at least twice a year, except where a different frequency has been required or approved by the Regional Board. Stormwater monitoring criteria must be identified based on precipitation levels and knowledge of soils or other factors affecting when stormwater runoff is expected to occur. The collection of storm samples is not contingent on the timing of other prescheduled sampling events and may result in monitoring more than once a month.

In the 2015 WY, the Coalition sampled two storm events which occurred on December 4, 2014 and February 9, 2015. Listed below are quarterly descriptions of all storms that occurred in the Coalition region during the reporting period and whether or not storm monitoring occurred. All tabulated monitoring results and sample details for the 2015 WY are included in Appendix III: Monitoring Results.

Daily rainfall records for the 2015 WY are provided for Stockton and Modesto, the two major cities in and near the Coalition region (October 2014 through December 2014, Figure 11; January 2015 through March 2015, Figure 12; April 2015 through June 2015, Figure 13; and July 2015 through September 2015, Figure 14).

OCTOBER THROUGH DECEMBER 2014

From October through December 2014, the Coalition monitored one storm even that met the trigger limit.

The first storm system of the 2015 WY occurred on October 25, 2014, and resulted in a total of 0.05 inches of precipitation in Stockton and 0.03 inches in Modesto (Figure 11). The Coalition did not conduct sampling because the rainfall trigger limit was not met in Stockton or Modesto. The next storm with measurable precipitation occurred October 31 through November 1, 2014. During this storm, there was a total of 0.5 inches of precipitation in Stockton, and 0.69 inches in Modesto (Figure 11). The amount of precipitation exceeded the rainfall trigger limit within a 24 hour period in Modesto, but did not meet the rainfall trigger limit within the required time frame in Stockton and therefore storm samples were not collected.

Three rain events occurred during the month of November. The first rain event occurred on November 13, 2014. During this storm, there was a total of 0.4 inches of precipitation in Stockton, and 0.27 inches in Modesto (Figure 11). The second rain event occurred from November 19 through November 22, 2014, and 0.33 inches of rainfall in Stockton, and 0.12 inches in Modesto. The last storm event occurred from November 29 through December 6, 2014, and resulted in 1.85 inches of rain in Stockton and 1.72 inches in Modesto (Figure 11). The precipitation during this storm system exceeded the rainfall trigger limit, and therefore storm samples were collected on December 4, 2014.

There were three additional rainfall events in December 2014. The first occurred from December 11 through December 12, 2014, and produced 2.4 inches of precipitation in Stockton and 2.94 inches in Modesto. The second occurred from December 15 through December 20, 2014, and produced 2.24 inches of precipitation in Stockton and 1.61 inches in Modesto (Figure 11). Both of these storms resulted in precipitation that exceeded the rainfall trigger limit in both target cities; however, storm sampling did not occur because the Coalition previously captured runoff from dormant sprays from the storm system that occurred in late November/ early December. Another reason for not capturing another storm event is that these storms occurred within a week of each other. The last storm in December 2014 produced measurable amounts of precipitation on December 24, 2014. Stockton reported a total rainfall of 0.07 inches, and Modesto reported 0.02 inches; storm samples were not collected because the storm did not produce enough precipitation to meet the rainfall trigger limit (Figure 11).

JANUARY THROUGH MARCH 2015

From January through March 2015, the Coalition monitored one storm event that met the trigger limit.

During the month of January, there were two days of measureable precipitation of 0.05 inches or less. Since these systems were isolated, the storms resulted in very little precipitation in either city (Figure 12).

During the month of February, a storm event occurred from February 6 through February 9, 2015 resulting in 1.39 inches of precipitation in Modesto and 1.42 inches in Stockton (Figure 12). Samples were collected on February 9 after a majority of the rainfall had occurred and the rainfall trigger limit was exceeded. A second rainfall event occurred on February 22, 2015, and produced 0.37 inches of precipitation in Modesto, and 0.00 inches in Stockton (Figure 12).

During the month of March, there were three measurable storm events; however, none of the events met the rainfall trigger. Two of the storms were small, isolated systems resulting in less than 0.05 inches of precipitation (Figure 12). The third storm system occurred on March 11, 2015, and produced 0.13 inches of precipitation in Stockton and 0.19 inches in Modesto (Figure 12).

APRIL THROUGH JUNE 2015

Storms during April through June 2015 did not produce enough rainfall within 24 hours in the two cities to meet the 0.50 inches rainfall trigger limit required for storm sample collection.

During April, there were two rainfall events that resulted in measurable precipitation. The first storm occurred from April 7 through April 8, 2015 and resulted in 0.58 inches of precipitation in Stockton and 0.42 inches in Modesto. The second storm event occurred from April 22 through April 25, 2015 and resulted in a total of 0.55 inches of precipitation in Stockton and 0.21 inches in Modesto. The Coalition did not conduct storm sampling in April because the precipitation levels of the storms did not met the rainfall trigger limit (Figure 13).

There was not enough rain during the month of May or June to trigger a storm sampling event. The largest rain event in May occurred on May 7, 2015 which resulted in 0.01 inches of precipitation in

Stockton, and 0.17 inches in Modesto (Figure 13). The largest rain event that occurred in June was on June 10, 2015, and resulted in 0.07 inches of precipitation in Stockton, and 0.00 inches in Modesto (Figure 13).

During the month of June, there was one storm event that resulted in measurable precipitation (Figure 13). This storm event occurred on Storm sampling for this event did not occur because the rainfall trigger limit was not met (Figure 13).

JULY THROUGH SEPTEMBER 2015

Storms during July through September 2015 did not produce enough rainfall within 24 hours in the two cities to meet the 0.50 inches within 24 hours rainfall trigger limit required for storm sample collection.

During July through September, the San Joaquin area had typical Mediterranean climate conditions in with hot and dry weather. During this timeframe, there were three separate storm systems that produced 0.05 inches of precipitation or less. All of these systems were isolated and resulted in very little rainfall in either target city and storm monitoring did not occur (Figure 14).

Figure 11. Precipitation history for Stockton and Modesto, October through December 2014.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.5” rain in 24 hours. All data reported on weatherunderground.com.

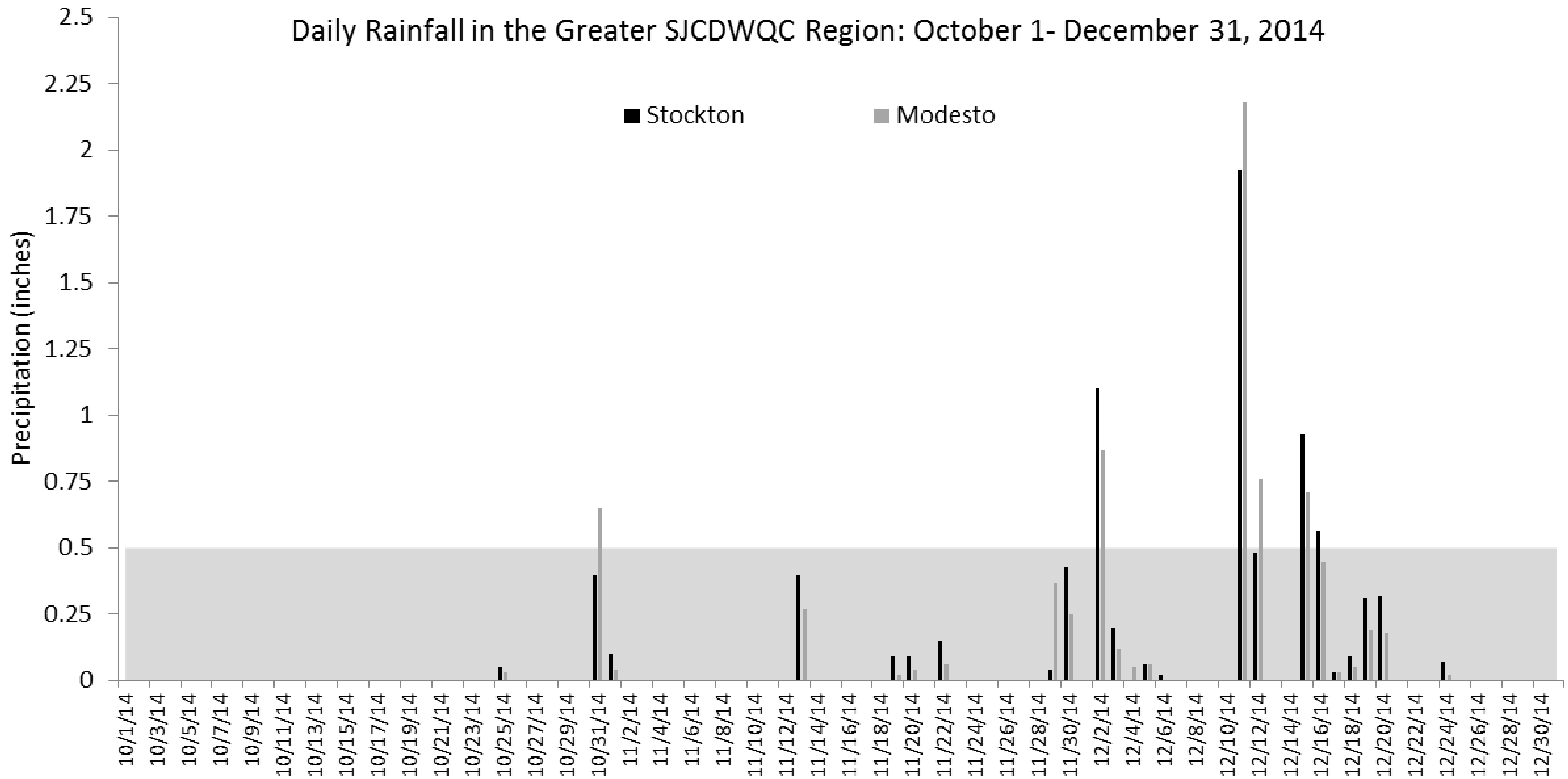


Figure 12. Precipitation history for Stockton and Modesto, January through March 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com.

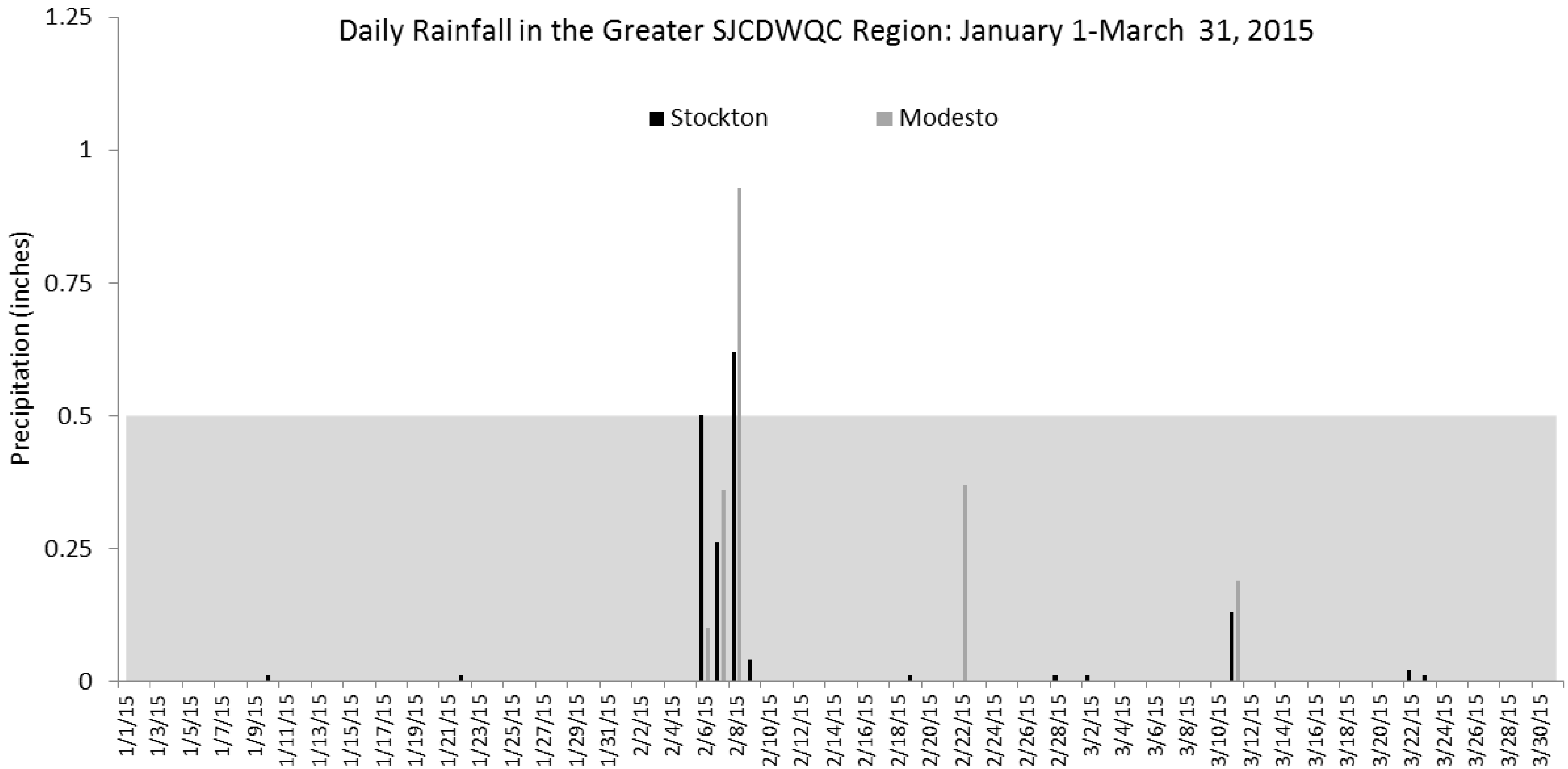


Figure 13. Precipitation history for Stockton and Modesto, April through June 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com

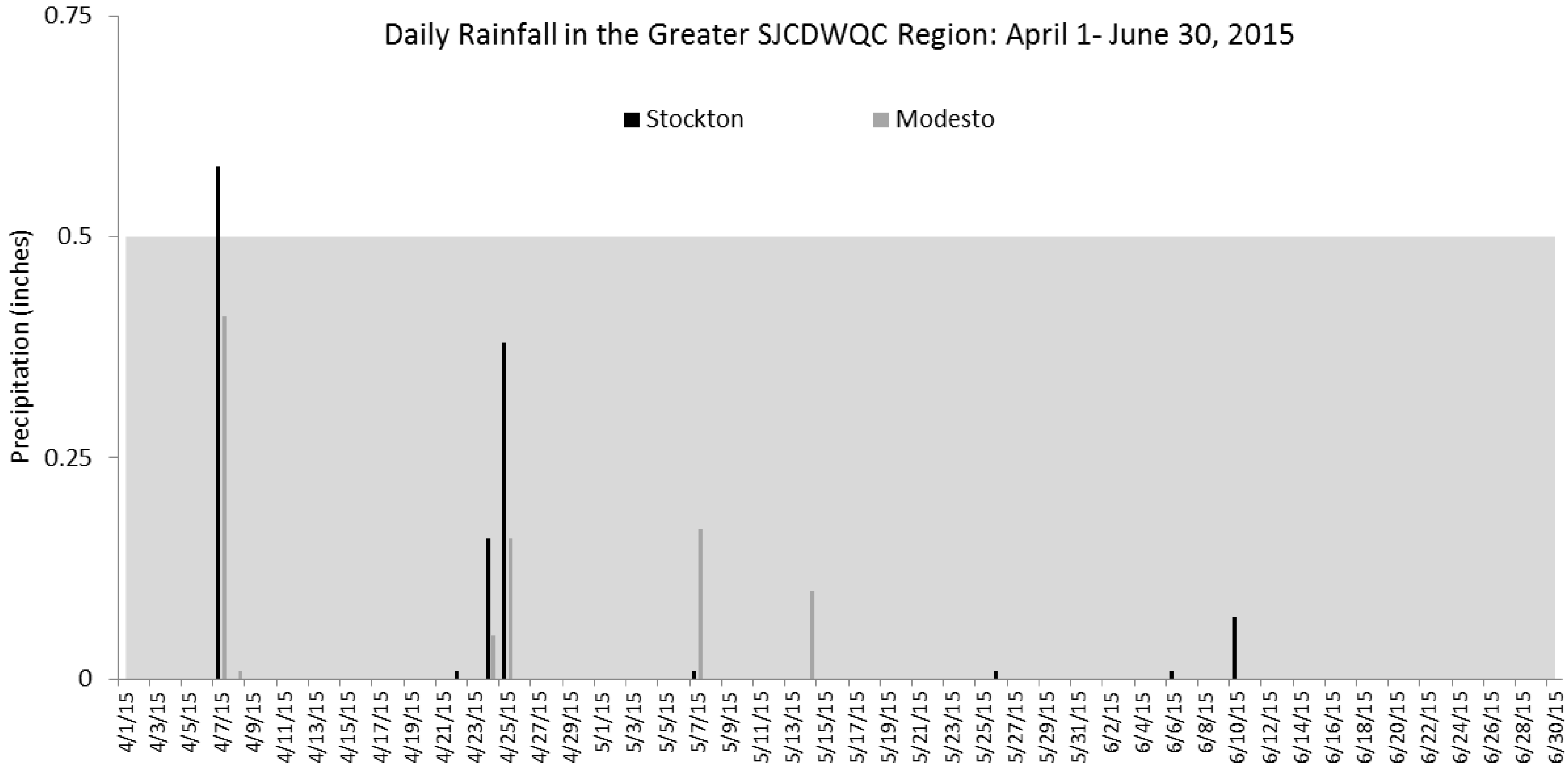
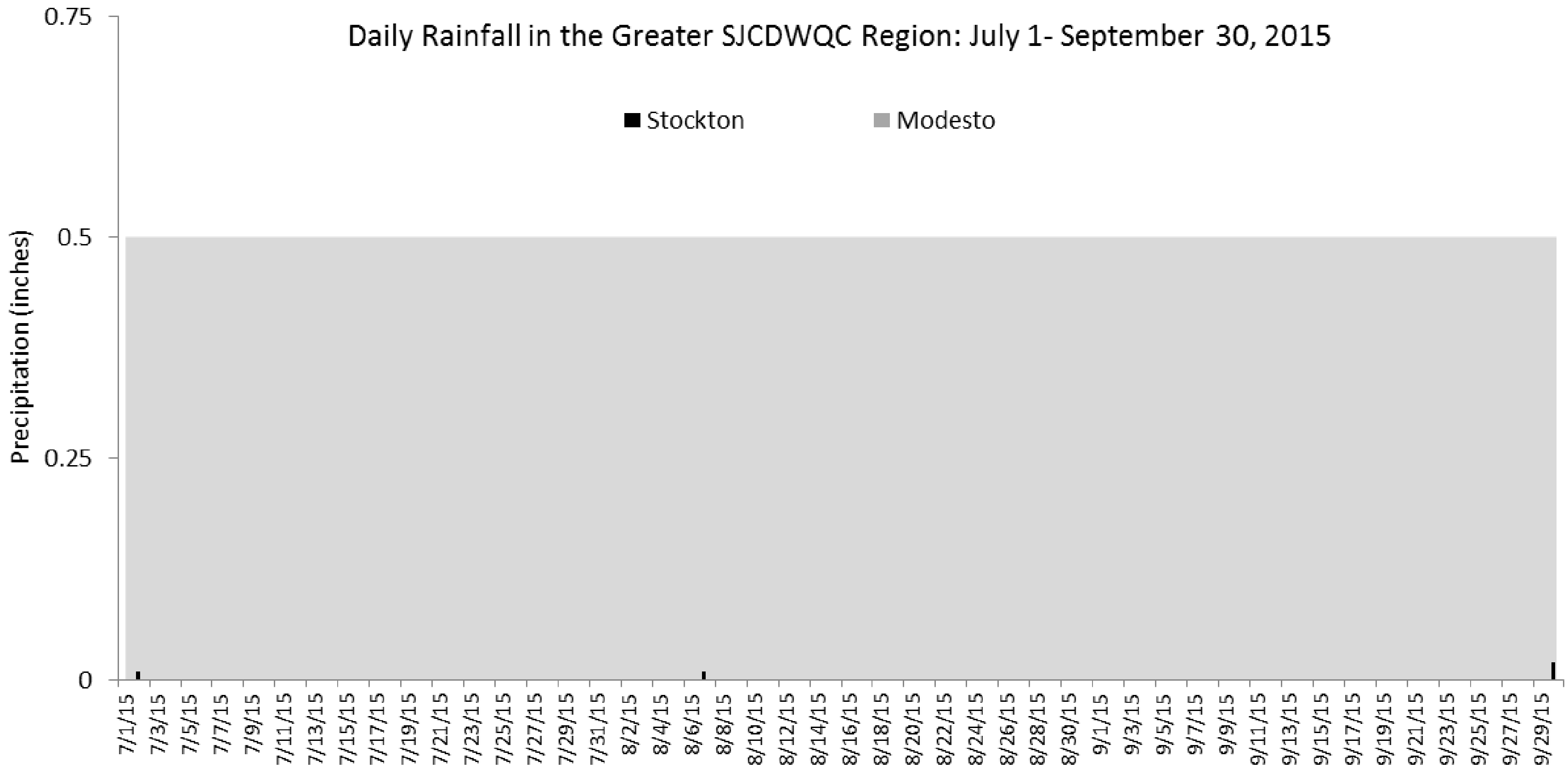


Figure 14. Precipitation history for Stockton and Modesto, July through September 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.5" rain in 24 hours. All data reported on weatherunderground.com.



MONITORING OBJECTIVES AND DESIGN

MONITORING OBJECTIVES

The objectives of the SJCDWQC monitoring program are:

1. Determine the concentration and load of waste(s) in discharges to surface waters.
2. 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.
3. Assess the impact of waste discharges from irrigated agriculture to surface water.
4. Determine the degree of implementation of management practices to reduce discharges of specific wastes that impact water quality in watersheds within the Coalition region.
5. Determine the effectiveness of management practices and strategies to reduce discharges of wastes that impact water quality.

MONITORING DESIGN

The Coalition conducts Normal Monitoring (NM) at Core and Represented sites to characterize discharge from irrigated agriculture, Management Plan Monitoring (MPM) to monitor constituents that require management plans and Total Maximum Daily Load (TMDL) monitoring to assess TMDL compliance. Normal Monitoring also includes two storm and two sediment monitoring events.

For the 2015 WY, sampling occurred monthly from October 2014 through September 2015, including two storm and two sediment monitoring events. The Coalition attempts to sample two storm events per year in order to characterize periods of high flows. A storm monitoring event is defined as monitoring within three days of a rainfall event that exceeds 0.5 inches within 24 hours. Storm sampling occurred on December 4, 2014 and February 9, 2015.

Samples are collected for sediment toxicity analysis twice each year at Core sites and during MPM. Sediment samples are collected after the winter rainfall events and before the height of the irrigation season (from March 1 through April 30). A 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 (from August 15 through October 15). Sediment samples were collected on March 17, 2015 and September 15, 2015.

2015 WY Monitoring Plan Update

Based on the requirements in the WDR, a monitoring schedule (including MPM) is submitted annually in the Monitoring Plan Update (MPU) which is due August 1 prior to the next monitoring WY. The Coalition submitted the first version of the MPU on August 1, 2015 (approved December 17, 2015); an amendment letter to address the monitoring schedule was submitted on February 12, 2016 (approved March 7, 2016). The Coalition reviews previous monitoring results and Pesticide Use Report (PUR) data to determine which sites require monitoring, at what frequency and for which constituents. Due to the submittal of the MPU on August 1, the Coalition is only able to review data through June of that year.

An addendum to the 2016 WY MPU is included in Appendix VIII of this report; the addendum includes any necessary updates to the monitoring schedule based on an analysis of monitoring data from August through September of the 2015 WY.

Monitoring at Core Sites

Monitoring occurs monthly at designated Core sites in each zone for two consecutive years. After two years, monitoring rotates to a second set of Core sites in each zone. Monitoring during the 2015 WY was the first of two consecutive years of monitoring for the current Core sites; following the 2016 WY, the Coalition will rotate to a new Core site within each zone. Table 5 includes a list of the 2015 WY Core sites by zone.

The Coalition monitors at each Core site in accordance to Table 2, Attachment B of the Order, which includes monitoring for physical parameters, nutrients, bacteria, pesticides, metals, and water column and sediment toxicity. All constituents monitored at Core sites are included in the 2014 MPU, Table 4. If a concentration of a constituent exceeds its respective WQTL at a Core site, monitoring will continue for a third consecutive year (Attachment B of the Order, Page 3).

Table 5. SJCDWQC 2015 WY Core sites by zone.

Zone	Site Type	Site Name	Station Code	Latitude	Longitude
1	Core	Mokelumne River @ Bruella Rd	531XMRABR	38.16010	-121.20510
2	Core	French Camp Slough @ Airport Way	531SJC504	37.88170	-121.24930
3	Core	Terminous Tract Drain @ Hwy 12	544XTTHWT	38.11660	-121.49360
4 and 6	Core	Roberts Island @ Whiskey Slough Pump	544RIAWSP	37.96698	-121.46366
5	Core	Walthall Slough @ Woodward Ave	544WSAWAV	37.77046	-121.52551
7	Core	Union Island Drain @ Bonetti Rd	544UIDABR	37.87170	-121.52551

There is no Core site in Zone 6; Roberts Island @ Whiskey Slough Pump will represent water quality in both zones.

Monitoring at Represented Sites

Monitoring at Represented sites occurs to evaluate the potential risk for water quality impairments when an exceedance of a WQTL occurs at an associated Core site (Attachment B of the WDR, Page 3). The Coalition evaluates potential monitoring locations that would represent the hydrological units (HUC12) within the zones, as specified in the WDR.

Monitoring occurs at Represented sites if the site is already in a management plan for an applied pesticide, metal or toxicity. If the Represented site is not in a management plan, monitoring for specific constituents may still occur if:

1. An exceedance of an applied pesticide, metal, or toxicity occurred at the Core site in the same zone during the previous reporting period, or
2. The Core site in the same zone is in a management plan for an applied pesticide, metal, or toxicity and monitoring is necessary at the Represented site to characterize potential discharge.

Once monitoring is initiated at a Represented site, the Coalition monitors at that site during the time of highest risk for exceedances of the WQTLs for that constituent for a minimum of two years. If two or more exceedances occur at the Represented site (or one exceedance for TMDL constituents) within three years of monitoring, a management plan is initiated.

Table 6 includes a list of the Represented sites in each zone. In the 2015 WY, the Coalition monitored at 19 of 20 Represented sites within the SJCDWQC boundary.

Table 6. SJCDWQC Represented sites.
The Coalition only conducts monitoring in Zone 5 for Core site at Walthall Slough @ Woodward Ave and Zone 6 for MPM at Sand Creek @ Hwy 4 Bypass. There are no Represented sites within those two zones.

Zone	Site Type	Site Name	Station Code	Latitude	Longitude
1	Represented	Coyote Creek Tributary @ Jack Tone Rd	531CCTALR	38.24082	-121.15200
1	Represented	Jahant Slough @ Cherokee Ln	531XJSACL	38.21035	-121.26200
1	Represented	Bear Creek @ North Alpine Rd	531BCANAR	38.07431	-121.21100
1	Represented	Mosher Creek @ North Alpine Rd	531MCANAR	38.06088	-121.20900
1	Represented	Mokelumne River Drain @ North Lower Sacramento Rd[1]	531MRDNLS	38.19557	-121.29400
1	Represented	Pixley Slough @ Furry Rd	531XPSAFR	38.08256	-121.24100
2	Represented	Duck Creek @ Hwy 4	531XDCAHF	37.94910	-121.18100
2	Represented	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	531UDLTAJ	37.85358	-121.14600
2	Represented	Mormon Slough @ Jack Tone Rd	544MSAJTR	37.96470	-121.14900
2	Represented	Lone Tree Creek @ Jack Tone Rd	531XLTCJR	37.83760	-121.14400
2	Represented	Littlejohns Creek @ Jack Tone Rd	531XLCAJR	37.88960	-121.14600
3	Represented	Drain @ Woodbridge Rd	544DAWRXX	38.15256	-121.50095
3	Represented	Empire Tract @ 8 Mile Rd	544ETAEMR	38.05972	-121.48403
3	Represented	Rindge Tract Drain	544RDGTRD	38.04553	-121.46933
3	Represented	Staten Island Drain @ Staten Island Rd	544SIDSIR	38.13297	-121.52225
4	Represented	Bacon Island Pump @ Old River	544BIPAOR	37.97935	-121.56945
4	Represented	Kellogg Creek along Hoffman Ln	544XKCAHL	37.88190	-121.65220
4	Represented	South McDonald Island Pump	544SMCDIP	37.98928	-121.46285
4	Represented	East Orwood Tract Drain	544EOWDTD	37.92857	-121.56067
7	Represented	Upper Roberts Island Drain	544UPRRID	37.81893	-121.35830

[1] No monitoring will occur at Mokelumne River Drain @ North Lower Sacramento Rd. Mokelumne River @ Bruella Rd is a Core site that will represent water quality in the Murphy Creek – Mokelumne River HUC12.

Monitoring at Special Project Sites

Special Monitoring sites include sites monitored as part of the Coalition's Surface Water Quality Management Plan (SQMP) and sites monitored for TMDL compliance. Core or Represented sites that are monitored in order to evaluate commodity or management practice-specific effects on identified water quality problems or to evaluate sources of identified water quality problems are considered Special Project sites for the parameters subject to a management plan. Special project monitoring in the SJCDWQC region includes both MPM and TMDL monitoring for site specific constituents.

Management Plan Monitoring

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.

As part of the Coalition's management plan strategy, MPM is conducted to identify contaminant sources and evaluate the efficiency of newly implemented management practices. For details on the 2015 WY MPM results, refer to the Status of Special Projects and Management Plan Status section of this report.

Management plans are required as a result of a single exceedance of the WQTL of a TMDL constituent (DO, SC, boron, chlorpyrifos, and diazinon), or more than one exceedance of a WQTL within a three year time period for all other constituents. Table 55 of the Status of Special Projects section of this report lists all of the specific sites and constituents approved for management plan completion to date.

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 Management Plan Update Report (MPUR). The Coalition submitted a revised SCJDWQC Surface Water Quality Management Plan (SQMP) on May 1, 2015 (approved November 24, 2015). The 2015 SQMP identifies when and where monitoring will occur to identify sources, evaluate effectiveness of management practices, assess performance goals and measures, and report on compliance time schedules. In addition, the SQMP includes management plan implementation schedules and timelines for reporting to the Regional Board on the effectiveness of the Coalition's management plan strategy.

Although management plans are developed for individual site subwatersheds and constituents of concern, the Coalition employs the strategy outlined in the 2015 SQMP to address the same constituents across the entire Coalition region. The WDR specifies that management plans must be completed in the shortest amount of time as practical and must not exceed 10 years from the date the management plan is reported to the Regional Board. For constituents not easily sourced, a timetable for providing workplans and/or source identification studies was provided to the Regional Board in the SQMP.

Management Plan Development Timelines

The Coalition developed a schedule establishing when sites undergo focused outreach and education (Table 7). Based on the 2015 Revised SQMP management plan process, any new site requiring a management plan due to the previous year's exceedances will be assessed on a case-by-case scenario where constituent compliance deadlines, pesticide use data, and Farm Evaluation results are analyzed to develop targeted grower lists for focused outreach and education.

Table 7 is an updated schedule including the approved changes to the prioritization scheme. There were 16 site subwatersheds scheduled for focused outreach from 2008 through 2016. In 2016, the Coalition will adopt the new management plan strategy as outlined in the 2015 SQMP.

Table 7. Schedule for addressing each site subwatershed with a detailed focused Management Plan approach.

Management Plan	Site Subwatershed Name	Priority Set	Year for Focused Approach
2008 Management Plan	Duck Creek @ Hwy 4	First Priority	2008-2010
	Lone Tree Creek @ Jack Tone Rd		2008-2010
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd		2008-2010
	Grant Line Canal @ Clifton Court Rd*	Second Priority	2010-2012
	Grant Line Canal near Calpack Rd*		2010-2012
	Littlejohns Creek @ Jack Tone Rd		2010-2012
	French Camp Slough @ Airport Way	Third Priority	2011-2013
	Mokelumne River @ Bruella Rd		2011-2013
	Terminous Tract Drain @ Hwy 12		2011-2013
	Kellogg Creek along Hoffman Ln	Fourth Priority	2012-2014
	Mormon Slough @ Jack Tone Rd		2012-2014
	Sand Creek @ Hwy 4 Bypass		2012-2014
	Bear Creek @ North Alpine Rd	Fifth Priority	2013-2015
	Roberts Island @ Whiskey Slough Pump[1]		2013-2015
	Walthall Slough @ Woodward Ave		2013-2015
	Drain @ Woodbridge Rd	Sixth Priority	2014-2016
2015 Revised Management Plan	French Camp Slough @ Airport Way	2016 Focused Outreach	2016-2018
	Lone Tree Creek @ Jack Tone Rd		2016-2018
	Terminous Tract Drain @ Hwy 12		2016-2018
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd		2016-2018

*Grant Line Canal sites were replaced by Union Island Drain @ Bonetti Rd in the 2015 WY.

[1]-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.

TMDL 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 in 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 2015, the Coalition conducted TMDL monitoring at four Delta monitoring locations to evaluate compliance with approved TMDL's for chlorpyrifos, diazinon, SC, boron, and DO. The Status of Special Projects section of this Report includes further details on Coalition monitoring and activities concerning these TMDL constituents.

MONITORING RESULTS

In order to achieve the objectives of the SJCDWQC monitoring program, the Coalition monitored 29 sites (including four TMDL sites) during the 2015 WY. The Coalition conducted MPM at 15 of the 29 sites (Table 3). Of those 15, eight sites were monitored as MPM only and MPM occurred at all six Core sites (Roberts Island @ Whiskey Slough Pump Core Site Monitoring is representative of both Zones 4 and 6).

Based on the 2015 WY MPU (approved December 17, 2014), the Coalition conducted site specific monitoring for the dissolved fraction of copper and the total fraction of arsenic during two storm and two irrigation events at Core sites. In addition, MPM was conducted for the dissolved fraction of copper at both Littlejohns Creek @ Jack Tone Rd and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd, and for arsenic at Terminous Tract Drain @ Hwy 12.

SAMPLING AND ANALYTICAL METHODS

Sample containers, volumes, and holding times are provided in Table 8. Table 9 references methods and equipment used to measure discharge. All sites, except for three of the TMDL monitoring sites (San Joaquin River @ West Neugerbauer Rd, Old River @ the West End of Clifton Court Rd, and Light House Restaurant @ West Brannon Island Rd), follow USGS R2 Cross Streamflow Method to measure discharge when it is safe to wade in the waterbody. Analytical methods and reporting limits (RLs) are also provided in Table 11. All field sampling and analytical methods were performed as outlined in the Standard Operating Procedures (SOPs) provided in the Quality Assurance Project Plan (February 23, 2011 approved QAPP; Appendix I-XXXVII). Any deviations from these procedures are documented in the Precision, Accuracy, and Completeness section of this report.

Discharge measurements for the three of the four 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) were obtained online (http://cdec.water.ca.gov) for their respective CDEC stations (Table 10). Discharge measurements were recorded on the field sheets and entered into the database at the time closest to when the sites were sampled.

Table 8. Sample container, volume, and holding times for collection.

Groups	Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
Physical Parameters	Total Suspended Solids	2000 mL	1x 2000 mL Polyethylene	Store at <6°C	7 Days
	Turbidity	2000 mL			7 Days
	Soluble Orthophosphate	2000 mL			48 Hours
	Total Organic Carbon	120 mL	3x 40 mL Amber glass VOA with PTFE-lined cap	Preserve with HCl, store at <6°C	28 Days
Nutrients	Ammonia and Nitrate-Nitrite as N	500 mL	1x 500 mL Polyethylene	Store at <6°C, with H_2SO_4, Preserve to pH $\leq$ 2	28 Hours
Metals	Metals/Trace Elements, Hardness	500 mL	1x 500 mL Polyethylene	Filter as necessary; preserve to ≤pH 2 with HNO_3, store at <6°C	180 Days
Drinking Water	*E. coli* (pathogens)[3]	150 mL	1x 150 mL Polyethylene	Preserved with $Na_2S_2O_3$, store at <8 °C	24 hours
Pesticides	Carbamates	1 L	2x L Amber Glass Jar	Store at <6°C; extract within 7 days	40 Days
	Herbicides	1 L	2x L Amber Glass Jar	Store at <6°C; extract within 7 days	40 Days
	Organophosphates	1 L	2x L Amber Glass Jar	Store at <6°C; extract within 7 days	40 Days
	Paraquat	500 mL	1x 500 mL polyethylene	Store at <6°C; extract within 7 days	21 Days
	Glyphosate	80 mL	2x 40 mL Amber glass VOA with PTFE-lined cap	Store at <6°C; extract within 7 days	6 Months
Water and Sediment Column Toxicity	Aquatic Toxicity	3 Gallons	3x 1 Gallon Amber Glass Jar	Store at <6°C; freeze (-20°C) within 2 weeks	36 Hours
	Sediment Toxicity	2 L	2x 1L Clear Glass Jar	Store at <6°C, do not freeze	14 Days
	Sediment Grain Size	8 oz.	1x 250 mL Glass Jar	Store at <6°C, do not freeze	28 Days
	Sediment Total Organic Carbon	8 oz.	1x 250 mL Glass Jar	Store at <6°C (not frozen), analyze or freeze (-20C) within 28 days	28 days (not frozen) 12 Months (frozen
	Sediment Chemistry	8 oz.	1x 250 mL Amber Glass Jar	Store at <6°C (not frozen), freeze within 48 hours	12 Months
	Sediment Total Solids	8 oz.	1x 250 mL Glass Jar	Store at <6°C	7 Days

[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] Samples for *E. coli* analyses are set up as soon as possible.

Table 9. 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 10. Site specific discharge methods for the 2015 WY.
The sites listed in the table are alphabetized.

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
Coyote Creek Tributary @ Jack Tone 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
East Orwood Tract Drain	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
Jahant Slough @ Cherokee Ln	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Kellogg Creek along Hoffman Lane	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Light House Restaurant @ West Brannon Island Rd	Discharge from CDEC station[2]	San Joaquin River at Prisoners PT NR Terminous 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 Road	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Mosher Creek @ North Alpine Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Old River @ the West End of Clifton Court Rd	Discharge from CDEC station[2]	Old River at Clifton Court Intake gauge
Pixley Slough @ Furry Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Rindge Tract Drain	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Roberts Island @ Whiskey Slough Pump	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
San Joaquin River @ West Neugerbauer Rd	Discharge from CDEC station[2]	Rough and Ready Island gauge
Sand Creek @ Hwy 4 Bypass	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
South McDonald Island Pump	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Staten Island Drain @ Staten Island Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Terminous Tract Drain @ Hwy 12	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Union Island Drain @ Bonetti Rd	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
Upper Roberts Island Drain	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.
[2]Discharge from CDEC station retrieved from website (http://cdec.water.ca.gov).

Table 11. Field and laboratory analytical methods.

GROUP	CONSTITUENT	MATRIX	ANALYZING LABORATORY	REPORTING LIMIT	MINIMUM DETECTION LIMIT	ANALYTICAL METHOD
Physical Parameters	Flow	Fresh Water	Field Measure	1 cfs	NA	USGS R2Cross Streamflow Method
	pH	Fresh Water	Field Measure	0.1	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

Group	Constituent	Matrix	Analyzing Laboratory	Reporting Limit	Minimum Detection Limit	Analytical Method
Bacteria	*E. coli*	Fresh Water	Caltest	1 MPN/100 mL	1 MPN/100 mL	SM 9223 B
Toxicity	Water Column Toxicity	Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-012
		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
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	3.2 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	0.036 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)
	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

Group	Constituent	Matrix	Analyzing Laboratory	Reporting Limit	Minimum Detection Limit	Analytical Method
	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
MPN- Most Probable Number
NA- Not applicable
[1] Subcontracted to Nautilus Laboratory.
[2] Subcontracted to PTS Laboratory.

MONITORING SEASONS

The Coalition categorizes monitoring by fall, winter, irrigation, and storm seasons (Table 12). Fall monitoring (October through December) occurs after irrigation is finished for a 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 through 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 16 provides the locations and seasons of Coalition monitoring from the 2015 WY.

Table 12. 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.

TABULATED RESULTS

Complete monitoring results from the 2015 WY 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 the 2015 WY, all sample collection procedures were followed as outlined in the Monitoring and Reporting Program (MRP) Order No R5-2008-005-R1 (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. Table 13 lists all sampling conditions and exceptions that could result in no sample collection. Sites that were not sampled due to lack of water are listed with scheduled sampling dates in Table 14. If a waterbody had "puddle-like conditions" the entire sample was grouped as "non-contiguous" in the database. Results associated with samples collected from a non-contiguous waterbody, including field parameters, chemistry, and toxicity, are associated with the non-contiguous flag and any exceedances of water quality objectives should be evaluated with the understanding that the water was not connected to a downstream waterbody. Sites and sample dates where samples were collected from a non-contiguous waterbody are listed in Table 15.

Table 13. Description of field sampling conditions.

Sampling Conditions	Definition	Sampling Exceptions	Water Samples Collected?	Sediment Samples Collected?
Contiguous	Waterbody connected upstream and downstream of the sample site.	None: enough water to collect required samples.	Yes	Yes
		Too Shallow: waterbody is <6 inches deep.	No*	Yes
		Hard Bottom: no sediment present or hardpan sediment only.	Yes	No*
Non-contiguous	Waterbody not connected upstream or downstream of the sample site.	None: water is puddled; however there is enough volume present to collect required samples.	Yes	Yes
		Too Shallow: waterbody is puddled and <6 inches deep.	No*	Yes
		Hard Bottom: no sediment present or hardpan sediment only.	Yes	No*
Dry	No water present or not enough volume present to collect required samples.	None: Sediment has enough moisture to collect required samples.	No*	Yes
		Dry: no water present or not enough volume present to collect required samples.	No*	No*

*If no samples are collected, the sampling event is considered 'Dry' and all results are reported as 'no exceedances of the WQTLs'.

Table 14. Sites that were not sampled due to lack of water during the 2015 WY.

Site	Dry Site Date
Duck Creek @ Highway 4	5/19/2015, 6/16/2015
Mosher Creek @ North Alpine Rd	11/18/2014, 12/4/2014, 1/20/2015, 2/9/2015, 3/17/2015, 5/19/2015, 6/16/2015, 7/21/2015, 8/18/2015
Pixley Slough @ Furry Rd	1/20/2015, 2/9/2015
Sand Creek Highway 4 Bypass	8/18/2015, 9/15/2015
Walthall Slough @ Woodward Ave	3/17/2015

Table 15. Sites that were sampled as a non-contiguous waterbody during the 2015 WY.

Site	Non-Contiguous Site Date
Bear Creek @ North Alpine Rd	7/21/2015
Duck Creek @ Highway 4	5/19/2015, 8/18/2015, 9/15/2015
French Camp Slough @ Airport Way	11/18/2014, 1/20/2015, 2/9/2015
Littlejohns Creek @ Jack Tone Rd	8/18/2015
Mormon Slough @ Jack Tone Rd	11/18/2014, 12/4/2014, 1/20/2015, 7/21/2015
Pixley Slough @ Furry Rd	12/4/2014
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	3/17/2015
Walthall Slough @ Woodward Ave	4/21/2015

Table 16. Sample sites and seasons monitored during the 2015 WY.
Sites organized by zone; Core site is listed first followed by Represented sites alphabetized.

Zone	Station Name	2014	2015		
		Fall	Winter	Storm	Irrigation
1	Mokelumne River @ Bruella Rd	X	X	X	X
	Bear Creek @ North Alpine Rd	X	X	X	X
	Coyote Creek tributary @ Jack Tone Rd		X	X	
	Jahant Slough @ Cherokee Ln		X	X	
	Mosher Creek @ North Alpine Rd	Dry	Dry	Dry	Dry*

Zone	Station Name	2014	2015		
	Pixley Slough @ Furry Rd	X	Dry	Dry*	
2	French Camp Slough @ Airport Way	X	X	X	X
	Duck Creek @ Highway 4		X		X*
	Littlejohns Creek @ Jack Tone Rd	X	X	X	X
	Lone Tree Creek @ Jack Tone Rd		X	X	X
	Mormon Slough @ Jack Tone Rd	X	X	X	X
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	X	X	X	X
3	Terminous Tract Drain @ Hwy 12	X	X	X	X
	Drain @ Woodbridge Rd		X		X
	Empire Tract @ 8 Mile Rd		X		X
	Rindge Tract Drain		X		X
	Staten Island Drain @ Staten Island Rd		X		X
4	Roberts Island @ Whiskey Slough Pump	X	X	X	X
	Bacon Island Pump @ Old River		X	X	X
	Kellogg Creek along Hoffman Lane		X		X
	South McDonald Island Pump	X	X	X	X
	East Orwood Tract Drain		X	X	X
5	Walthall Slough @ Woodward Ave	X	X	X	X
6	Sand Creek @ Hwy 4 Bypass		X		X
7	Union Island Drain @ Bonetti Rd	X	X	X	X
	Upper Roberts Island Drain		X	X	X
NA	San Joaquin River @ West Neugerbauer Rd			X	X
	Old River @ the West End of Clifton Court Rd			X	X
	Light House Restaurant @ West Brannon Island Rd			X	X

A blank cell indicates that no sampling occurred at the site during the specified season.
"Dry" indicates that the site was dry during one or more events during the specified monitoring season.
*Indicates the site also had water and was sampled during one or more event in the specified monitoring season.
NA – Not applicable; TMDL sites are not designated to zones.

Instantaneous loads are calculated for all detections (Appendix III, Table III-7) according to the following formula: Instantaneous Load (µg/sec) = Discharge (cfs) X 28.317L/ft3 X Concentration (µg/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.

QUARTLERY SUBMITTALS

As required in Attachment B to the General Order R5-2014-0029-R1, the Coalition submits the Quarterly Monitoring Reports in an electronic format. Table 17 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 Custody (COCs) forms,
    d) Toxicity Reports with raw data including copies of the original bench sheets.

Table 17. 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 quarterly for monitoring that occurred during the 2015 WY. If any discrepancies between the COCs and sample delivery occurred, each item was resolved and documented either directly on the COC or on an anomaly form filled out by the laboratory.

During the 2015 WY, two COC discrepancies were identified and resolved. The first discrepancy was identified when the laboratory contacted sampling crews on November 18, 2014 to confirm the sample date on the COC for one site (Roberts Island @ Whiskey Slough Pump). The second discrepancy was for the December 4, 2014 sampling event where the COC indicated a hardness analysis for the equipment blank. The Coalition contacted the laboratory to stop the analysis on December 19, 2014 and the COC was revised. The laboratory corrected the sample date on the COC and provided the updated COC in the final laboratory report.

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.

COMPLETENESS, PRECISION, AND ACCURACY

The sections below include an assessment of completeness, precision, and accuracy for data generated from samples collected during the 2015 WY. Completeness is determined based on whether samples were collected according to the schedule in the MPU, received and analyzed by the laboratory, and the required QC was performed. Tables 18 through 20 include counts and percentages for completeness per method and analyte for the 2015 WY.

Precision and accuracy are evaluated based on Data Quality Objectives (DQOs) as outlined in the QAPP. Tables 21 through 33 include counts per method and analyte to calculate the percentage of Quality Control (QC) samples which meet DQOs. Within the WY, 90% or more of the DQOs must be met for each QC sample and analyte for data acceptability. All results that do not meet DQOs are flagged using California Environmental Data Exchange Network (CEDEN) codes. The Coalition works with the Central Valley Regional Data Center (CV RDC) to ensure all data are CEDEN comparable. Data generated for the 2015 WY can be accessed in the CV RDC database and in Appendices III and IV of this report.

COMPLETENESS

Completeness is assessed on three levels: field and transport, analytical, and batch completeness. Field and transport completeness is based on the number of samples successfully collected and transported to the appropriate laboratories (Tables 18 through 20). Field and transport completeness may be less than 100% due to bottle breakage during sample transport to the laboratory or inability to access a site. Dry sites and waterbodies that lack enough water to collect samples are considered "sampled" and are counted toward field and transport completeness. Analytical completeness is based on the number of samples successfully analyzed by the laboratory. Analytical completeness may be less than 100% due to bottles breaking while at the laboratory or if an analysis failed or was not performed due to laboratory error. Batches discussed in this section of the report refer to samples (both field and QC samples) that are analyzed together on the same instrument. Batches comprise of no more than 20 QC and field samples in a single analysis. Batch completeness assesses whether chemistry and toxicity batches were processed with the required QC samples as prescribed in the QAPP.

Field and Transport Completeness

Overall, field and transport completeness for all the environmental samples was 99.9% for the 2015 WY. Completeness was less than 100% because the Coalition did not receive permission to access East Orwood Tract Drain and Rindge Tract Drain by the time the sites were scheduled for monitoring in October 2014. Permission to access the sites was granted in November 2014 and samples were collected from both sites for the remainder of the scheduled events. Field parameter measurements (DO, pH, SC, and water temperature) were taken at each site for all sampling events when there was enough water for sample collection. Due to not gaining access to East Orwood Tract Drain and Rindge Tract Drain during the October 2014 sampling event, field measurement completeness was 99.9% for all field parameters (Table 18).

Discharge is either measured by sampling crew or obtained from gauge stations (Table 10). Field and transport completeness is only assessed for discharge where sampling crews collect the measurement. When a waterbody has no measureable flow or is non-contiguous, discharge is recorded as 0 cfs and is counted toward the total number of measurements taken for discharge completeness (Table 19). When samples are only collected for toxicity at a location, discharge is not measured since an instantaneous load does not apply to toxicity; these situations do not count toward the total number of samples scheduled when assessing discharge field and transport completeness (Table 19). Discharge may not be measured when the waterbody is too deep to safely take flow readings or equipment failure occurs; these instances are counted against the total number of measurements taken (Table 19). Discharge was not measured at sites due to the waterbody being unsafe to take flow readings a total of 45 times at 12 sites during 13 scheduled events. In addition, Walthall Slough @ Woodward Ave was too shallow to obtain flow readings for discharge once for the November 18, 2014 sampling event. Overall, there were 46 times (sites/events) where discharge measurements were not taken (Table 19). Completeness for discharge was 69.2% for the 2015 WY.

Field duplicate, field blank, and equipment blank samples are collected in the field and transported to the laboratories. These field QC samples are collected during each event as described in the QAPP. For example, equipment blanks are collected during monitoring events and are analyzed to assess contamination in the filtration system used to collect dissolved metals samples. If dissolved metals are not scheduled for monitoring, collecting an equipment blank sample is not necessary. At a minimum, field QC samples must comprise 5% of the samples collected and be collected with each sampling event. All analytes had field samples collected at a frequency greater than 5%, ranging from 7.6% to 50% (Table 20).

Analytical Completeness

During the 2015 WY, all samples collected for analyses were analyzed for each analyte scheduled successfully. Therefore, analytical completeness was 100% (Table 18)

Batch Completeness

Each chemistry and toxicity analytical batch must be processed with a minimum set of QC samples as prescribed in the QAPP. Batch completeness is determined based on whether or not all required QC samples were run with every batch. All chemistry and toxicity batches (224 of 224) met batch completeness requirements (obtained from CEDEN database).

Hold Time Compliance

Samples must be analyzed within the hold times prescribed in the QAPP to avoid potential degradation of the scheduled analyte. Each sample must be stored, extracted (if applicable), and analyzed within a specific timeframe to meet hold time requirements as outlined in Table 21 and the SJCDWQC QAPP. Results associated with hold time violations are flagged accordingly in the database. During the 2015 WY, 98.7% of samples were analyzed within hold time (Table 21).

Sediment was collected from sites in the SJCDWQC region on March 17, April 21, and September 15 during the 2015 WY. During the March 17, 2015 event, samples were shipped to the laboratory for sediment toxicity analysis and were found to be outside of the hold temperature requirement of ≤6°C. Therefore, these samples were recollected on April 21, 2015. Sediment samples collected for grain size and TOC were analyzed outside of hold time at a frequency less than the 90% requirement (Table 21). The 28 day hold times were met in 20 of 40 (50%) grain size analyses and 6 of 40 (15%) TOC analyses conducted within the reporting period.

During the March 17, 2015 event, samples collected from Mormon Slough @ Jack Tone Rd were analyzed two days outside of the hold time requirement for the method (ASTM D422) used to analyze grain size. The samples were originally analyzed within hold time. However, because the composition of the sample contained grain sizes larger than the method (ASTM D4464M) is capable of measuring, the laboratory reanalyzed the sample two days outside of hold time following another method (ASTM D422) to characterize the grain sizes in the sample (Table 21). The hold time violation does not affect the quality of the results.

When sediment samples are collected, they are sent to the toxicology laboratory for toxicity testing and the chemistry laboratory for grain size and TOC analyses. During the March 17, 2015 sampling event, TOC hold time violations occurred for two separate reasons. First, the toxicology laboratory received a cooler containing several samples with temperature measurements outside the required temperature (≤6°C). As a result of toxicity sample temperature requirement violations, sampling crews recollected 5 of 19 samples. The laboratory was notified of which samples were going to be recollected a week after the March event. The analysis occurred 10 days past the hold time requirement prescribed in the QAPP due to the delay in the identifying which sample could be analyzed. The second hold time violation occurred because five other samples had TOC concentrations exceeding the highest concentration on the calibration curve and the samples had to be reanalyzed; the original samples were run within hold time. The reanalysis of these samples occurred six days past the hold time.

During the September 15, 2015 sampling event, all 19 samples collected for grain size analyses were analyzed outside of the 28 day hold time requirement. Two separate grain size batches were processed; one was processed seven days past the hold time and the other batch was processed eight days past the hold time requirement. Similarly, TOC analyses occurred seven and 10 days past the hold time requirement. Seven of the 19 samples had to be diluted and reanalyzed because the concentrations for TOC in the samples exceeded the highest point on the calibration curve; this resulted in analysis occurring 10 days after hold time. The hold time violations do not affect the quality of the results and all data are still considered useable.

The laboratory was contacted about hold time violations and corrective actions were discussed for future monitoring events. To ensure hold time violations do not occur due to oversight in the future, the Coalition creates comments on COCs and contacts the laboratory after samples are received as reminders to analyze samples collected in the Coalition region within the hold time requirement in the QAPP. The details regarding the discussions with the laboratory concerning the hold time violations and the corrective actions taken to ensure hold times are met for future samples/analyses are outlined in the ‘Corrective Actions’ section below.

PRECISION AND ACCURACY

Precision and accuracy are evaluated for each type of QC sample analyzed during the 2015 WY in Tables 22 through 32 including:

- Evaluation of blank samples (field blank, equipment blank, and laboratory blank)- Table 22, Table 23, and Table 25;
- Evaluation of field precision for chemistry, toxicity, and grain size- Table 24 and Table 33;
- Evaluation of laboratory accuracy (laboratory control spikes, matrix spikes, and surrogates) - Table 26, Table 28, and Table 31;
- Evaluation of laboratory precision (LCSD, MSD, and laboratory duplicate)- Table 27, Table 29, and Table 30;
- Summary of holding time evaluations- Table 21; and
- Summary of negative control toxicity tests- Table 32.

During the 2015 WY, each batch was processed with a combination of any of the following QC samples: field blank, equipment blank, laboratory blank, matrix spike (MS), laboratory control spike (LCS), laboratory duplicate, field duplicate, and/or an appropriate set of surrogate samples. Blank samples (field blank, equipment blank, and laboratory blank) are analyzed to determine sources of contamination in either the field (field blanks), the equipment (equipment blank) or the laboratory (laboratory blank). Percent recoveries in LCS, MS, and surrogate samples are calculated to assess laboratory accuracy in recovering known concentrations of analytes. Relative percent differences (RPDs) are calculated in duplicate samples (laboratory duplicate, LCS duplicate, MS duplicate) to assess the laboratory's precision of recoveries. In turn, the RPD calculated for field duplicates assesses field sampling precision.

When a concentration of a chemical constituent in an environmental sample exceeds the highest point on a calibration curve, a dilution of the sample is required. The laboratory reports the result of the diluted sample multiplied by the dilution factor to represent the concentration of the analyte detected in the original sample. All 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.

Reporting limits are established according to QAPP guidelines and set at levels where laboratory instruments can reliably detect analytes in samples. Although instruments can detect analytes below the RL, accurate detections become less reliable and results reported below the RL are associated with variability. Laboratories report all detections, even when analytes are detected at concentrations below the RL. When the concentration of an analyte is reported below the RL and above the Method Detection Limit (MDL), the result is reported as an estimated value and flagged in the laboratory report with a "J Flag" and assigned a "DNQ" code when it's loaded in the database.

An evaluation of the precision and accuracy for each analyte or group of analytes is discussed in the sections below. Batches are accepted by evaluating all measures of precision and accuracy. Justification for accepting 2015 WY data when DQO acceptability criteria fell below 90% is provided in each analyte section. Overall, precision and accuracy criteria were met for more than 90% of the samples for all criteria and all data are considered usable.

Chemistry

E. coli: Quality control samples analyzed for *E. coli* include field and laboratory blanks and field and laboratory duplicates. In addition, sterility checks and positive/negative controls and positive/positive controls are analyzed in each batch. The Coalition reviews data quality based on the DQOs for the blank and duplicate samples as prescribed in the QAPP. Precision for *E. coli* is evaluated using the mean of logarithm (R_{log}) of duplicate results. The DQO is determined by multiplying the mean R_{log} of at least 20 duplicate results by 3.27. The laboratory calculated the range of means using some Coalition samples and other samples with the same type of matrix. The *E. coli* R_{log} of the means was 0.40 resulting in an acceptable limit for *E.coli* of $R_{log} \leq 1.30$. All field and laboratory duplicates had a $R_{log} \leq 1.30$ and all results for field and laboratory blanks were non-detect. All *E. coli* results reported were accepted and are useable.

Hardness: Hardness is analyzed in samples that are also analyzed for dissolved metals and is used to calculate the hardness based WQTLs for dissolved metals. Quality control samples for hardness include: field and laboratory blanks, field duplicates, LCS, and MS, and a laboratory duplicate sample (usually a LCSD or MSD). Acceptability was met for 10 of 10 (100%) laboratory blanks, 8 of 8 (100%) field blanks, 8 of 8 (100%) field duplicates, 10 of 10 (100%) LCS, 19 of 20 (95%) MS, and 10 of 10 (100%) MSD samples. Since acceptability criteria were met for all QC samples, all hardness data are useable.

Metals (dissolved): All metals are analyzed following the EPA method 200.8. Samples collected for dissolved metals are filtered through a 0.45 µm filter and preserved with nitric acid to measure the dissolved fraction. A clean and new filter is used when filtering samples from different bottles during environmental and field duplicate sample collection. Dissolved metal samples are analyzed with the following QC: field blank, equipment blank, method blank, field duplicate, MS, LCS, and laboratory duplicate samples. During the 2015 WY, copper was the only dissolved metal analyzed in the SJCDWQC and acceptability criteria were met for 8 of 8 (100%) field blanks, 8 of 8 (100%) equipment blanks, 9 of 9 (100%) laboratory blanks, 7 of 8 (87.5%) field duplicates, 17 of 18 (94.4%) MS, 9 of 9 (100%) LCS samples, and 9 of 9 (100%) MSD samples.

Acceptability criteria were met for 7 of 8 (87.5%) field duplicate samples analyzed for dissolved copper. The only field duplicate that was outside of the acceptable limit was collected from Terminous Tract @ Hwy 12 on February 9, 2015 during a storm event; the RPD was 29%. The copper concentrations were 2.0 µg/L in the environmental sample and 1.5 µg/L in the field duplicate sample. The results of the field duplicate could have resulted in a high RPD due to heterogeneity in the water column at the time of sampling. The high field duplicate RPD did not affect the quality of the analytical results and the batch was accepted as useable.

Metals (total): Arsenic was the only total metal analyzed during the 2015 WY. Quality control samples analyzed for arsenic include: laboratory and field blanks, field duplicates, LCS, MS, and laboratory duplicate samples. Acceptability was met for all arsenic QC samples analyzed for the 2015 WY and all data are useable.

Nutrients: Nutrients analyzed in water samples include ammonia as N, nitrate + nitrite as N, and orthophosphate as P. Quality control samples for these constituents are as follows: laboratory blanks, field blanks, field duplicates, LCS, MS, and a MSD or LCSD. Acceptability was met for 100% of nutrients analyzed in laboratory blanks, field blanks, LCS, and LCSD. Field duplicate acceptability was met for 100% of samples analyzed for orthophosphate as P. Acceptability was met for 7 of 12 (58.3%) ammonia as N and 10 of 12 (83.3%) Nitrate + Nitrite as N field duplicate samples analyzed. One hundred percent of MS samples recovered ammonia as N and orthophosphate as P within acceptable limits. Acceptability was met for 24 of 26 (92.3%) MS samples analyzed for nitrate + nitrite as N. All MSD RPDs met acceptability criteria.

Field duplicate RPDs were outside the acceptable limit for ammonia in samples collected for the following sampling events: November 18, 2014, March 17, 2015, April 21, 2015, July 21, 2015, and September 15, 2015. The RPDs for these events ranged from 29% to 93% which are outside of the acceptable limit of ≤25%. All of the ammonia results associated with high RPDs were reported below or right at the RL (0.1 mg/L). The concentration in the field duplicate was slightly above the RL (0.12 mg/L) and the environmental sample concentration was below the RL and was flagged as an estimated value. The associated RPD was the most variable (93%) out of the five RPDs that were greater than 25%. The RPDs for all samples may have exceeded the acceptable limit due to the high variability associated with results reported below the RL because they are considered estimates. The overall results were accepted because all of the other QC samples analyzed in each batch met their respective DQOs.

Field duplicate RPDs did not meet the acceptable limit for nitrate + nitrite as N for the following sample dates: November 18, 2014 and August 18, 2015. The RPDs ranged between 29% and 48%. The RPD for the November 18, 2014 sampling event was calculated from low concentrations detected in the environmental (0.13 mg/L) and field duplicate (0.08 mg/L) samples. The RPD (29%) could be due to variability that can occur when concentrations are detected at low levels. The results for August 18, 2015 were reported below the RL (0.05 mg/L). The high RPD (48%) could be due to the variability associated with estimated concentrations reported below the RL.

Nitrate + nitrite as N recovered below the acceptable limit of 90% in MS samples analyzed for the following sampling events: November 18, 2014 and January 20, 2015. The percent recoveries for both sets of MS samples were 93% (MS) and 89% (MSD) in November and 97% (MS) and 73% (MSD) in January; the MSD samples recovered nitrate + nitrite as N below the acceptable limit. Compounds or physical parameters such as sulfates, chloride ions, and high levels of particulates (indicated by turbidity) can cause interferences in nitrate + nitrite as N analyses. Samples collected from the site used as the MS samples (Walthall Slough @ Woodward Ave) were also collected for analysis of turbidity for both events. Turbidity was 4.3 NTU (November 18, 2014) and 2.6 NTU (January 20, 2015). These results, in combination with other constituents not analyzed could have been present at high enough levels to reduce recoverability of the MS samples. The batches processed for nitrate + nitrite as N were accepted because DQOs for the rest of the QC samples met acceptability and the data are useable.

Pesticides in water: Pesticides were analyzed from seven different analytical 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). The SJCDWQC is not required to monitor group A pesticides or organochlorine pesticides. However, samples were collected from Walthall Slough @ Woodward Ave for the analysis of HCH isomers (alpha, beta, delta, and gamma) and Sand Creek @ Hwy 4 Bypass for the analysis of dieldrin as part of MPM during the 2015 WY. Paraquat and glyphosate are only monitored twice a year during one storm and one irrigation event.

Acceptability criteria for pesticides in water samples are evaluated per each analyte. For each analyte, 100% of laboratory blank, field blank, field duplicate, and LCSD samples met the acceptability criteria. Although acceptability criteria were not achieved in 100% of the LCS, MS, MSD and surrogate samples, most met the 90% acceptability requirement for the WY except paraquat in the LCS (2 of 4, 50%), glyphosate in the MS (3 of 4, 75%), paraquat in the MS (1 of 4, 25%), and demeton-s in the MSD (10 of 12, 83.3%). Each instance is discussed below.

The acceptable LCS limits for paraquat are 70%-130%. Paraquat recovered outside of the acceptable limits in 2 of 4 (50%) LCS samples during the 2015 WY; both LCS samples were analyzed with samples collected during the December 4, 2015 sampling event. The recoveries in the LCS samples were 53.9% (LCS) and 61.9% (LCSD). Within the same batch, paraquat also recovered low in the MS samples; 67.6% (MS) and 65.8% (MSD). Paraquat was not detected in any of the samples collected during the sampling event. Even though acceptable recoveries were not achieved in the LCS and MS samples, the lowest standard was accurately detected at the expected value. Therefore, any paraquat in the samples would have been detected even at low levels. Paraquat recovered below the acceptable limit at 69.1% in the MS samples analyzed in the batch for the July 21, 2015 sampling event. Both LCS samples recovered paraquat within limits and the lowest calibration standard was accurately detected. Paraquat was not detected in any of the environmental samples. Therefore, all paraquat data was accepted and are useable.

The acceptable MS limits are 85.7%-121% for glyphosate. Acceptability was met in 3 of 4 (75%) MS samples analyzed for glyphosate. Acceptability was not met in one MS sample analyzed in the batch processed for the July 21, 2015 sampling event, where the recovery was 122%. Glyphosate was not detected in samples collected during the event. Due to the recovery being only slightly above the highest acceptable limit and non-detect sample results, the data were accepted because detections would have occurred if concentrations (even low concentrations) of glyphosate were present in samples.

The acceptable MS/MSD RPD limit is ≤25% for demeton-s. Demeton-s MS/MSD RPDs were above the acceptable limit for samples collected during the January 20, 2015 and May 19, 2015 sampling events. The January 20, 2015 MS/MSD RPD for demeton-s was 29.6%. Within the January batch, the LCS and MS/MSD recoveries were within DQOs. The MS/MSD analyzed with the May 19, 2015 samples had a demeton-s RPD of 103.4%; in addition, the MS recovered below the acceptable limit of 35% (PR = 20.5%). However, the MSD, LCS and surrogates in the batch recovered within acceptable limits and the environmental samples were all non-detect; the data were accepted and are useable.

Total Organic Carbon (TOC) in water: Quality control samples analyzed for TOC include: field and laboratory blanks, field duplicates, LCS, MS, and laboratory duplicates samples. During the 2015 WY, acceptability criteria were met in 12 of 12 (100%) field blanks, 15 of 15 (100%) laboratory blanks, 12 of 12 (100%) field duplicates, 20 of 20 (100%) LCS, 5 of 5 (100%) LCSD, 30 of 32 (93.8%) MS, and 16 of 16

(100%) MSD samples. All TOC acceptability criteria were met for all QC samples and all TOC data are useable.

Total Suspended Solids (TSS): The QC samples analyzed for TSS analytes include: field blanks, laboratory blanks, field duplicates, laboratory duplicates, and LCS samples. Acceptability was met in 100% of the field blank, laboratory blank and LCS samples. Acceptability was met in 5 of 12 (41.7%) field duplicate samples and 11 of 14 (78.6%) of laboratory duplicate samples.

The acceptable RPD for TSS field duplicates is ≤25%. Field duplicate RPDs exceeded the acceptable limit during the following sample events: November 18, 2014, December 4, 2014, January 20, 2015, February 9, 2015, April 21, 2015, June 16, 2015, and August 18, 2015. The RPDs ranged from 29% to 50%. The concentrations of the environmental and associated field duplicate samples ranged from 2.0 mg/L to 10 mg/L; the only concentration reported below the RL of 3 mg/L was the result for the April 21, 2015 sampling event (2.0 mg/L). Acceptability was met for all other QC samples in the TSS batches analyzed for these events, except the January and August sampling events where the laboratory duplicate RPDs were above the 20% acceptable limit. All of the data associated with the high field duplicate RPDs were accepted and are useable because the variability could be explained by the heterogeneity within the water column during sample collection.

The acceptable RPDs for TSS laboratory duplicates is ≤20%. Laboratory duplicates created from samples collected on January 20, 2015, August 18, 2015, and September 15, 2015 had RPDs greater than 20%. The results for the laboratory duplicates were non-detect and 2.5 mg/L (below the 3 mg/L RL) for the September sampling event. The laboratory can calculate a laboratory duplicate RPD with a non-detect result because the instrument provides a raw result even when it is below the MDL. Therefore, the laboratory calculated and flagged the September result accordingly based on the raw result (RPD was 200%). Within this batch, all other QC samples met acceptability criteria and therefore the data are useable.

Turbidity: Quality control samples analyzed for turbidity include: field blanks, laboratory blanks, field duplicates, laboratory duplicates, and LCS samples. Acceptability criteria were met for 100% of all QC samples except one field duplicate sample. The acceptability for the field duplicate was greater than 90%. Therefore, all data are acceptable and useable.

Sediment Pesticides: Sediment pesticides are analyzed following two different methods: EPA 8270M (chlorpyrifos and pyrethroids) and EPA 8270 (piperonyl butoxide, PBO). During sediment monitoring events, additional sediment samples are collected and stored at the chemistry laboratory until the Coalition receives the sediment toxicity results. If the percent survival of *Hyalella azteca* is less than 80% and statistically significant compared to the control, a list of all samples requiring additional pesticide analysis is sent to the chemistry laboratory. When pesticides are analyzed in sediment samples, QC samples include: laboratory blanks, field duplicates, LCS, and MS samples.

During the 2015 WY, pesticide analysis was required in sediment samples collected from a single site during the March 17, 2015 monitoring event, Upper Roberts Island Drain. Therefore, acceptability for the year is based on the performance of the chlorpyrifos and pyrethroid batch, and the PBO batch analyzed with samples collected during the March 17, 2015 monitoring event. Due to the small number of QC samples, there is a smaller margin for the 90% acceptability requirement to be achieved.

For the chlorpyrifos and pyrethroids batch, acceptability criteria were met for 100% of the laboratory blank, LCS and surrogate samples. Acceptability criteria were met for each analyte except lambda-cyhalothrin in the field duplicate (0 of 1, 0%), bifenthirn (0 of 2, 0%), chlorpyrifos (0 of 2, 0%), and PBO (0 of 2, 0%) in the MS, and deltamethrin (0 of 1, 0%) in the MSD samples. Matrix spike samples are spiked prior to extracting samples to demonstrate the laboratory's ability to recover analytes through the extraction process. The spike concentration is added to the sample before knowing the concentrations for each analyte in the environmental sample. In some cases, environmental samples are diluted to accurately quantify detected analytes and associated RLs increase. As a result, the MS spike concentration is below the RL and so low compared to the environmental sample concentration that recoveries may be negative. Percent recoveries and expected values for MS samples are based on wet weight concentrations.

The DQO for field duplicate RPDs is ≤25%. The field duplicate RPD for lambda cyhalothrin was 48%. Within the same batch, the MS and MSD recovered bifenthrin and chlorpyrifos outside of the acceptable limits. The recoveries in the MS samples for bifenthrin were -32% (MS) and 200% (MSD) (acceptable limits are 65%-148%); however, the RPD was within the acceptable limit of ≤ 25% (RPD=18%). The bifenthrin concentration of the associated environmental sample was 32 ng/g dw. The MS recoveries for bifenthrin did not meet acceptability because the spike concentration was essentially lost within the environmental sample concentration. In addition, the MSD RPD for deltamethrin/tralomethrin did not met the acceptable limit of ≤ 25% (RPD= 43%). Despite the results for deltamethrin/tralomethrin being non-detect in the associated environmental samples, the recoveries were variable due to the nature of sediments. The laboratory homogenized all samples prior to analysis to increase the precision of the sediment RPDs; however, due to the affinity of sediment pesticides to organic matter, binding can occur in a heterogeneous manner, even when samples are homogenized. The batch was accepted because there is no other evidence that DQOs were not met from field collection or laboratory errors and the results are more likely due to the heterogeneous nature of sediments.

For the PBO batch, acceptability was 100% for the laboratory blank, field duplicate, LCS, LCSD, MSD samples. Acceptability was met in none of 2 (0%) of MS samples and in 3 of 7 (42.8%) of surrogate samples. Recoveries for the two PBO MS samples were 209% (MS) and 216% (MSD) and the associated RPD was 3.4%. The surrogate, esfenvalerate-d6, also recovered above the acceptable limit of 150% in both MS samples and environmental and field duplicate samples. Piperonyl butoxide was not detected in either the environmental or field duplicate samples. The batch was accepted because the high recoveries in the MS samples indicated PBO would have been detected, if PBO was in the samples, and the LCS recovered within the DQO limits.

Sediment Grain Size and TOC: Samples were collected for sediment grain size and TOC analyses on March 10, April 21, and September 15 during the 2015 WY. Three sampling events occurred during the 2015 WY because some samples had to be recollected in April due the laboratory receiving the March sediment samples with temperatures outside the requirement. The associated QC for inorganics in sediments consist of laboratory blanks (TOC only), certified reference material or CRMs (TOC only), field duplicates, and laboratory duplicates.

Precision of grain size is measured by the relative standard deviation (RSD) of sediment between environmental and field duplicate samples. This method is more accurate to measure duplicity than RPD due to the nature of grain size analysis. With all sediment analyses, sample results may reflect heterogeneous composition rather homogenous composition due to 1) sediment settling within the sample container (affects laboratory duplicate precision) and 2) heterogeneity of the sediment in the field (affects field duplicate precision).

Individual grain size classes are reported as a percentage of the entire sample composition and are not values that can be evaluated individually (they are not independent from other grain size class 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:

$$SD = \frac{\phi 84 - \phi 16}{4} + \frac{\phi 95 - \phi 5}{6.6}$$

Where:

$\phi 84$ = phi value of the 84th percentile sediment grain size category

$\phi 16$ = phi value of the 16th percentile sediment grain size category

$\phi 95$ = phi value of the 95th percentile sediment grain size category

$\phi 5$ = phi value of the 5th percentile sediment grain size category

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:

$$RSD = 200\ x \left| \frac{SDi - SDd}{SDi + SDd} \right|$$

Where SDi is the standard deviation of the initial or environmental sample and SDd is the standard deviation of the field or laboratory duplicate sample.

Acceptability was met in 100% of laboratory duplicates analyzed for grain size. Field duplicates analyzed for TOC met acceptability in 2 of 3 (66.7%) of samples. The one field duplicate RPD was greater than 25% during the September 15, 2015 sampling event (RPD=42%). The TOC concentrations were 1,600 mg/kg dw (environmental sample) and 2,450 mg/kg dw (field duplicate). Due to the nature of sediment samples, the high RPD could be due to heterogeneous composition of TOC in the sediments. These same samples were analyzed 7 days outside of hold time; however, it is not expected that the 7 days affected the concentrations of TOC detected. The data were accepted and are useable.

Toxicity

The Coalition analyzes for water column toxicity on three test species (*C. dubia*, *S. capricornutum*, *and P. promelas*) and sediment toxicity to *H. azteca*. Quality control for toxicity testing is based on the performance of the control tests (CNEG) and RPDs calculated from the environmental and field duplicate samples. Reference tests also occur at the time of toxicity testing to assess the overall health of the organisms and predictability of responses to exposure.

Water Column Toxicity: During the 2015 WY, field duplicate samples were collected from sites scheduled for toxicity monitoring for one or more of the test species. The RPDs for all field duplicate samples were within 25% (Table 24). Control tests for each test species occur concurrently with toxicity tests conducted on Coalition samples. All control tests met the acceptability criteria for each of the test species (Table 32).

Sediment Toxicity: Sediment samples were collected to test for toxicity on March 17, April 21, and September 15, 2015. Field duplicate samples were collected during these monitoring events and all RPDs were within the acceptable limit (Table 24). All control tests met the 80% acceptability criterion (Table 32).

CORRECTIVE ACTIONS

Corrective actions are decisions made by the laboratory to demonstrate laboratory capabilities to perform analyses and maintain the integrity of the data. The laboratories routinely address analytical discrepancies, such as reanalysis or confirmation analyses, prior to submitting final laboratory reports and EDDs. In some cases, the Coalition will address corrective action options to improve QC that is consistently demonstrating failure to meet DQOs.

During the 2015 WY, sediment MS recoveries were not acceptable for several pesticides. The Coalition also recognized in previous years recoveries were not achieved due to high concentrations in native samples. On July 23, 2015, The Coalition discussed options with the laboratory to address MS recoverability and QA improvements associated with sediment pesticide analyses. Due to consistently high sediment pesticide concentrations in toxic samples and enough data to evaluate expected trends, the laboratory agreed to change the spike concentration in the MS samples based on evidence from past Coalition monitoring results improve recoveries. The change should reduce or eliminate instances where recoveries cannot be calculated due to high the concentration in the environmental sample. Since toxicity to *H. azteca* did not occur during the September 2015 monitoring event, this update to laboratory protocol will take place during the next sediment monitoring event requiring additional sediment pesticide chemistry analysis in the 2016 WY.

The analyses for sediment TOC and grain size analyses are performed by a subcontracted laboratory, PTS. Any concerns about grain size or TOC analyses are communicated to PTS through Caltest directly. In December 2015, the Coalition contacted Caltest to discuss the number of hold time violations for grain size and TOC analyses and the specific comments about the hold times on the original COCs. The COCs for grain size analyses were re-created for PTS by Caltest and, during the process, the original comments were omitted. The hold time requirements in the QAPP guidelines are unique for grain size analyses; there is no hold time associated with the method used for grain size analysis and the laboratory does not commonly impose a hold time requirement. Hold time violations were due to laboratory oversight and corrective actions to increase communication regarding ILRP specific hold times have been implemented. To reconcile the error, Caltest agreed to remind PTS of grain size and

TOC hold times and through personal communication. In addition, PTS has internally increased the documentation regarding hold time requirements for Coalition samples.

Table 18. SJCDWQC field and transport and analytical completeness: environmental sample counts and percentages.

Samples collected for the 2015 WY. The table counts environmental samples only; field duplicates are not included. Each constituent is sorted by method and analyte. Bolded rows represent analytes that did not meet completeness requirement.

Method	Matrix	Analyte	Environmental Samples Scheduled	Dry sites/too shallow	Environmental Samples Collected	Field and Transport Completeness (%)	Total Samples Analyzed	Analytical Completeness (%)
ASTM D422/ASTM D4464M	Sediment	Grain size	39	2	37	100.0	37	100.0
EPA 180.1	Water	Turbidity	71	0	71	100.0	71	100.0
EPA 200.8	Water	Arsenic	20	0	20	100.0	20	100.0
EPA 200.8	Water	Dissolved Copper	30	0	30	100.0	30	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	72	1	71	100.0	71	100.0
EPA 547M	Water	Glyphosate	12	0	12	100.0	12	100.0
EPA 549.2M	Water	Paraquat	12	0	12	100.0	12	100.0
EPA 600/R-99-064	Sediment	*Hyalella azteca*	39	2	37	100.0	37	100.0
EPA 8081A	Water	Dieldrin	3	1	2	100.0	2	100.0
EPA 8081A	Water	HCH, alpha-	3	0	3	100.0	3	100.0
EPA 8081A	Water	HCH, beta-	3	0	3	100.0	3	100.0
EPA 8081A	Water	HCH, delta-	3	0	3	100.0	3	100.0
EPA 8081A	Water	HCH, gamma-	3	0	3	100.0	3	100.0
EPA 8141A	Water	Atrazine	72	1	71	100.0	71	100.0
EPA 8141A	Water	Azinphos Methyl	72	1	71	100.0	71	100.0
EPA 8141A	Water	Chlorpyrifos	139	4	133	98.6	133	100.0
EPA 8141A	Water	Cyanazine	72	1	71	100.0	71	100.0
EPA 8141A	Water	Demeton-s	72	1	71	100.0	71	100.0
EPA 8141A	Water	Diazinon	87	1	86	100.0	86	100.0
EPA 8141A	Water	Dichlorvos	72	1	71	100.0	71	100.0
EPA 8141A	Water	Dimethoate	72	1	71	100.0	71	100.0
EPA 8141A	Water	Disulfoton	72	1	71	100.0	71	100.0
EPA 8141A	Water	Malathion	75	1	74	100.0	74	100.0
EPA 8141A	Water	Methidathion	72	1	71	100.0	71	100.0
EPA 8141A	Water	Parathion, Methyl	72	1	71	100.0	71	100.0
EPA 8141A	Water	Phorate	72	1	71	100.0	71	100.0
EPA 8141A	Water	Phosmet	72	1	71	100.0	71	100.0
EPA 8141A	Water	Simazine	72	1	71	100.0	71	100.0
EPA 8141A	Water	Trifluralin	72	1	71	100.0	71	100.0
EPA 821/R-02-012	Water	*Ceriodaphnia dubia*	103	2	99	98.0	99	100.0
EPA 821/R-02-012	Water	*Pimephales promelas*	75	2	73	100.0	73	100.0
EPA 821/R-02-013	Water	*Selenastrum capricornutum*	127	13	114	100.0	114	100.0
EPA 8270	Sediment	Piperonyl Butoxide	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, Total	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, Total	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, Total	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	1	0	1	100.0	1	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	1	0	1	100.0	1	100.0

Method	Matrix	Analyte	Environmental Samples Scheduled	Dry sites/too shallow	Environmental Samples Collected	Field and Transport Completeness (%)	Total Samples Analyzed	Analytical Completeness (%)
EPA 8321A	Water	Aldicarb	72	1	71	100.0	71	100.0
EPA 8321A	Water	Carbaryl	72	1	71	100.0	71	100.0
EPA 8321A	Water	Carbofuran	72	1	71	100.0	71	100.0
EPA 8321A	Water	Diuron	90	2	88	100.0	88	100.0
EPA 8321A	Water	Linuron	72	1	71	100.0	71	100.0
EPA 8321A	Water	Methamidophos	72	1	71	100.0	71	100.0
EPA 8321A	Water	Methiocarb	72	1	71	100.0	71	100.0
EPA 8321A	Water	Methomyl	72	1	71	100.0	71	100.0
EPA 8321A	Water	Oxamyl	72	1	71	100.0	71	100.0
SM 2340 C	Water	Hardness as CaCO3	30	0	30	100.0	30	100.0
SM 2540 D	Water	Total Suspended Solids	72	1	71	100.0	71	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	72	1	71	100.0	71	100.0
SM 4500-P E	Water	OrthoPhosphate as P	72	1	71	100.0	71	100.0
SM 5310 B	Water	Total Organic Carbon	72	1	71	100.0	71	100.0
SM 9223 B	Water	*E. coli*	72	1	71	100.0	71	100.0
Walkley-Black	Sediment	Total Organic Carbon	39	2	37	100.0	37	100.0
Total			**2956**	**59**	**2894**	**99.9**	**2894**	**100.0**

Table 19. SJCDWQC field and transport completeness: field parameter counts and percentages.
Samples collected for the 2015 WY. Bolded rows represent analytes that did not meet completeness requirement.

Method	Analyte	Samples Scheduled[1]	Dry Sites/Too Shallow	Measurements taken	Completeness (%)
USGS R2Cross streamflow	Discharge, cfs	156	4	104	69.2
SM 4500-O	Dissolved Oxygen, mg/L	215	16	197	99.0
EPA 150.1	pH	215	16	197	99.0
EPA 120.1	Specific Conductivity, µS/cm	215	16	197	99.0
SM 2550	Temperature, °C	215	16	197	99.0
Total		**1016**	**68**	**892**	**89.4**

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

Table 20. SJCDWQC field and transport and analytical completeness: environmental sample and field QC counts and percentages.
Samples collected during the 2015WY. Each analyte is sorted by method and in alphabetical order. Bolded rows represent analytes that did not meet completeness requirement

Method	Matrix	Analyte	Total Environmental Samples	Total Field Duplicate Samples	Total EB Samples	Total FB Samples	Total Environmental & Field QC Samples	Field Duplicate Completeness (%)	EB Completeness (%)	FB Completeness (%)
ASTM D422/ ASTM D4464M	Sediment	Grain size	37	3	NA	NA	40	7.5	NA	NA
EPA 180.1	Water	Turbidity	71	12	NA	12	95	12.6	NA	12.6
EPA 200.8	Water	Arsenic	20	12	NA	12	44	27.3	NA	27.3
EPA 200.8	Water	Dissolved Copper	30	8	8	8	54	14.8	14.8	14.8
EPA 353.2	Water	Nitrate + Nitrite as N	71	12	NA	12	95	12.6	NA	12.6
EPA 547M	Water	Glyphosate	12	2	NA	2	16	12.5	NA	12.5
EPA 549.2M	Water	Paraquat	12	2	NA	2	16	12.5	NA	12.5
EPA 600/R-99-064	None	*Hyalella azteca*	37	3	NA	NA	40	7.5	NA	NA
EPA 8081A	Water	Dieldrin	2	2	NA	2	6	33.3	NA	33.3
EPA 8081A	Water	HCH, alpha-	3	3	NA	3	9	33.3	NA	33.3
EPA 8081A	Water	HCH, beta-	3	3	NA	3	9	33.3	NA	33.3
EPA 8081A	Water	HCH, delta-	3	3	NA	3	9	33.3	NA	33.3
EPA 8081A	Water	HCH, gamma-	3	3	NA	3	9	33.3	NA	33.3
EPA 8141A	Water	Atrazine	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Azinphos Methyl	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Chlorpyrifos	136	12	NA	12	157	7.6	NA	7.6
EPA 8141A	Water	Cyanazine	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Demeton-s	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Diazinon	86	12	NA	12	110	10.9	NA	10.9
EPA 8141A	Water	Dichlorvos	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Dimethoate	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Disulfoton	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Malathion	74	12	NA	12	98	12.2	NA	12.2
EPA 8141A	Water	Methidathion	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Parathion, Methyl	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Phorate	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Phosmet	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Simazine	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Trifluralin	71	12	NA	12	95	12.6	NA	12.6
EPA 821/R-02-012	Water	*Ceriodaphnia dubia*	102	13	NA	NA	112	11.6	NA	NA
EPA 821/R-02-012	Water	*Pimephales promelas*	73	12	NA	NA	85	14.1	NA	NA
EPA 821/R-02-013	Water	*Selenastrum capricornutum*	114	14	NA	NA	128	10.9	NA	NA
EPA 8270	Sediment	Piperonyl Butoxide	1	1	NA	NA	2	50.0	NA	NA

Method	Matrix	Analyte	Total Environmental Samples	Total Field Duplicate Samples	Total EB Samples	Total FB Samples	Total Environmental & Field QC Samples	Field Duplicate Completeness (%)	EB Completeness (%)	FB Completeness (%)
EPA 8270M_NCI	Sediment	Bifenthrin	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Chlorpyrifos	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Cyfluthrin, Total	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Cypermethrin, Total	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, Total	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Fenpropathrin	1	1	NA	NA	2	50.0	NA	NA
EPA 8270M_NCI	Sediment	Permethrin, Total	1	1	NA	NA	2	50.0	NA	NA
EPA 8321A	Water	Aldicarb	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Carbaryl	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Carbofuran	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Diuron	88	13	NA	13	114	11.4	NA	11.4
EPA 8321A	Water	Linuron	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Methamidophos	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Methiocarb	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Methomyl	71	12	NA	12	95	12.6	NA	12.6
EPA 8321A	Water	Oxamyl	71	12	NA	12	95	12.6	NA	12.6
SM 2340 C	Water	Dissolved Hardness as CaCO3	30	8	NA	8	46	17.4	NA	17.4
SM 2540 D	Water	Total Suspended Solids	71	12	NA	12	95	12.6	NA	12.6
SM 4500-NH3 C v20	Water	Ammonia as N	71	12	NA	12	95	12.6	NA	12.6
SM 4500-P E	Water	OrthoPhosphate as P	71	12	NA	12	95	12.6	NA	12.6
SM 5310 B	Water	Total Organic Carbon	71	12	NA	12	95	12.6	NA	12.6
SM 9223 B	Water	*E. coli*	71	12	NA	12	95	12.6	NA	12.6
Walkley-Black	Sediment	Total Organic Carbon	37	3	NA	NA	40	7.5	NA	NA
Total			**2894**	**489**	**8**	**431**	**3822**	**12.8**	**14.8**	**11.3**

NA-Not Applicable; analysis was not conducted for the constituent listed.
EB-Equipment Blank
FB-Field Blank

Table 21. SJCDWQC summary of holding time evaluations for environmental, field blank, equipment blank, field duplicate and matrix spike samples.

Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	Hold time	Total Samples	Samples Analyzed within Hold time	Acceptability Met (%)
ASTM D422/ ASTM D4464M	**Sediment**	**Grain size**	**28 days, unfrozen**	**40**	**20**	**50.0**
EPA 180.1	Water	Turbidity	48 hours	95	95	100
EPA 200.8	Water	Arsenic	180 days	57	57	100
EPA 200.8	Water	Dissolved Copper	180 days	63	63	100
EPA 353.2	Water	Nitrate + Nitrite as N	28 days	108	108	100
EPA 547M	Water	Glyphosate	6 months	18	18	100
EPA 549.2M	Water	Paraquat	Extract within 7 days, analyze within 21 days	18	18	100
EPA 600/R-99-064	None	*Hyalella azteca*	14 days	40	40	100
EPA 8081A	Water	Dieldrin	Extract with 7 days, analyze within 40 days	8	8	100
EPA 8081A	Water	HCH, alpha-	Extract with 7 days, analyze within 40 days	12	12	100
EPA 8081A	Water	HCH, beta-	Extract with 7 days, analyze within 40 days	12	12	100
EPA 8081A	Water	HCH, delta-	Extract with 7 days, analyze within 40 days	12	12	100
EPA 8081A	Water	HCH, gamma-	Extract with 7 days, analyze within 40 days	12	12	100
EPA 8141A	Water	Atrazine	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Azinphos methyl	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Chlorpyrifos	Extract with 7 days, analyze within 40 days	169	169	100
EPA 8141A	Water	Cyanazine	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Demeton-s	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Diazinon	Extract with 7 days, analyze within 40 days	122	122	100
EPA 8141A	Water	Dichlorvos	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Dimethoate	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Disulfoton	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Malathion	Extract with 7 days, analyze within 40 days	110	110	100
EPA 8141A	Water	Methidathion	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Parathion, Methyl	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Phorate	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Phosmet	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Simazine	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8141A	Water	Trifluralin	Extract with 7 days, analyze within 40 days	107	107	100
EPA 821-R-02-012	None	*Ceriodaphnia dubia*	36 hours	112	112	100

Method	Matrix	Analyte	Hold time	Total Samples	Samples Analyzed within Hold time	Acceptability Met (%)
EPA 821-R-02-012	None	*Pimephales promelas*	36 hours	85	85	100
EPA 821-R-02-013	None	*Selenastrum capricornutum*	36 hours	128	128	100
EPA 8270	Sediment	Piperonyl butoxide	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Bifenthrin	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Chlorpyrifos	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Cyfluthrin, total	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Cypermethrin, total	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Fenpropathrin	12 Months	3	3	100
EPA 8270M_NCI	Sediment	Permethrin, Total	12 Months	3	3	100
EPA 8321A	Water	Aldicarb	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Carbaryl	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Carbofuran	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Diuron	Extract with 7 days, analyze within 40 days	127	127	100
EPA 8321A	Water	Linuron	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Methamidophos	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Methiocarb	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Methomyl	Extract with 7 days, analyze within 40 days	107	107	100
EPA 8321A	Water	Oxamyl	Extract with 7 days, analyze within 40 days	107	107	100
SM 2340 C	Water	Dissolved Hardness as CaCO3	180 days	56	56	100
SM 2540 D	Water	Total Suspended Solids	7 days	95	95	100
SM 4500-NH3 C v20	Water	Ammonia as N	28 days	107	107	100
SM 4500-P E	Water	OrthoPhosphate as P	48 hours	107	107	100
SM 5310 B	Water	Total Organic Carbon	28 days	111	111	100
SM 9223 B	Water	*E. coli*	24 hours	95	95	100
Walkley-Black	**Sediment**	**Total Organic Carbon**	**28 days, unfrozen**	**40**	**6**	**15**
Total				**4236**	**4182**	**98.7**

Table 22. SJCDWQC summary of field blank (FB) quality control sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte[1]	FB Data Acceptability Criteria	Total FB Samples	FB Samples within Acceptability	Acceptability Met (%)
EPA 180.1	Water	Turbidity	< RL or Concentration of environmental/5	12	12	100.0
EPA 200.8	Water	Arsenic	< RL or Concentration of environmental/5	12	12	100.0
EPA 200.8	Water	Dissolved Copper	< RL or Concentration of environmental/5	8	8	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	< RL or Concentration of environmental/5	12	12	100.0
EPA 547M	Water	Glyphosate	< RL or Concentration of environmental/5	2	2	100.0
EPA 549.2M	Water	Paraquat	< RL or Concentration of environmental/5	2	2	100.0
EPA 8081A	Water	Dieldrin	< RL or Concentration of environmental/5	2	2	100.0
EPA 8081A	Water	HCH, alpha-	< RL or Concentration of environmental/5	3	3	100.0
EPA 8081A	Water	HCH, beta-	< RL or Concentration of environmental/5	3	3	100.0
EPA 8081A	Water	HCH, delta-	< RL or Concentration of environmental/5	3	3	100.0
EPA 8081A	Water	HCH, gamma-	< RL or Concentration of environmental/5	3	3	100.0
EPA 8141A	Water	Atrazine	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Azinphos methyl	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Cyanazine	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Demeton-s	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Diazinon	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Dichlorvos	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Dimethoate	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Disulfoton	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Malathion	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Methidathion	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Phorate	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Phosmet	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Simazine	< RL or Concentration of environmental/5	12	12	100.0
EPA 8141A	Water	Trifluralin	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Aldicarb	< RL or Concentration of	12	12	100.0

Method	Matrix	Analyte[1]	FB Data Acceptability Criteria	Total FB Samples	FB Samples within Acceptability	Acceptability Met (%)
			environmental/5			
EPA 8321A	Water	Carbaryl	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Carbofuran	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Diuron	< RL or Concentration of environmental/5	13	13	100.0
EPA 8321A	Water	Linuron	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Methamidophos	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Methiocarb	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Methomyl	< RL or Concentration of environmental/5	12	12	100.0
EPA 8321A	Water	Oxamyl	< RL or Concentration of environmental/5	12	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	< RL or Concentration of environmental/5	8	8	100.0
SM 2540 D	Water	Total Suspended Solids	< RL or Concentration of environmental/5	12	12	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	< RL or Concentration of environmental/5	12	12	100.0
SM 4500-P E	Water	OrthoPhosphate as P	< RL or Concentration of environmental/5	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	< RL or Concentration of environmental/5	12	12	100.0
SM 9223 B	Water	*E. coli*	< RL or Concentration of environmental/5	12	12	100.0
Total				**429**	**429**	**100.0**

[1]Field blanks are not run for sediment grain size, pesticides, and TOC and water column and sediment toxicity analyses and are not included in table.

Table 23. SJCDWQC summary of equipment blank (EB) quality control sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	EB Data Acceptability Criteria	Total EB Samples	EB within Acceptability	Acceptability Met (%)
EPA 200.8	Water	Dissolved Copper	< RL or concentration of environmental/5	8	8	100.0
Total				**8**	**8**	**100.0**

Table 24. SJCDWQC summary of field duplicate quality control sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total Field Duplicate Samples	Field Duplicate Samples within Limit	Acceptability Met (%)
ASTM D422/ ASTM D4464M	Sediment	Grain size	RSD < 20	3	3	100.0
EPA 180.1	Water	Turbidity	RPD ≤25	12	11	91.7
EPA 200.8	Water	Arsenic	RPD ≤25	12	12	100.0
EPA 200.8	**Water**	**Dissolved Copper**	RPD ≤25	**8**	**7**	**87.5**
EPA 353.2	**Water**	**Nitrate + Nitrite as N**	RPD ≤25	**12**	**10**	**83.3**
EPA 547M	Water	Glyphosate	RPD ≤25	2	2	100.0
EPA 549.2M	Water	Paraquat	RPD ≤25	2	2	100.0
EPA 600/R-99-064	None	*Hyalella azteca*	RPD ≤25	3	3	100.0
EPA 8081A	Water	Dieldrin	RPD ≤25	2	2	100.0
EPA 8081A	Water	HCH, alpha-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, beta-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, delta-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, gamma-	RPD ≤25	3	3	100.0
EPA 8141A	Water	Atrazine	RPD ≤25	12	12	100.0
EPA 8141A	Water	Azinphos methyl	RPD ≤25	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	RPD ≤25	12	12	100.0
EPA 8141A	Water	Cyanazine	RPD ≤25	12	12	100.0
EPA 8141A	Water	Demeton-s	RPD ≤25	12	12	100.0
EPA 8141A	Water	Diazinon	RPD ≤25	12	12	100.0
EPA 8141A	Water	Dichlorvos	RPD ≤25	12	12	100.0
EPA 8141A	Water	Dimethoate	RPD ≤25	12	12	100.0
EPA 8141A	Water	Disulfoton	RPD ≤25	12	12	100.0
EPA 8141A	Water	Malathion	RPD ≤25	12	12	100.0
EPA 8141A	Water	Methidathion	RPD ≤25	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	RPD ≤25	12	12	100.0
EPA 8141A	Water	Phorate	RPD ≤25	12	12	100.0
EPA 8141A	Water	Phosmet	RPD ≤25	12	12	100.0
EPA 8141A	Water	Simazine	RPD ≤25	12	12	100.0
EPA 8141A	Water	Trifluralin	RPD ≤25	12	12	100.0
EPA 821/R-02-012	None	*Ceriodaphnia dubia*	RPD ≤25	13	13	100.0
EPA 821/R-02-012	None	*Pimephales promelas*	RPD ≤25	12	12	100.0
EPA 821/R-02-013	None	*Selenastrum capricornutum*	RPD ≤25	14	14	100.0
EPA 8270	Sediment	Piperonyl butoxide	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	**Sediment**	**Cyhalothrin, Total lambda-**	RPD ≤25	**1**	**0**	**0.0**
EPA 8270M_NCI	Sediment	Cypermethrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	RPD ≤25	1	1	100.0
EPA 8321A	Water	Aldicarb	RPD ≤25	12	12	100.0
EPA 8321A	Water	Carbaryl	RPD ≤25	12	12	100.0
EPA 8321A	Water	Carbofuran	RPD ≤25	12	12	100.0
EPA 8321A	Water	Diuron	RPD ≤25	13	13	100.0
EPA 8321A	Water	Linuron	RPD ≤25	12	12	100.0

METHOD	MATRIX	ANALYTE	DUPLICATE DATA ACCEPTABILITY CRITERIA	TOTAL FIELD DUPLICATE SAMPLES	FIELD DUPLICATE SAMPLES WITHIN LIMIT	ACCEPTABILITY MET (%)
EPA 8321A	Water	Methamidophos	RPD ≤25	12	12	100.0
EPA 8321A	Water	Methiocarb	RPD ≤25	12	12	100.0
EPA 8321A	Water	Methomyl	RPD ≤25	12	12	100.0
EPA 8321A	Water	Oxamyl	RPD ≤25	12	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤25	8	8	100.0
SM 2540 D	**Water**	**Total Suspended Solids**	RPD ≤25	**12**	**5**	**41.7**
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤25	12	7	58.3
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤25	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	RPD ≤25	12	12	100.0
SM 9223 B	Water	*E. coli*	R_{log} >1.30	12	12	100.0
Walkley-Black	**Water**	**Total Organic Carbon**	**RPD <20**	**3**	**2**	**66.7**
Total				489	470	96.3

Table 25. SJCDWQC summary of laboratory blank (LB) quality control sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

METHOD	MATRIX	ANALYTE[1]	LB DATA ACCEPTABILITY CRITERIA	TOTAL LB SAMPLES	LB SAMPLES WITHIN LIMITS	ACCEPTABILITY MET (%)
EPA 180.1	Water	Turbidity	< RL	12	12	100.0
EPA 200.8	Water	Arsenic	< RL	13	13	100.0
EPA 200.8	Water	Dissolved Copper	< RL	9	9	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	< RL	13	13	100.0
EPA 547M	Water	Glyphosate	< RL	2	2	100.0
EPA 549.2M	Water	Paraquat	< RL	2	2	100.0
EPA 8081A	Water	Dieldrin	< RL	2	2	100.0
EPA 8081A	Water	HCH, alpha-	< RL	3	3	100.0
EPA 8081A	Water	HCH, beta-	< RL	3	3	100.0
EPA 8081A	Water	HCH, delta-	< RL	3	3	100.0
EPA 8081A	Water	HCH, gamma-	< RL	3	3	100.0
EPA 8141A	Water	Atrazine	< RL	12	12	100.0
EPA 8141A	Water	Azinphos methyl	< RL	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	< RL	12	12	100.0
EPA 8141A	Water	Cyanazine	< RL	12	12	100.0
EPA 8141A	Water	Demeton-s	< RL	12	12	100.0
EPA 8141A	Water	Diazinon	< RL	12	12	100.0
EPA 8141A	Water	Dichlorvos	< RL	12	12	100.0
EPA 8141A	Water	Dimethoate	< RL	12	12	100.0
EPA 8141A	Water	Disulfoton	< RL	12	12	100.0
EPA 8141A	Water	Malathion	< RL	12	12	100.0
EPA 8141A	Water	Methidathion	< RL	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	< RL	12	12	100.0
EPA 8141A	Water	Phorate	< RL	12	12	100.0
EPA 8141A	Water	Phosmet	< RL	12	12	100.0
EPA 8141A	Water	Simazine	< RL	12	12	100.0
EPA 8141A	Water	Trifluralin	< RL	12	12	100.0
EPA 8270	Sediment	Piperonyl butoxide	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/	< MDL	1	1	100.0

Method	Matrix	Analyte[1]	LB Data Acceptability Criteria	Total LB Samples	LB Samples within Limits	Acceptability Met (%)
		Fenvalerate, total				
EPA 8270M_NCI	Sediment	Fenpropathrin	< MDL	1	1	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	< MDL	1	1	100.0
EPA 8321A	Water	Aldicarb	< RL	12	12	100.0
EPA 8321A	Water	Carbaryl	< RL	12	12	100.0
EPA 8321A	Water	Carbofuran	< RL	12	12	100.0
EPA 8321A	Water	Diuron	< RL	13	13	100.0
EPA 8321A	Water	Linuron	< RL	12	12	100.0
EPA 8321A	Water	Methamidophos	< RL	12	12	100.0
EPA 8321A	Water	Methiocarb	< RL	12	12	100.0
EPA 8321A	Water	Methomyl	< RL	12	12	100.0
EPA 8321A	Water	Oxamyl	< RL	12	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	< RL	10	10	100.0
SM 2540 D	Water	Total Suspended Solids	< RL	14	14	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	< RL	12	12	100.0
SM 4500-P E	Water	OrthoPhosphate as P	< RL	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	< RL	15	15	100.0
SM 9223 B	Water	*E. coli*	< RL	12	12	100.0
Walkley-Black	Sediment	Total Organic Carbon	< RL	6	6	100.0
Total				**457**	**457**	**100.0**

[1]Laboratory blanks are not run for grain size and water column and sediment toxicity analyses and are not included in table.

Table 26. SJCDWQC summary of laboratory control spike (LCS) quality control sample evaluations. Laboratory control spikes and laboratory control spike duplicates analyzed in batches with samples collected the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method[1]	Matrix	Analyte[2]	LCS Data Acceptability Criteria	Total LCS Samples	LCS Samples within Limits	Acceptability Met (%)
EPA 180.1	water	Turbidity	PR 90-110	12	12	100.0
EPA 200.8	Water	Arsenic	PR 80-120	13	13	100.0
EPA 200.8	Water	Dissolved Copper	PR 80-120	9	9	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	PR 90-110	13	13	100.0
EPA 547M	Water	Glyphosate	PR 85.7-121	4	4	100.0
EPA 549.2M	**Water**	**Paraquat**	**PR 70-130**	**4**	**2**	**50.0**
EPA 8081A	Water	Dieldrin	PR 48-121	2	2	100.0
EPA 8081A	Water	HCH, alpha-	PR 33-111	3	3	100.0
EPA 8081A	Water	HCH, beta-	PR 49-119	3	3	100.0
EPA 8081A	Water	HCH, delta-	PR 12-97	3	3	100.0
EPA 8081A	Water	HCH, gamma-	PR 40-114	3	3	100.0
EPA 8141A	Water	Atrazine	PR 39-156	12	12	100.0
EPA 8141A	Water	Azinphos methyl	PR 30-172	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	PR 40-144	12	12	100.0
EPA 8141A	Water	Cyanazine	PR 22-172	12	12	100.0
EPA 8141A	Water	Demeton-s	PR 35-130	12	12	100.0
EPA 8141A	Water	Diazinon	PR 45-130	12	12	100.0
EPA 8141A	Water	Dichlorvos	PR 13-161	12	12	100.0
EPA 8141A	Water	Dimethoate	PR 40-170	12	12	100.0
EPA 8141A	Water	Disulfoton	PR 28-131	12	12	100.0
EPA 8141A	Water	Malathion	PR 30-137	12	12	100.0
EPA 8141A	Water	Methidathion	PR 50-150	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	PR 55-164	12	12	100.0
EPA 8141A	Water	Phorate	PR 42-125	12	12	100.0
EPA 8141A	Water	Phosmet	PR 40-153	12	12	100.0
EPA 8141A	Water	Simazine	PR 21-179	12	12	100.0
EPA 8141A	Water	Trifluralin	PR 40-148	12	12	100.0
EPA 8270	Sediment	Piperonyl butoxide	PR 30-150	2	2	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	PR 65-148	2	2	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	PR 53-141	2	2	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	PR 51-149	2	2	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	PR 27-164	2	2	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	PR 63-149	2	2	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/Tralomethrin	PR 43-139	2	2	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/Fenvalerate, total	PR 58-157	2	2	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	PR 44-178	2	2	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	PR 50-184	2	2	100.0
EPA 8321A	Water	Aldicarb	PR 31-133	12	12	100.0
EPA 8321A	Water	Carbaryl	PR 44-133	12	12	100.0
EPA 8321A	Water	Carbofuran	PR 36-165	12	12	100.0
EPA 8321A	Water	Diuron	PR 52-136	13	13	100.0
EPA 8321A	Water	Linuron	PR 49-144	12	12	100.0
EPA 8321A	Water	Methamidophos	PR 36-124	12	12	100.0
EPA 8321A	Water	Methiocarb	PR 35-142	12	12	100.0
EPA 8321A	Water	Methomyl	PR 23-152	12	12	100.0
EPA 8321A	Water	Oxamyl	PR 10-117	12	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	PR 80-120	10	10	100.0
SM 2540 D	Water	Total Suspended Solids	PR 80-120	14	14	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	PR 90-110	24	24	100.0
SM 4500-P E	Water	OrthoPhosphate as P	PR 90-110	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	PR 80-120	20	20	100.0

Method[1]	Matrix	Analyte[2]	LCS Data Acceptability Criteria	Total LCS Samples	LCS Samples within Limits	Acceptability Met (%)
Walkley-Black	Sediment	Total Organic Carbon	PR 75-125	NA	NA	NA
Total				**470**	**468**	**99.6**

[1]Certified Reference Materials (CRMs) are used as the LCS or LCSD for TOC following the Walkley-Black method.
[2]Laboratory control spikes are not run for *E. coli*, grain size and water column and sediment toxicity analyses and are not included in table.

Table 27. SJCDWQC summary of lab control spike duplicate (LCSD) quality control sample evaluations. Laboratory control spikes duplicates analyzed in batches with samples collected during the 2015 WY sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method[1]	Matrix	Analyte[2]	Duplicate Data Acceptability Criteria	Total LCSD Samples	LCSD Samples within Limits	Acceptability Met (%)
EPA 180.1	Water	Turbidity	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Arsenic	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Dissolved Copper	RPD ≤20	NA	NA	NA
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤20	NA	NA	NA
EPA 547M	Water	Glyphosate	RPD ≤25	2	2	100.0
EPA 549.2M	Water	Paraquat	RPD ≤25	2	2	100.0
EPA 8081A	Water	HCH, alpha-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, beta-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, delta-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, gamma-	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Atrazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Azinphos methyl	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Chlorpyrifos	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Cyanazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Demeton-s	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Diazinon	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Dichlorvos	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Dimethoate	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Disulfoton	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Malathion	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Methidathion	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Parathion, Methyl	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Phorate	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Phosmet	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Simazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Trifluralin	RPD ≤25	NA	NA	NA
EPA 8270	Sediment	Piperonyl butoxide	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	RPD ≤25	1	1	100.0
EPA 8321A	Water	Aldicarb	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Carbaryl	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Carbofuran	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Diuron	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Linuron	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methamidophos	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methiocarb	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methomyl	RPD ≤25	NA	NA	NA

METHOD[1]	MATRIX	ANALYTE[2]	DUPLICATE DATA ACCEPTABILITY CRITERIA	TOTAL LCSD SAMPLES	LCSD SAMPLES WITHIN LIMITS	ACCEPTABILITY MET (%)
EPA 8321A	Water	Oxamyl	RPD ≤25	NA	NA	NA
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤20	NA	NA	NA
SM 2540 D	Water	Total Suspended Solids	RPD ≤20	NA	NA	NA
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤20	12	12	100
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤20	NA	NA	NA
SM 5310 B	Water	Total Organic Carbon	RPD ≤20	5	5	100
Walkley-Black	Sediment	Total Organic Carbon	RPD ≤20	NA	NA	NA
Total				**31**	**31**	**100.0**

[1]Certified Reference Materials (CRMs) are used as the LCS or LCSD for TOC following the Walkley-Black method.
[2] Laboratory control spike duplicates are not run for *E. coli*, grain size and water column and sediment toxicity analyses and are not included in table.
NA; Not applicable, analysis was not conducted for analyte.

Table 28. SJCDWQC summary of matrix spike (MS) quality control sample evaluations.
Matrix spikes and matrix spike duplicates collected for the 2015 WY. Non-project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte[1]	MS Data Acceptability Criteria	Total MS Samples	MS Samples within Limits	Acceptability Met (%)
EPA 200.8	Water	Arsenic	PR 80-120	26	26	100.0
EPA 200.8	Water	Dissolved Copper	PR 80-120	18	17	94.4
EPA 353.2	Water	Nitrate + Nitrite as N	PR 90-110	26	24	92.3
EPA 547M	**Water**	**Glyphosate**	**PR 85.7-121**	**4**	**3**	**75.0**
EPA 549.2M	**Water**	**Paraquat**	**PR 70-130**	**4**	**1**	**25.0**
EPA 8081	Water	Dieldrin	PR 48-121	4	4	100.0
EPA 8081A	Water	HCH, alpha-	PR 33-111	6	6	100.0
EPA 8081A	Water	HCH, beta-	PR 49-119	6	6	100.0
EPA 8081A	Water	HCH, delta-	PR 12-97	6	6	100.0
EPA 8081A	Water	HCH, gamma-	PR 40-114	6	6	100.0
EPA 8141A	Water	Atrazine	PR 39-156	24	24	100.0
EPA 8141A	Water	Azinphos methyl	PR 30-172	24	24	100.0
EPA 8141A	Water	Chlorpyrifos	PR 40-144	24	24	100.0
EPA 8141A	Water	Cyanazine	PR 22-172	24	24	100.0
EPA 8141A	Water	Demeton-s	PR 35-130	24	23	95.8
EPA 8141A	Water	Diazinon	PR 45-130	24	24	100.0
EPA 8141A	Water	Dichlorvos	PR 13-161	24	24	100.0
EPA 8141A	Water	Dimethoate	PR 40-170	24	24	100.0
EPA 8141A	Water	Disulfoton	PR 28-131	24	23	95.8
EPA 8141A	Water	Malathion	PR 30-137	24	22	91.7
EPA 8141A	Water	Methidathion	PR 50-150	24	24	100.0
EPA 8141A	Water	Parathion, Methyl	PR 55-164	24	24	100.0
EPA 8141A	Water	Phorate	PR 42-125	24	24	100.0
EPA 8141A	Water	Phosmet	PR 40-153	24	22	91.7
EPA 8141A	Water	Simazine	PR 21-179	24	24	100.0
EPA 8141A	Water	Trifluralin	PR 40-148	24	24	100.0
EPA 8270	**Sediment**	**Piperonyl butoxide**	**PR 30-150**	**2**	**0**	**0.0**
EPA 8270M_NCI	**Sediment**	**Bifenthrin**	**PR 31-200**	**2**	**0**	**0.0**
EPA 8270M_NCI	**Sediment**	**Chlorpyrifos**	**PR 8-190**	**2**	**0**	**0.0**
EPA 8270M_NCI	Sediment	Cyfluthrin, total	PR 51-149	2	2	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	PR 27-164	2	2	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	PR 70-152	2	2	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	PR 31-174	2	2	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	PR 30-175	2	2	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	PR 48-176	2	2	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	PR 30-200	2	2	100.0
EPA 8321A	Water	Aldicarb	PR 31-133	24	24	100.0
EPA 8321A	Water	Carbaryl	PR 44-133	24	24	100.0
EPA 8321A	Water	Carbofuran	PR 36-165	24	24	100.0
EPA 8321A	Water	Diuron	PR 52-136	26	26	100.0
EPA 8321A	Water	Linuron	PR 49-144	24	24	100.0
EPA 8321A	Water	Methamidophos	PR 36-124	24	24	100.0
EPA 8321A	Water	Methiocarb	PR 35-142	24	24	100.0
EPA 8321A	Water	Methomyl	PR 23-152	24	24	100.0
EPA 8321A	Water	Oxamyl	PR 10-117	24	24	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	PR 80-120	20	19	95.0
SM 4500-NH3 C v20	Water	Ammonia as N	PR 90-110	24	24	100.0
SM 4500-P E	Water	OrthoPhosphate as P	PR 90-110	24	24	100.0
SM 5310 B	Water	Total Organic Carbon	PR 80-120	32	30	93.8
Total				**828**	**806**	**97.3**

[1]Matrix spikes are not run for *E. coli*, grain size, sediment TOC and water column and sediment toxicity analyses and are not included in table.

Table 29. SJCDWQC summary of matrix spike duplicate quality control sample evaluations.
Matrix spike duplicates collected for the 2015 WY. Non project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total MSD Samples	MSD Samples within Limits	Acceptability Met (%)
EPA 200.8	Water	Arsenic	RPD ≤20	13	13	100.0
EPA 200.8	Water	Dissolved Copper	RPD ≤20	9	9	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤20	13	13	100.0
EPA 547M	Water	Glyphosate	RPD ≤25	2	2	100.0
EPA 549.2M	Water	Paraquat	RPD ≤25	2	2	100.0
EPA 8081A	Water	Dieldrin	RPD ≤25	2	2	100.0
EPA 8081A	Water	HCH, alpha-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, beta-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, delta-	RPD ≤25	3	3	100.0
EPA 8081A	Water	HCH, gamma-	RPD ≤25	3	3	100.0
EPA 8141A	Water	Atrazine	RPD ≤25	12	12	100.0
EPA 8141A	Water	Azinphos methyl	RPD ≤25	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	RPD ≤25	12	12	100.0
EPA 8141A	Water	Cyanazine	RPD ≤25	12	12	100.0
EPA 8141A	**Water**	**Demeton-s**	RPD ≤25	**12**	**10**	**83.3**
EPA 8141A	Water	Diazinon	RPD ≤25	12	12	100.0
EPA 8141A	Water	Dichlorvos	RPD ≤25	12	11	91.7
EPA 8141A	Water	Dimethoate	RPD ≤25	12	12	100.0
EPA 8141A	Water	Disulfoton	RPD ≤25	12	11	91.7
EPA 8141A	Water	Malathion	RPD ≤25	12	12	100.0
EPA 8141A	Water	Methidathion	RPD ≤25	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	RPD ≤25	12	12	100.0
EPA 8141A	Water	Phorate	RPD ≤25	12	12	100.0
EPA 8141A	Water	Phosmet	RPD ≤25	12	12	100.0
EPA 8141A	Water	Simazine	RPD ≤25	12	12	100.0
EPA 8141A	Water	Trifluralin	RPD ≤25	12	12	100.0
EPA 8270	Sediment	Piperonyl butoxide	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	**Sediment**	**Deltamethrin/ Tralomethrin**	RPD ≤25	**1**	**0**	**0.0**
EPA 8270M_NCI	Sediment	Esfenvalerate Fenvalerate, total	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	RPD ≤25	1	1	100.0
EPA 8270M_NCI	Sediment	Permethrin, Total	RPD ≤25	1	1	100.0
EPA 8321A	Water	Aldicarb	RPD ≤25	12	11	91.7
EPA 8321A	Water	Carbaryl	RPD ≤25	12	12	100.0
EPA 8321A	Water	Carbofuran	RPD ≤25	12	12	100.0
EPA 8321A	Water	Diuron	RPD ≤25	13	13	100.0
EPA 8321A	Water	Linuron	RPD ≤25	12	12	100.0
EPA 8321A	Water	Methamidophos	RPD ≤25	12	12	100.0
EPA 8321A	Water	Methiocarb	RPD ≤25	12	12	100.0
EPA 8321A	Water	Methomyl	RPD ≤25	12	12	100.0
EPA 8321A	Water	Oxamyl	RPD ≤25	12	11	91.7
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤20	10	10	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤20	12	12	100.0
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤20	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	RPD ≤20	16	16	100.0
Total				**414**	**407**	**98.3**

[1]Matrix spike duplicates are not run for *E. coli*, grain size and water column and sediment toxicity analyses and are not included in table.

Table 30. SJCDWQC summary of laboratory duplicate quality control sample evaluations.
Lab duplicates were analyzed in batches with samples collected for the 2015 WY. Non project samples are included for batch Quality Assurance completeness purposes. Evaluations sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total Laboratory Duplicate Samples	Laboratory Duplicate Samples within Limit	Acceptability Met (%)
ASTM D422/ ASTM D4464M	Sediment	Grain Size	RSD ≤20	5	5	100.0
EPA 180.1	Water	Turbidity	RPD ≤20	12	12	100.0
EPA 200.8	Water	Arsenic	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Dissolved Copper	RPD ≤20	NA	NA	NA
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤20	NA	NA	NA
EPA 547M	Water	Glyphosate	RPD ≤25	NA	NA	NA
EPA 549.2M	Water	Paraquat	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, alpha-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, beta-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, delta-	RPD ≤25	NA	NA	NA
EPA 8081A	Water	HCH, gamma-	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Atrazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Azinphos methyl	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Chlorpyrifos	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Cyanazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Demeton-s	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Diazinon	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Dichlorvos	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Dimethoate	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Disulfoton	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Malathion	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Methidathion	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Parathion, Methyl	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Phorate	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Phosmet	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Simazine	RPD ≤25	NA	NA	NA
EPA 8141A	Water	Trifluralin	RPD ≤25	NA	NA	NA
EPA 8270	Sediment	Piperonyl butoxide	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Bifenthrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Chlorpyrifos	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Cyfluthrin, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Cypermethrin, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Deltamethrin/Tralomethrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Fenpropathrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Sediment	Permethrin, Total	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Aldicarb	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Carbaryl	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Carbofuran	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Diuron	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Linuron	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methamidophos	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methiocarb	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Methomyl	RPD ≤25	NA	NA	NA
EPA 8321A	Water	Oxamyl	RPD ≤25	NA	NA	NA
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤20	NA	NA	NA
SM 2540 D	**Water**	**Total Suspended Solids**	RPD ≤20	**14**	**11**	**78.6**
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤20	NA	NA	NA

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total Laboratory Duplicate Samples	Laboratory Duplicate Samples within Limit	Acceptability Met (%)
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤20	NA	NA	NA
SM 9223 B	Water	*E. coli*	R_{log} ≤ 1.30	12	12	100.0
Walkley-Black	Sediment	Total Organic Carbon	RPD ≤20	6	6	100.0
Total				**49**	**46**	**94.0**

[1]Laboratory duplicates are not run for water column and sediment toxicity analyses and are not included in table.

NA; Not applicable, analysis was not conducted for constituent.

Table 31. SJCDWQC summary of surrogate recovery quality control sample evaluations.
Surrogates were run with samples collected and Laboratory Quality Assurance (LABQA) analyzed for the 2015WY for all organics except paraquat and glyphosate. Evaluations are sorted by method and analyte. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Matrix	Analyte	Surrogate Data Acceptability Criteria	Total Surrogate Samples	Surrogates within Limits	Acceptability Met (%)
EPA 8081A	Water	PCB 209	PR 16-146	35	35	100.0
EPA 8081A	Water	Tetrachloro-m-xylene	PR 15-98	35	35	100.0
EPA 8141A	Water	Tributylphosphate	PR 60-150	206	199	96.6
EPA 8141A	Water	Triphenyl phosphate	PR 56-129	206	206	100.0
EPA 8270	**Sediment**	**Esfenvalerate-d6, Total**	**PR 30-150**	**7**	**3**	**42.8**
EPA 8270M_NCI	Sediment	Esfenvalerate-d6-1	PR 70-130	7	7	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate-d6-2	PR 70-130	7	7	100.0
EPA 8321A	Water	Diphenamid	PR 52-122	143	139	97.2
EPA 8321A	Water	Tributylphosphate	PR 36-140	166	166	100.0
Total				**812**	**797**	**98.1**

Table 32. SJCDWQC summary of toxicity lab control sample evaluations.
Samples collected for the 2015 WY; sorted by method and species. Bolded rows represent analytes that did not meet 90% acceptability requirement.

Method	Test Species	Test Acceptability	Total Control Tests	Control Tests within Limit	Acceptability Met (%)
EPA 600/R-99-064	*Hyalella azteca*	Survival >80%	3	3	100.0
EPA 821/R-02-012	*Ceriodaphnia dubia*	Survival >90%	13	13	100.0
EPA 821/R-02-012	*Pimephales promelas*	Survival >80%	12	12	100.0
EPA 821/R-02-013	*Selenastrum capricornutum*	Growth >200,000 cells/mL and variability <20%	14	14	100.0
Total			**43**	**43**	**100.0**

Table 33. 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 17, 2015	0.20	1.06	3.88	6.12	1.60	NA
Field Duplicate	March 17, 2015	-0.14	0.90	4.35	6.33	1.84	13.98
Laboratory Duplicate	March 17, 2015	0.30	1.15	4.64	6.50	1.81	1.69
Environmental Sample	March 17, 2015	-3.22	-1.98	1.60	3.03	1.84	NA
Laboratory Duplicate	March 17, 2015	-4.24	-2.29	1.48	2.95	2.03	9.81
Environmental Sample	April 21, 2015	1.66	3.70	7.70	9.30	2.15	NA
Field Duplicate	April 21, 2015	1.72	3.58	7.47	9.10	2.09	3.15
Laboratory Duplicate	April 21, 2015	2.11	3.76	7.46	9.09	1.98	5.31
Environmental Sample	September 15, 2015	-0.33	0.37	2.64	5.24	1.41	NA
Field Duplicate	September 15, 2015	-0.09	0.65	3.16	5.86	1.53	8.00
Laboratory Duplicate	September 15, 2015	-0.11	0.60	2.99	5.72	1.48	4.80

Φ84 = phi value of the 84th percentile sediment grain size category
Φ16 = phi value of the 16th percentile sediment grain size category
Φ5 = phi value of the 5th percentile sediment grain size category
Φ95 = phi value of the 95th percentile sediment grain size category

DISCUSSION OF RESULTS

INTRODUCTION

The Discussion of Results section summarizes exceedance data for each site by zone. A list of all WQTLs used to evaluate results is included in Table 34. Tallies of exceedances that occurred during the 2015 WY are listed by site and zone in Appendix III. The tallies in Appendix III represent 1) the number of exceedances per constituent and 2) the percent of exceedances relative to the number of samples collected (including dry sites). If an exceedance occurred in both the environmental and associated field duplicate sample, only the environmental sample result was counted.

During the 2015 WY, exceedances of WQTLs occurred for DO, pH, SC, *E. coli*, arsenic, ammonia as N, chlorpyrifos, diuron, nitrate, and simazine. Water column toxicity to *C. dubia* and *S. capricornutum,* and sediment toxicity to *H. azteca* also occurred. The following sections include discussions of methods used for sourcing chemicals associated with exceedances as well as a summary of all exceedances by zone.

Table 34. 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				
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

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
	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					
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	

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
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
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

<table>
<tr><th>Constituent</th><th>Water Quality Trigger Limit (WQTL)</th><th>Standard Type</th><th>Beneficial Use (BU) with most protective limit</th><th>Reference for the Trigger Limit</th><th>Category (see footnotes)</th></tr>
<tr><td>Simazine</td><td>4.0 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td>Thiobencarb</td><td>ND</td><td>Numeric</td><td></td><td>Sacramento/San Joaquin Basin Plan - Basin Plan Discharge Prohibition</td><td>2</td></tr>
<tr><td>Trifluralin</td><td>5 µg/L</td><td>Narrative</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Toxicity Objective:
USEPA IRIS Cancer Risk Level.
One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water</td><td>3</td></tr>
<tr><td colspan="6">Metals (c)</td></tr>
<tr><td>Arsenic</td><td>10 µg/L</td><td>Narrative</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
USEPA Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td>Boron</td><td>700 µg/L</td><td>Narrative</td><td>Agricultural Supply</td><td>Water Quality for Agriculture (Ayers & Westcot)</td><td>3</td></tr>
<tr><td rowspan="2">Cadmium</td><td>For aquatic life; variable (see cadmium worksheet).</td><td>Numeric</td><td>Freshwater Habitat</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
CTR Freshwater Aquatic Life Protection - Continuous Concentration,
4-Day Average - Varies with water hardness</td><td>1</td></tr>
<tr><td>5 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td rowspan="2">Copper</td><td>For aquatic life; variable (see copper worksheet).</td><td>Numeric</td><td>Freshwater Habitat</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
CTR Freshwater Aquatic Life Protection - Continuous Concentration,
4-Day Average - Varies with water hardness/</td><td>1</td></tr>
<tr><td>1,300 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td rowspan="2">Lead</td><td>For aquatic life; variable (see lead worksheet).</td><td>Numeric</td><td>Freshwater Habitat</td><td>CTR Freshwater Aquatic Life Protection - Continuous Concentration,
4-Day Average - varies with water hardness</td><td>1</td></tr>
<tr><td>15 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td rowspan="4">Molybdenum</td><td>15 µg/L</td><td rowspan="2">Numeric</td><td rowspan="2">Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan - San Joaquin River, Mouth of the Merced River to Vernalis</td><td rowspan="2">1</td></tr>
<tr><td>50 µg/L</td><td>Sacramento/San Joaquin Basin Plan - Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River</td></tr>
<tr><td>10 µg/L</td><td rowspan="2">Narrative</td><td>Agricultural Supply</td><td>Water Quality for Agriculture (Ayers & Westcot)</td><td rowspan="2">3</td></tr>
<tr><td>35 µg/L</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Toxicity Objective:
USEPA IRIS Reference Dose as a drinking water level.</td></tr>
<tr><td rowspan="2">Nickel</td><td>For aquatic life variable (see Nickel worksheet).</td><td>Numeric</td><td>Freshwater Habitat</td><td>CTR Freshwater Aquatic Life Protection - Continuous Concentration,
4-Day Average - varies with water hardness</td><td>1</td></tr>
<tr><td>100 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td>1</td></tr>
<tr><td rowspan="2">Selenium</td><td>50 µg/L</td><td>Numeric</td><td>Municipal and Domestic Supply</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
California Primary MCL (MUN, human health)</td><td rowspan="2">1</td></tr>
<tr><td>5 µg/L (4-day average)</td><td>Numeric</td><td>Freshwater Habitat</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
NTR Freshwater Aquatic Life Protection -
Continuous Concentration - 4-Day Average</td></tr>
<tr><td>Zinc</td><td>For aquatic life variable (see Zinc worksheet).</td><td>Numeric</td><td>Freshwater Habitat</td><td>Sacramento/San Joaquin Basin Plan Chemical Constituents Objective:
Freshwater Aquatic Life Protection -
Continuous Concentration,
4-Day Average - varies with water hardness</td><td>1</td></tr>
</table>

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
			Nutrients		
Nitrate as NO3 Nitrate as N	45,000 µg/L as NO3 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

EXCEEDANCE REPORTS

All exceedances of WQTLs were reported to Regional Board staff via email within five business days upon a sampling event or receipt of laboratory results. If any errors occurred in the original Exceedance Report, an amended report was emailed to the Regional Board. During the 2015 WY, four Exceedance Reports were amended as described below:

1. The Field Exceedance Report originally submitted on December 11, 2014 was amended on the same day to correct a monitoring type at a site that was incorrectly entered in the database.
2. The Water Column Toxicity Exceedance Report submitted on July 1, 2015 was amended on July 14, 2015 to include a toxicity that was not reported in the preliminary laboratory results.
   a) The same Exceedance Report was subsequently amended again January 5, 2016 to specify that the misreported toxicity occurred in the field duplicate sample only.
3. The inorganics, metals, and nutrients Exceedance Report originally submitted on December 11, 2014 was amended on June 4, 2015 to correct the sample date entered in the excel file attached to the email.
4. The Sediment Toxicity Exceedance Report submitted on October 13, 2015 was amended on December 23, 2015 to update the percent survival compared to the control result. However, this amendment prompted discussions with Region Board to evaluate sediment toxicities based on the criteria recommended by the SWAMP Toxicity Work Group in a memo submitted on August 27, 2017. Based on the memo, the amended result associated with the sample is no longer considered toxic. Complete details on the toxicity criteria and affected sites are summarized in the Management Plan section of this report.

METHODS FOR SOURCING

Pesticide Use Report Data

Available PUR data are provided to the Coalition by each of the County Agricultural Commissioner's offices. Preliminary PUR data are uploaded to an Access database maintained by the Coalition and associated with WQTL exceedances based on active ingredients. The database links registered products to active ingredients (AI) and calculates pounds of AI per acre based on the use reported by growers to the County Agricultural Commissioner.

Registered products are evaluated for applications relevant to exceedances of WQTLs. To assess possible sources of toxicity, applications of pesticides known to be toxic to the test species are identified based on a variety of factors including organic carbon partitioning coefficient (Koc), chemical type, mode of action, and solubility. If water column toxicity occurs, pesticides with a relatively low Koc (below 1900) are evaluated and the PUR database is queried for pesticides applied within 30 days prior to sampling. If sediment toxicity occurs, pesticides with a relatively high Koc (1600 or greater) are considered potential causes and the PUR database is queried for applications within 90 days prior to the date of toxicity. The PUR database is queried for applications of pyrethroids within 180 days prior to the date of toxicity (for water column or sediment) due to the long half-life of pyrethroids. The database is queried for applications of metals within 90 days prior to exceedances (Table 35). If no applications can be associated to the exceedance or toxicity in the specified time period, the PUR database iss queried an additional 30 days to determine which pesticides were applied within 60 days of the sample date.

If exceedances of WQTLs for aldrin, dieldrin, endrin, hexachlorocyclohexane (HCH), DDD, DDE, DDT, arsenic or molybdenum occur, the PUR database cannot be queried for associated applications since there are no longer any registered products containing these chemicals. During the 2015 WY, the only exceedance of a chemical that is not registered was for arsenic.

Table 35. Timeframes of PUR data associated with exceedances of pesticides, metals, sediment toxicities and water column toxicities.

Exceedance Type	PUR Data Timeframes
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 V). 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 result in a blank cell for AI per acre column. Values recorded as 'zero' 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 of chemical applied to an acre is very minimal. The original data are not rounded; pounds AI per acre derived from calculations are the only rounded values.

Appendix V includes tables and maps of all pesticide applications relevant to exceedances and toxicity. When PUR data for any county are unattainable, the Coalition makes a note in Appendix V; any outstanding PUR data are submitted in an Addendum to the Annual Report. The Coalition does not expect all PUR data for the 2015 WY to become available until August 2015 and therefore an addendum to the 2016 Annual Report will be submitted on September 1, 2016 to include all outstanding PUR data from San Joaquin County. Information regarding available and outstanding PUR data is included in Table 36.

Table 36. Obtained PUR data for 2015 WY exceedances.

County	2015 PUR Data Obtained	2015 PUR Data Outstanding
Contra Costa	January through December	NA
San Joaquin	January through June	July through December
Stanislaus	January through December	NA

Toxic Identification Evaluations

A TIE was performed on water samples when survival or growth of the respective target organisms was 50% or less compared to the control. All TIE results were submitted quarterly with all laboratory results. Water column and sediment toxicity results are listed in Table 37. A Phase III TIE is performed to further identify chemistry data in toxic samples; Phase III TIE results are listed in Table 38. Additional sediment chemistry results associated with sediment toxicity are listed in Table 39.

Sediment Chemistry Analysis

The Coalition analyzes pyrethroids and chlorpyrifos in sediment samples when toxicity to *H. azteca* occurs and survival is less than 80% compared to the control. Pyrethroids readily bind to sediment and a small portion of what binds to sediment partitions off into pore water becoming bioavailable to *H. azteca*. The additional sediment chemistry results are used to determine if sediment bound pyrethroids and chlorpyrifos were bioavailable at concentrations that would cause toxicity. The amount of pyrethroids contributing to sediment toxicity can be evaluated using the toxic units (TUs) for the acute endpoint (TUa) calculation based on the LC50s for pyrethroids determined to cause acute toxicity to *H. azteca* (LC50=1 TUa). The LC50 concentrations for pyrethroids and chlorpyrifos that were 1) detected in samples collected by the Coalition, and 2) determined to cause toxicity to *H. azteca* (Table 40). Sediment chemistry analysis is discussed in the Summary of Exceedances section below.

Table 37. 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	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Bacon Island Pump @ Old River	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	162590	9	SL	A TIE was conducted on 2/18/2015. It was concluded that non-polar organics was the cause of toxicity.
East Orwood Tract Drain	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1152566	67	SL	
East Orwood Tract Drain	5/19/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1146053	76	SL	
Mokelumne River @ Bruella Rd	3/17/2015	*S. capricornutum*	Total Cell Count (cells/ml)	947407	**63**	SL	
Mokelumne River @ Bruella Rd-FD	3/17/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1038589	**69**	SL	FD RPD 9.1
Mokelumne River @ Bruella Rd –FD	6/16/2015	*S. capricornutum*	Total Cell Count (cells/ml)	576166	82	SG	Environmental sample was not toxic (XX pct compared to control)
Mokelumne River @ Bruella Rd	7/21/2015	*S. capricornutum*	Total Cell Count (cells/ml)	947407	**63**	SL	
Mokelumne River @ Bruella Rd-FD	7/21/2015	*S. capricornutum*	Total Cell Count (cells/ml)	996254	**60**	SL	FD RPD XX
Roberts Island @ Whiskey Slough Pump	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1041845	**60**	SL	
Roberts Island @ Whiskey Slough Pump	5/19/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1139540	**75**	SL	
South McDonald Island Pump	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	758530	44	SL	A TIE was conducted on 2/18/2015. It was concluded that non-polar organics was the cause of toxicity.
South McDonald Island Pump	3/17/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1100462	73	SL	
Terminous Tract Drain @ Hwy 12	10/21/2014	*C. dubia*	Survival (%)	15	15	SL	A TIE was conducted on 10/15/14. It was concluded that cationic metals and OP insecticides were the causes of toxicity.
Terminous Tract Drain @ Hwy 12	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	354724	21	SL	A TIE was conducted on 2/18/2015. It was concluded that non-polar organics was the cause of toxicity.

Station Name	Sample Date	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Union Island Drain @ Bonetti Rd	1/20/2015	*S. capricornutum*	Total Cell Count (cells/ml)	647809	**87**	SG	
Union Island Drain @ Bonetti Rd	2/9/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1058128	**61**	SL	
Union Island Drain @ Bonetti Rd	4/21/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1142797	**88**	SG	
Union Island Drain @ Bonetti Rd	6/16/2015	*S. capricornutum*	Total Cell Count (cells/ml)	537088	76	SL	
Union Island Drain @ Bonetti Rd	7/21/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1074410	**67**	SL	
Union Island Drain @ Bonetti Rd	9/15/2015	*S. capricornutum*	Total Cell Count (cells/ml)	507779	41	SL	A TIE was conducted on 9/22/15. It was concluded that non-polar organics and/or cationic metals were the cause of toxicity.
Upper Roberts Island Drain	3/17/2015	*C. dubia*	Survival (%)	0	0	SL	A TIE was conducted on 3/19/15. It was concluded that organophosphate insecticides were the cause of toxicity.
Upper Roberts Island Drain	3/17/2015	*H. azteca*	Survival (%)	34	34	SL	Bifenthrin (32 ng/g), chlorpyrifos (4.2 ng/g), lambda-cyhalothrin (4.6 ng/g), cyhalothrin (2.7 ng/g) were detected in sediment samples.
Upper Roberts Island Drain	5/19/2015	*C. dubia*	Survival (%)	35	35	SL	A TIE was conducted on 5/25/15. However, no toxicity was detected in the baseline TIE tests, indicating that the samples lost all detectable toxicity prior to or during the TIE.
Walthall Slough @ Woodward Ave	5/19/2015	*S. capricornutum*	Total Cell Count (cells/ml)	1181875	78	SL	

MPM – Management Plan Monitoring
SG-Statistically significantly different from control; greater than 80% threshold
SL-Statistically significantly different from control; less than 80% threshold

Table 38. 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 ECOTOX database.

Station Name	Sample Date	Species	Baseline Toxicity Result		Phase III TIE Result			Phase III conclusions
			EC_{50} (%)	TU	Chemical, concentration	EC_{50} (µg/L)	TU	
Terminous Tract Drain @ Hwy 12	10/21/2014	*C. dubia*	80.9	1.2	Arsenic, 6 µg/L	NA	NA	There was no Phase III TIE conclusion because all chemistry was either ND (organics) or there was no data in the eEcoTox database for detected analytes (arsenic) to calculate TUs.
Terminous Tract Drain @ Hwy 12	2/9/2015	*S. capricornutum*	64.1	1.6	Arsenic, 9.7 µg/L	NA	NA	The Phase III TIE analysis confirmed that the concentration of diuron detected in the sample was the cause of all the sample toxicity.
					Dissolved Copper, 2 µg/L	NA	NA	
					Diuron, 12 µg/L	2	6	
Union Island Drain @ Bonetti Rd	9/8/2015	*S. capricornutum*	69	1.5	Dimethoate, 0.04 µg/L	NA	NA	There was no Phase III TIE conclusion because there was no data in the EcoTox database for detected analytes (dimethoate) to calculate TUs.

EC_{50} = the effective concentration of the sample that inhibits 50% of test population.
TU = toxic unit
NA-Not applicable.

Table 39. Sediment toxicity chemistry results for samples with less than 80% survival when compared to the control.

Station Name	Sample Date	Monitoring Type	*H. azteca* (% Control)	Sediment Pesticides µg/kg dw										TOC (mg/Kg dw)	Percent TOC	Mean GS Description	Median GS (mm)
				Bifenthrin, µg/kg	Chlorpyrifos , µg/kg	Cyfluthrin, µg/kg	Cyhalothrin, lambda µg/kg	Cypermethrin, µg/kg	Deltamethrin:Tralomethrin, µg/kg	Esfenvalerate/Fenvalerate, µg/kg	Fenpropathrin, µg/kg	Permethrin, µg/kg	Piperonyl Butoxide				
Upper Roberts Island Drain	3/17/2015	NM	34	32	4.2	ND	4.6	2.7	ND	ND	ND	ND	ND	23200	2.32	Silt (0.005 to <0.075 mm)	0.026

GS- Grain Size, recorded in MM (millimeter).
ND- Not Detected
NM- Normal Monitoring (Core or Represented Site Monitoring)
TOC- Total Organic Carbon

Table 40. Pyrethroid and chlorpyrifos LC50 concentrations.

Sediment Pesticide	LC50[1] (µg/g OC)
Bifenthrin	0.52
Chlorpyrifos	4.16
Cyhalothrin, lambda	0.45
Cypermethrin	0.38
Deltamethrin	0.79
Esfenvalerate/Fenvalerate	1.54
Permethrin	10.83

[1]Normalized to TOC measurements in sediments collected for research (Amweg, et al., 2005 and Weston, et al., 2013).

SUMMARY OF EXCEEDANCES

All exceedances and toxicity that occurred during the 2015 WY are included in Tables 41 through 47 and discussed by zone in the sections below. Each section includes an analysis of exceedances by zone with an assessment of agricultural pesticide applications that were potential sources of the exceedance. Measures taken to address these exceedances are described in the "Member Actions Taken to Address Water Quality Exceedances" section of this report.

Zone 1: Bear Creek @ North Alpine Rd, Coyote Creek Tributary @ Jack Tone Rd, Jahant Slough @ Cherokee Ln, Mokelumne River @ Bruella, Mosher Creek @ North Alpine Rd, and Pixley Slough @ Furry Rd

The Mokelumne River @ Bruella Rd Zone includes the Core site, Mokelumne River @ Bruella Rd, and five Represented sites: Bear Creek @ North Alpine Rd, Coyote Creek Tributary @ Jack Tone Rd, Jahant Slough @ Cherokee Ln, Mosher Creek @ North Alpine Rd, and Pixley Slough @ Furry Rd. All Represented sites in Zone 1, with the exception of Bear Creek @ North Alpine Rd, were new sites in which the Coalition monitored for the first time in the 2015 WY.

During the 2015 WY, the Coalition conducted MPM at Mokelumne River @ Bruella Rd for water column toxicity to *S. capricornutum* in addition to monthly monitoring for the entire suite of constituents (as indicated in the 2014 MPU, Table 4). The Coalition conducted MPM for chlorpyrifos and malathion at Bear Creek @ North Alpine Rd. The Coalition also monitored at all five Represented sites for toxicity to *S. capricornutum* due to past toxicity issues at the Core site. Table 41 includes all exceedances for Zone 1 for the 2015 WY.

Mosher Creek @ North Alpine Rd was dry from November 2014 through March 2015 and from May 2015 through August 2015. Pixley Slough @ Furry Rd was dry in January and February 2015 (Table 14). Non-contiguous samples were collected from Bear Creek @ North Alpine Rd in July 2015 and from Pixley Slough @ Furry Rd in December 2014 (Table 15).

Field Parameters

In Zone 1, exceedances of the WQTLs for field parameters DO (20) and pH (4) occurred during monitoring in the 2015 WY (Table 41).

Exceedances of water quality objectives for field parameters such as DO, SC, and pH are difficult to source. These parameters are non-conserved, meaning they may fluctuate as water moves downstream. The concentrations of these parameters are the result of processes occurring in the water column and in the sediment which can vary diurnally and seasonally.

Dissolved Oxygen

The Coalition conducted a preliminary sourcing analysis for DO and pH (submitted February 22, 2016). Processes affecting DO in waterways and drains including stream flow, fluctuations in temperature, loss of vegetation around streams, excessive nutrients (phosphate), associated field parameters (SC, TOC, TSS), and algae growth are discussed in the study. Conclusions from the DO and pH preliminary study indicate TOC, phosphate, and SC had the strongest correlations with exceedances of DO in the Coalition region.

Monitoring during the 2015 WY resulted in exceedances of the WQTL for DO at all sites in Zone 1 except the Core site; exceedances ranged from 0.71 to 6.89 mg/L. The majority of the exceedances occurred at Bear Creek @ North Alpine Rd where 11 out of 12 monitoring events resulted in exceedances. Exceedances of the WQTL for DO also occurred at Coyote Creek Tributary @ Jack Tone Rd (4), Jahant Slough @ Cherokee Ln (3), Mosher Creek @ North Alpine Rd (1), and Pixley Slough @ Furry Rd (1; Table 41). Exceedances of the WQTL for DO coincided with samples collected from non-contiguous waterbodies at Bear Creek @ North Alpine Rd in September 2015 and Pixley Slough @ Furry Rd in December 2014; low flow conditions, particularly stagnant water, most likely affected DO levels in the waterbodies during these months.

pH

Findings from the preliminary sourcing study for DO and pH indicate potential causes of fluctuating levels of pH can be both natural and anthropogenic. Low pH is primarily caused by anthropogenic influences such as atmospheric deposition of air pollutants and drainage from mining activities, neither of which is caused by agricultural sources. The study concluded that the primary agricultural contributors to elevated pH levels are limited to stormwater and irrigation runoffs; runoff of lime-rich fertilizers and nitrogen-rich organic matter can cause fluctuations in pH levels. Furthermore, photosynthesis and decomposition can cause daily and seasonal variation in pH and the bioavailability of some constituents (e.g. copper) are affected by changes in pH.

During the 2015 WY, exceedances of the WQTL for pH at Mokelumne River @ Bruella Rd (3) and Coyote Creek tributary @ Jack Tone Rd (1); exceedances ranged from 4.90 to 8.60 (Table 41). At Mokelumne River @ Bruella Rd, two of the exceedances were above the upper WQTL of 8.5, and one was below the lower WQTL of 6.5; the exceedance at Coyote Creek tributary @ Jack Tone Rd was below the lower 6.5 WQTL.

Water Column Toxicity

During the 2015 WY, three monitoring events resulted in five toxicities to *S. capricornutum* (including field duplicates) at the Core site, Mokelumne River @ Bruella Rd. The percent growth in all five samples was greater than 50% compared to the control and therefore TIEs were not required.

S. capricornutum Toxicity

Mokelumne River @ Bruella Rd

Samples collected from Mokelumne River @ Bruella Rd during MPM on March 17, 2015 were toxic to *S. capricornutum* (63% growth compared to the control in the environmental samples and 69% growth compared to the control in the field duplicate). A TIE was not required since growth compared to the control was greater than 50%. The PUR data associated with the toxicity in March indicated that there were 169 applications of 4,277 lbs of herbicides (including two applications of 395 lbs of copper) across 4,592 acres of primarily wine grapes, cherry, walnut, and apple orchards from January 10, 2015 through March 17, 2015 that potentially contributed to the toxicity. The Coalition sampled for a suite of herbicides which could be associated with the toxicity during the same sampling event and there were no detections.

Samples collected from Mokelumne River @ Bruella Rd during NM on June 16, 2015 were toxic to *S. capricornutum* in the field duplicate (82% growth compared to the control). The environmental sample, which was collected at the same time as the field duplicate, resulted in 92% growth compared to the control and was not toxic. A TIE was not required since growth compared to the control was greater than 50%. The PUR data associated with the toxicity in June indicated that there were 170 applications of herbicides from March 25, 2015 through June 15, 2015 that potentially contributed to the toxicity. There were a total of 11,283 lbs of herbicides (including 54 applications of 8,126 lbs of copper) applied across 4,999 acres of primarily wine grapes, and lesser of cherry, walnut, and corn. Similar to the March sampling event, the Coalition also sampled for a suite of herbicides on the corresponding June sampling event and there were no detections of chemicals that could be associated with the toxicity.

Samples collected from Mokelumne River @ Bruella Rd during MPM on July 21, 2015 were toxic to *S. capricornutum* (63% growth compared to the control in the environmental sample and 60% growth compared to the control in the field duplicate). The PUR data associated with the toxicity in July indicated that there were 74 applications of herbicides from April 29, 2015 through July 21, 2015 that potentially contributed to the toxicity. There were a total of 2,585 lbs of herbicides (including nine applications of 1,104 lbs of copper) applied across 1,976 acres of primarily wine grapes and walnuts. During the corresponding sampling event, there was a detection of copper (0.58 µg/L in the environmental sample and 0.61 µg/L in the field duplicate) in the waterbody. The detection of copper in the sample, although not an exceedance of the WQTL, may have potentially contributed to the toxicity.

Table 41. Zone 1: Bear Creek @ North Alpine Rd, Coyote Creek Tributary @ Jack Tone Rd, Jahant Slough @ Cherokee Ln, Mokelumne River @ Bruella Rd, Mosher Creek @ North Alpine Rd, Pixley Slough @ Furry Rd.

Red bolded values represent MPM 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	Represented	MPM	10/21/2014	2.24		
Bear Creek @ North Alpine Rd	Represented	NM	11/18/2014	4.50		
Bear Creek @ North Alpine Rd	Represented	NM	12/4/2014	5.08		
Bear Creek @ North Alpine Rd	Represented	MPM, NM	1/20/2015	5.59		
Bear Creek @ North Alpine Rd	Represented	NM	2/9/2015	6.81		
Bear Creek @ North Alpine Rd	Represented	NM	3/17/2015	3.84		
Bear Creek @ North Alpine Rd	Represented	NM	4/21/2015	4.38		
Bear Creek @ North Alpine Rd	Represented	MPM, NM	5/19/2015	4.83		
Bear Creek @ North Alpine Rd	Represented	MPM, NM, Non-contiguous	7/21/2015	1.44		
Bear Creek @ North Alpine Rd	Represented	MPM	8/18/2015	0.94		
Bear Creek @ North Alpine Rd	Represented	MPM	9/15/2015	1.02		
Coyote Creek Tributary @ Jack Tone Rd	Represented	NM	12/4/2014	5.40		
Coyote Creek Tributary @ Jack Tone Rd	Represented	NM	1/20/2015	4.05		
Coyote Creek Tributary @ Jack Tone Rd	Represented	NM	2/9/2015	6.89	4.90	
Coyote Creek Tributary @ Jack Tone Rd	Represented	NM	3/17/2015	3.53		
Jahant Slough @ Cherokee Ln	Represented	NM	1/20/2015	2.45		
Jahant Slough @ Cherokee Ln	Represented	NM	2/9/2015	3.59		
Jahant Slough @ Cherokee Ln	Represented	NM	3/17/2015	0.71		
Mokelumne River @ Bruella Rd	Core	NM	2/9/2015		5.89	
Mokelumne River @ Bruella Rd	Core	MPM, NM	3/17/2015			**63**
Mokelumne River @ Bruella Rd (FD)	Core	MPM, NM	3/17/2015			**69**
Mokelumne River @ Bruella Rd	Core	MPM, NM	4/21/2015		8.60	
Mokelumne River @ Bruella Rd (FD)	Core	NM	6/16/2015			82
Mokelumne River @ Bruella Rd	Core	MPM, NM	7/21/2015			**63**
Mokelumne River @ Bruella Rd (FD)	Core	MPM, NM	7/21/2015			**60**
Mokelumne River @ Bruella Rd	Core	NM	9/15/2015		8.59	
Mosher Creek @ North Alpine Rd	Represented	NM	4/21/2015	3.04		
Pixley Slough @ Furry Rd	Represented	NM, Non-contiguous	12/4/2014	0.97		

Zone 1 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7mg/L	pH, <6.5 and >8.5 units	*S. capricornutum*, % Control
			Normal Monitoring Exceedances	20	4	1
			Non-contiguous Waterbody Exceedances	2	0	0
			Management Plan Monitoring Exceedances	NA	NA	4
			Total Exceedances	20	4	5

MPM-Management Plan Monitoring
NM-Normal Monitoring
NA-Not applicable; MPM not conducted for constituent.

Zone 2: French Camp Slough @ Airport Way Zone (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, Unnamed Drain to Lone Tree Creek @ Jack Tone Rd

The French Camp Slough @ Airport Way Zone includes the Core site, French Camp Slough @ Airport Way, and five Represented sites: Duck Creek @ Hwy 4, 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.

During the 2015 WY, the Coalition conducted MPM at French Camp Slough @ Airport Way for chlorpyrifos, diuron, water column toxicity to *C. dubia*, and sediment toxicity to *H. azteca* in addition to monthly monitoring for the entire suite of constituents (as indicated in the 2014 MPU, Table 4). The Coalition also conducted MPM at all five Represented sites. Monitoring for diuron occurred at Littlejohns Creek @ Jack Tone Rd and Mormon Slough @ Jack Tone Rd due to past exceedances at the Core site; monitoring for sediment toxicity to *H. azteca* also occurred at Mormon Slough @ Jack Tone Rd due past toxicity at the Core site.

Duck Creek @ Hwy 4 was dry in May and June 2015 (Table 14). Non-contiguous samples were collected from Duck Creek @ Hwy 4 in May, August, and September 2015, from French Camp Slough @ Airport Way in November 2014 and January and February 2015, from Littlejohns Creek @ Jack Tone Rd in August 2015, from Mormon Slough @ Jack Tone Rd from November 2014 through February 2015, and July 2015, and from Unnamed Drain to Lone Tree Creek @ Jack Tone Rd in March 2015 (Table 15). Table 42 includes all exceedances for Zone 2 for the 2015 WY.

Field Parameters and E. coli

In Zone 2, exceedances of the WQTLs for DO (17), pH (3), SC (1), and *E. coli* (4) occurred during monitoring in the 2015 WY (Table 42).

Dissolved Oxygen

During the 2015 WY, exceedances of the WQTL for DO occurred at all sites in Zone 2: French Camp Slough @ Airport Way (6), Duck Creek @ Hwy 4 (4), Littlejohns Creek @ Jack Tone Rd (1), Lone Tree Creek @ Jack Tone Rd (1), Mormon Slough @ Jack Tone Rd (4), and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (1); the exceedances ranged from 1.17 mg/L to 6.95 mg/L (Table 42). Exceedances of the WQTL for DO coincided with samples collected during non-contiguous water conditions from Duck Creek @ Hwy 4 in August and September 2015, French Camp Slough @ Airport Way in January and February 2015, Littlejohns Creek @ Jack Tone Rd in August 2015, Mormon Slough @ Jack Tone Rd in November and December 2014. Low flow conditions, particularly stagnant water, most likely affected DO levels in the waterbodies during these months.

pH

During the 2015 WY, three exceedances of the WQTL for pH occurred at sites in Zone 2. All three exceedances occurred at Mormon Slough @ Jack Tone Rd during non-contiguous sampling events (January, May and July); the pH levels were all above the upper limit of 8.5 (Table 42).

E. coli

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.

During the 2015 WY, there were four exceedances of the WQTL for *E. coli*, all of which occurred at French Camp Slough @ Airport Way and ranged from 517.2 to >2419.6 MPN/100mL. Three of the four exceedances at French Camp Slough @ Airport Way occurred during a storm event or irrigation season. It is possible that stormwater or irrigation tailwater runoff could have transported bacteria into the waterbody from dairy discharge or manure applications occurring upstream of French Camp Slough @ Airport Way during the four monitoring events. Naturally occurring *E. coli* are always present and could also have contributed to the exceedances.

Ammonia

Ammonia as N 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.

During the 2015 WY, one exceedance of the WQTL for ammonia occurred in Zone 2. Samples collected from French Camp Slough @ Airport Way during NM on March 17, 2015 resulted in an exceedance of the WQTL for ammonia as N. The exceedance of the 1.5 mg/L WQTL (1.80 mg/L) was the first to occur at this site and therefore a management plan for ammonia as N is not required. As discussed above for exceedances of *E. coli*, there are a significant number of dairies and feedlots in the French Camp Slough @ Airport Way site subwatershed; stormwater and irrigation tailwater runoff may have transported bacteria to the waterway and contributed to elevated levels of ammonia.

Chlorpyrifos

Chlorpyrifos is an organophosphate pesticide used for agricultural pest control on a wide variety of crops in California. In a waterbody, chlorpyrifos can both bind to sediment and remain in the water column (K_{oc} of 6,070). The concentration at which 50% mortality (LC50) to *C. dubia* occurs is 0.055 µg/L. The WQTL to protect aquatic life is 0.015 µg/L.

During the 2015 WY, there were six exceedances of the WQTL for chlorpyrifos in Zone 2 ranging between 0.016 to 0.075 µg/L at Duck Creek @ Hwy 4 (2), French Camp Slough @ Airport Way (1), Mormon Slough @ Jack Tone Rd (1), and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (2; (Table 42).

Duck Creek @ Hwy 4

Samples collected from Duck Creek @ Hwy 4 during MPM on April 21, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.016 µg/L). The exceedance corresponded with the beginning of the irrigation season (typically April through September), when chlorpyrifos is most heavily used to control pests in row crops and orchards. The PUR data associated with the April exceedance indicate there were eight applications of chlorpyrifos from April 2, 2015 through April 21, 2015. The applications totaled 352 lbs of AI across 375 acres of walnut orchards. However, further analyses of the data indicated that only two of the eight applications were made within the site subwatershed boundary. The remaining applications were associated to the exceedance because a small portion of the TRSs is within the site subwatershed boundary; the applications of chlorpyrifos within the TRSs, however, were located well outside of the site subwatershed boundary and it is unlikely that those applications could have contributed to the April exceedance. The Coalition determined that the two applications within the site subwatershed boundary were on parcels enrolled within the Coalition and irrigation tailwater runoff could have transported the chlorpyrifos to the waterway and contributed to the exceedance. The Coalition previously conducted focused outreach in the Duck Creek @ Hwy 4 site subwatershed from 2008 through 2010; however, membership has changed since then and there are members in the site subwatershed now that did not previously receive focused outreach. The Coalition will initiate 2016 focused outreach in this site subwatershed.

Non-contiguous samples collected from Duck Creek @ Hwy 4 during MPM on August 18, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.022 µg/L). The site was connected The PUR data associated with the August exceedance indicated there was a single application on August 4, 2015. The application totaled 68 lbs of chlorpyrifos applied across 36 acres of walnut orchards. Further analyses of the data indicated that applications of chlorpyrifos associated with the exceedance were associated to a single member. However, similar to the case with the April exceedance, the member parcel is located outside the site subwatershed boundary and it is highly unlikely this application contributed to the exceedance. Therefore, it is more likely that an unreported application was the cause of the exceedance.

French Camp Slough @ Airport Way

Non-contiguous samples collected from a small puddle at French Camp Slough @ Airport Way during NM on January 20, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.075 µg/L). Aside from several scattered small puddles, the site was nearly dry. A single application of chlorpyrifos (18.79 lbs of AI) occurred on January 16, 2015 across 32.5 acres of almond orchards. There was also an exceedance of the WQTL for chlorpyrifos of the same magnitude in samples collected on the same date from Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (0.075 µg/L). Unnamed Drain to Lone Tree Creek @ Jack Tone Rd is an upstream site subwatershed that drains into French Camp Slough. However, since French Camp Slough was non-contiguous during the time of sampling it is unclear if chlorpyrifos concentrations from Unnamed Drain to Lone Tree Creek contributed to the concentration detected in French Camp Slough. The PUR data for the exceedance at Unnamed Drain to Lone Tree Creek @ Jack Tone Rd is discussed below.

Mormon Slough @ Jack Tone Rd

Non-contiguous samples collected from a large puddle at Mormon Slough @ Jack Tone Rd during MPM on July 21, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.029 µg/L). The PUR data associated with the July exceedance were incomplete at the time of this report; all outstanding PUR data will be submitted in an addendum to the AMR on September 1, 2016.

Unnamed Drain to Lone Tree Creek @ Jack Tone Rd

Samples collected from Unnamed Drain to Lone Tree Creek @ Jack Tone Rd during MPM resulted in exceedances of the WQTL for chlorpyrifos during the January 20, 2015 (0.075 µg/L) and June 16, 2015 (0.025 µg/L) monitoring events. There were no applications of chlorpyrifos within 30 days of the January sampling event. The most recent applications were on October 22 and 24, 2014 of 156 lbs of chlorpyrifos across 83 acres of wine grapes. It is possible that there were additional applications that were not reported at the time of the PUR data review. The Coalition will submit an addendum to the Annual Report on September 1, 2016 to include any outstanding PUR data.

The PUR data associated with the June exceedance indicated two applications on May 26, 2015 and June 10, 2015 totaling 336 lbs of chlorpyrifos applied across 180 acres of walnut orchards. Both applications occurred on member parcels. The Coalition previously conducted focused outreach in the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed from 2008 through 2010; however, membership has changed since then and there are members in the site subwatershed now that did not previously receive focused outreach. The Coalition will initiate 2016 focused outreach in this site subwatershed.

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 (EC50) of 2.4 µg/L. The WQTL for diuron is 2 µg/L (Table 34). In Zone 2, there was one exceedance of the WQTL for diuron at French Camp Slough @ Airport Way during storm monitoring.

Non-contiguous storm samples were collected from a large puddle at French Camp Slough @ Airport Way during MPM on February 9, 2015 (2.9 µg/L, Table 42). The PUR data associated with the exceedance indicated that there were four applications of 151.3 lbs of diuron applied from January 15 through 16, 2015 across 110 acres of alfalfa. Further analyses of the data indicate that two of the four applications occurred on non-member parcels (a total of 50 lbs). The February storm monitoring event was triggered by 1.42 inches of rainfall in the region. It is likely that stormwater runoff mobilized diuron in soil particles and transported the chemical to the waterway. Since French Camp Slough was non-contiguous, it was unlikely to receive any influence from upstream waterbodies. Therefore, it is more likely that applications of diuron in the French Camp Slough @ Airport Way site subwatershed contributed to the exceedance in the waterbody. The two members with applications associated with the exceedance of the diuron WQTL were not previously contacted during focused outreach and will be included in the Coalition's 2016 focused outreach.

Table 42. 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, Unnamed Drain to Lone Tree Creek @ Jack Tone Rd exceedances.

MPM exceedances indicated by bolded red font.

Zone 2 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7mg/L	pH, <6.5 and>8.5	SC, >700 µS/cm	Ammonia, 1.5 mg/L	*E. coli*, >235 MPN/ 100 mL	Chlorpyrifos, >0.015 µg/L	Diuron, 2 µg/L
Duck Creek @ Hwy 4	Represented	MPM	4/21/2015	3.78		765			**0.016**	
Duck Creek @ Hwy 4	Represented	MPM	7/21/2015	1.17						
Duck Creek @ Hwy 4	Represented	MPM, Non-contiguous	8/18/2015	1.22					**0.022**	
Duck Creek @ Hwy 4	Represented	MPM, Non-contiguous	9/15/2015	2.56						
French Camp Slough @ Airport Way	Core	NM, Non-contiguous	11/18/2014	4.76						
French Camp Slough @ Airport Way	Core	NM	12/4/2014					866.4		
French Camp Slough @ Airport Way	Core	MPM, NM, Non-contiguous	1/20/2015						0.075	
French Camp Slough @ Airport Way	Core	MPM, NM, Non-contiguous	2/9/2015	6.71						**2.9**
French Camp Slough @ Airport Way	Core	MPM, NM	3/17/2015	6.95			1.80	488.4		
French Camp Slough @ Airport Way	Core	MPM, NM	5/19/2015					517.2		
French Camp Slough @ Airport Way	Core	MPM, NM	7/21/2015	6.73						
French Camp Slough @ Airport Way	Core	MPM, NM	8/18/2105	4.66						
French Camp Slough @ Airport Way	Core	MPM, NM	9/15/2015	6.11				>2419.6		
Littlejohns Creek @ Jack Tone Rd	Represented	MPM, Non-contiguous	8/18/2105	2.14						
Lone Tree Creek @ Jack Tone Rd	Represented	MPM	1/20/2015	4.68						
Mormon Slough @ Jack Tone Rd	Represented	NM, Non-contiguous	11/18/2014	2.15						
Mormon Slough @ Jack Tone Rd	Represented	NM, Non-contiguous	12/4/2014	4.75						
Mormon Slough @ Jack Tone Rd	Represented	NM, Non-contiguous	1/20/2015		8.61					
Mormon Slough @ Jack Tone Rd	Represented	NM, Non-contiguous	3/17/2015	6.31						
Mormon Slough @ Jack Tone Rd	Represented	MPM, Non-contiguous	5/19/2015		8.64					
Mormon Slough @ Jack Tone Rd	Represented	MPM, Non-contiguous	7/21/2015		9.16				**0.029**	
Mormon Slough @ Jack Tone Rd	Represented	MPM, NM	9/15/2015	6.08						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Represented	MPM	1/20/2015	3.65					**0.075**	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Represented	MPM	6/16/2015						**0.025**	
			Normal Monitoring Exceedances	10	0	1	1	4	0	0
			Non-contiguous Waterbody Exceedances	7	3	0	0	0	1	0
			Management Plan Monitoring Exceedances	NA	NA	NA	NA	NA	**5**	**1**
			Total Exceedances	17	3	1	1	4	6	1

MPM-Management Plan Monitoring

NM-Normal Monitoring

NA-Not applicable; no MPM conducted for constituent.

Zone 3: Drain @ Woodbridge Rd, Empire Tract @ 8 Mile Rd, Rindge Tract Drain, Staten Island Drain @ Staten Island Rd, and Terminous Tract Drain @ Hwy 12

The Terminous Tract Drain @ Hwy 12 Zone includes the Core site, Terminous Tract Drain @ Hwy 12, and four Represented sites: Drain @ Woodbridge Rd, Empire Tract @ 8 Mile Rd, Rindge Tract Drain, and Staten Island Drain @ Staten Island Rd. Rindge Tract Drain and Staten Island Drain @ Staten Island Rd were new sites in the 2015 WY with no monitoring history.

During the 2015 WY, the Coalition conducted MPM at Terminous Tract Drain @ Hwy 12 for arsenic, chlorpyrifos, and sediment toxicity to *H. azteca* in addition to monthly monitoring for the entire suite of constituents (as indicated in the 2014 MPU, Table 4). The Coalition also conducted MPM at Drain @ Woodbridge Rd for chlorpyrifos. Monitoring for chlorpyrifos occurred at Empire Tract @ 8 Mile Rd and Rindge Tract Drain due to past exceedances and toxicity at the Core site. Monitoring for toxicity to *H. azteca* also occurred at Drain @ Woodbridge Rd, Empire Tract @ 8 Mile Rd, Rindge Tract Drain, and Staten Island Drain @ Staten Island Rd due to past toxicity at the Core site. Samples were not collected from Rindge Tract Drain on the scheduled sampling date in October 2014 because the Coalition had not yet received permission to access the sample location; the Coalition was able to access the site and collect samples in November 2014 as scheduled.

Table 43 includes all exceedances for Zone 3 for the 2015 WY.

Field Parameters and E. coli

In Zone 3, exceedances of the WQTL for DO (19), SC (9), and *E. coli* (5) occurred during monitoring in the 2015 WY (Table 43).

Dissolved Oxygen

During the 2015 WY, exceedances of the WQTL for DO occurred at all sites in Zone 3: Terminous Tract Drain @ Hwy 12 (9), Drain @ Woodbridge Rd (3), Empire Tract @ 8 Mile Rd (3), Rindge Tract Drain (2), and Staten Island Drain @ Staten Island Rd (2); the exceedances ranged from 0.99 mg/L to 6.26 mg/L (Table 43). Drain @ Woodbridge Rd, Empire Tract @ 8 Mile Rd, and Rindge Tract Drain are all pump stations within the Delta islands and pumping is required to remove water from the agricultural 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 result in depletion of oxygen in the waterbody and contribute to low DO detections. Therefore, exceedances of the WQTL for DO are common in Zone 3 due to a lack of flow.

Specific Conductivity

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, 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 has been established based on seasonal salinity water quality objectives for September through March (1000 µS/cm) and April through August (700 µS/cm). Monitoring during the 2015 WY resulted in 14 exceedances of the WQTL for SC ranging from 713 µS/cm to 1,457 µS/cm (Table 43).

E. coli

During the 2015 WY, there were four exceedances of the WQTL for *E. coli*; all five exceedances occurred in samples collected from Terminous Tract Drain @ Hwy 12. Exceedances ranged from 290.9 to 1119.9 MPN/100 mL (Table 43). It is possible that stormwater or irrigation tailwater runoff could have transported bacteria into the waterbody from manure applications occurring in the site subwatershed. Naturally occurring *E. coli* are always present and could also have contributed to the exceedances.

Chlorpyrifos

During the 2015 WY, there was a single exceedance of the WQTL for chlorpyrifos in Zone 3 at Terminous Tract Drain @ Hwy 12.

Samples collected at Terminous Tract Drain @ Hwy 12 during NM on January 20, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.074 µg/L; Table 43). The PUR data associated with the exceedance indicate there were eight applications of 260 lbs of AI applied from November 17 through 19, 2014 across 280 acres of asparagus. However, the applications occurred approximately 62 days before the sampling event and exceedance, which is outside of the date range for associating pesticide applications to exceedances (Table 35). Further analyses of the data indicated three members were responsible for the applications of chlorpyrifos from November 17 through 19, 2014. The Coalition previously conducted focused outreach in this site subwatershed from 2011 through 2013 and two of the three members were contacted during 2011 focused outreach. The Coalition will conduct 2016 focused outreach in the Terminous Tract Drain @ Hwy 12 site subwatershed to address ongoing water quality impairments; all three members who applied chlorpyrifos are targeted for contact.

Diuron

During the 2015 WY, two exceedances of the WQTL for diuron occurred in samples collected from Terminous Tract Drain @ Hwy 12.

Monitoring during the 2015 WY resulted in exceedances of the WQTL for diuron at Terminous Tract Drain @ Hwy 12 during storm monitoring on February 9, 2015 (12.0 µg/L) and during NM on March 17, 2015 (2.5 µg/L; Table 43). The PUR data associated with both February and March exceedances indicated one application associated to a single member on January 28, 2015 of 400 lbs AI applied across 100 acres of uncultivated non-ag land. The storm during February brought 1.42 inches of rainfall to the area. Although the storm occurred 12 days before the applications of diuron, it is possible that storm runoff could have transported the chemical to the waterway where it remained until samples were collected. The exceedance in February was six times the trigger limit of 2 µg/L. The exceedance in March was likely residual from the large concentration of diuron that was in the water column in February. The exceedance of the WQTL for diuron in February was also associated with toxicity to *S. capricornutum*, as described below. The two exceedances of diuron in 2015 were the first occurrences for the site subwatershed; a new management plan for diuron at Terminous Tract Drain @ Hwy 12 has been instated due to the two exceedances. During 2016, focused outreach will occur in the Terminous Tract Drain @ Hwy 12 site subwatershed to address ongoing water quality impairments; members associated with the diuron exceedances were targeted and will be contacted.

Nitrate

Potential sources of nitrate in surface waters include runoff of fertilizer or organic matter from irrigated fields, leaking septic systems, waste-treatment facility effluent, and inputs from animal waste. These sources can move to surface waters through above ground runoff or shallow subsurface flows. Total Kjeldahl nitrogen (TKN) and ammonium in animal waste that enter surface waters can be converted to nitrate by nitrifying bacteria. Possible sources of animal waste in a waterbody include dairies, poultry operations, pasture, and/or wildlife. From years of movement of nitrate into groundwater, there is a significant amount of nitrate in the aquifers beneath the SJCDWQC region. Many of these aquifers are very shallow and many of the drains in the western portion of the Coalition region were constructed in the late 1800s to lower the water table and allow farming. More recently, tile drains have been placed in the area, and these further remove shallow groundwater from the subsurface to surface drainages. As a result, nitrate in shallow groundwater may now be intercepted by the field and surface drains resulting in exceedances of the WQTL for nitrate. Deeper wells contaminated with nitrate can be a source of fertilizer in irrigation water. Excessive nutrients can cause eutrophication of surface waters resulting in low DO and an inability to support healthy aquatic communities. Sources of nutrients, organic carbon, and low DO are difficult to identify. Because of their extreme solubility, nitrates in fertilizer could move to surface waters immediately after application although it is unlikely that applications in the spring would result in exceedances of the WQTL throughout the irrigation season. Nitrates may move past the root zone to the shallow subsurface (vadose zone) and move laterally to surface waters although the extent of this potential pathway is not known.

During the 2015 WY, a single exceedance of the WQTL for nitrate as N occurred in samples collected from Terminous Tract Drain @ Hwy 12 on December 4, 2014 (11 µg/L).

Water Column Toxicity

During the 2015 WY, samples collected from Terminous Tract Drain @ Hwy 12 were toxic to *C. dubia* and *S. capricornutum* during (Table 43).

C. dubia **Toxicity**

Terminous Tract Drain @ Hwy 12

Samples collected from Terminous Tract Drain @ Hwy 12 during NM in October 2014 were toxic to *C. dubia* (15% survival compared to the control; Table 43). Since the survival of the water flea was less than 50%, a TIE was conducted. The TIE results indicate that cationic metals and organophosphate insecticides were the causes for the toxicity. There was no Phase III TIE conclusion because all chemistry results were non-detect or there was no data in the ecoTox database for detected analytes to calculate TUs. The PUR data associated with the toxicity indicated there were 1,480 lbs of insecticides applied across 2,538 acres of tomato processing plants, blueberry, corn, and walnut crops. There was a detection of arsenic (6 µg/L) in the waterbody; however, an exceedance of the trigger limit for arsenic did not occur. The concentration detected in the water column, which has no data in the ecoTox database used for Phase III TIEs, may have contributed to the toxicity. This was the first toxicity to *C. dubia* in this site subwatershed since monitoring was initiated in 2005.

S. capricornutum **Toxicity**

Terminous Tract Drain @ Hwy 12

Samples collected from Terminous Tract Drain @ Hwy 12 during storm monitoring in February 2015 were toxic to *S. capricornutum* (21% growth compared to the control; Table 43). Since the algae growth compared to the control was less than 50%, a TIE was conducted. The TIE results indicate non-polar organics were the cause for the toxicity; a Phase III TIE confirmed that the concentration of diuron (12.0 µg/L) detected in the sample was the cause of toxicity. The PUR data associated with the toxicity indicate 33 applications totaling 2,802 lbs of herbicides were applied across 2,463 acres of alfalfa, blueberry, and as soil fumigation. Of these applications, a single application of diuron (400 lbs of AI) occurred on January 28, 2015. There was 1.42 inches of rainfall for this storm monitoring event; therefore, it is likely that the diuron detected in toxic sample was due to stormwater runoff. The toxicity to algae at Terminous Tract Drain @ Hwy 12 was the first since 2008.

Table 43. Zone 3: Drain @ Woodbridge, Empire Tract @ 8 Mile Rd, Staten Island Drain @ Staten Island Rd, Terminous Tract Drain @ Hwy 12.
MPM exceedances indicated by bolded red font.

Zone 3 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm	Nitrate + Nitrite as N, mg/L	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	Diuron, 2 µg/L	*C. dubia*, % control	*S. capricornutum*, % control
Drain @ Woodbridge Rd	Represented	NM	3/17/2015	3.75	1026						
Drain @ Woodbridge Rd	Represented	MPM	4/21/2015	5.12	883						
Drain @ Woodbridge Rd	Represented	NM	9/15/2015	2.69							
Empire Tract @ 8 Mile Rd	Represented	NM	3/17/2015	2.17	1163						
Empire Tract @ 8 Mile Rd	Represented	NM	8/18/2015	2.14	713						
Empire Tract @ 8 Mile Rd	Represented	NM	9/15/2015	2.00							
Rindge Tract Drain	Represented	NM	3/17/2015	1.30							
Rindge Tract Drain	Represented	NM	8/18/2015	1.30	714						
Staten Island Drain @ Staten Island Rd	Represented	NM	3/17/2015	0.99	1457						
Staten Island Drain @ Staten Island Rd	Represented	NM	9/15/2015	1.74	1142						
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	10/21/2014	6.26						15	
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	11/18/2014				290.9				
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	12/4/2014	4.83		11	1119.9				
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	1/20/2015		1263			0.074			
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	2/9/2015	5.68	1193		307.6		12.0		21
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	3/17/2015	6.29					2.5		
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	5/19/2015	6.71							
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	6/6/2015	5.03			461.1				
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	7/21/2015	3.58							
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	8/18/2015	4.20			435.2				
Terminous Tract Drain @ Hwy 12	Core	MPM, NM	9/15/2015	4.57							
Normal Monitoring Exceedances				19	9	1	5	1	2	1	1
Non-contiguous Waterbody Exceedances				0	0	0	0	0	0	0	0
Management Plan Monitoring Exceedances				NA	NA	NA	NA	0	0	0	0
Total Exceedances				19	9	1	5	1	2	1	1

MPM-Management Plan Monitoring
NM-Normal Monitoring
NA- Not applicable; no MPM conducted for constituent.

Zone 4: Bacon Island Pump @ Old River, East Orwood Tract Drain, Kellogg Creek along Hoffman Ln, Roberts Island @ Whiskey Slough Pump, and South McDonald Island Pump

The Roberts Island @ Whiskey Slough Pump Zone includes the Core site, Roberts Island @ Whiskey Slough Pump, and four Represented sites: Bacon Island Pump @ Old River, East Orwood Tract Drain, Kellogg Creek along Hoffman Ln, and South McDonald Island Pump. East Orwood Tract Drain and South McDonald Island Pump were new sites in the 2015 WY with no monitoring history.

During the 2015 WY, the Coalition conducted MPM at Roberts Island @ Whiskey Slough Pump for chlorpyrifos, diuron, water column toxicity to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca* in addition to monthly monitoring for the entire suite of constituents (as indicated in the 2014 MPU, Table 4). The Coalition also conducted MPM at Kellogg Creek along Hoffman Ln for sediment toxicity to *H. azteca* and Represented Site Monitoring at Bacon Island Pump @ Old River, East Orwood Tract Drain, and South McDonald Island Pump for chlorpyrifos, diuron, water column toxicity to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca*. Samples were not collected from East Orwood Tract Drain during the scheduled monitoring event in October 2014 because the Coalition had not yet received permission to access the sample location; monitoring resumed at the site in November as scheduled.

Table 44 includes all exceedances for Zone 4 for the 2015 WY.

Field Parameters and E. coli

In Zone 4, exceedances of the WQTLs for DO (36), pH (4), SC (24), and *E. coli* (7) occurred during monitoring in the 2015 WY (Table 44).

Dissolved Oxygen

During the 2015 WY, exceedances of the WQTL for DO occurred at all sites in Zone 4 except at Kellogg Creek @ along Hoffman Ln: Roberts Island @ Whiskey Slough Pump (11), Bacon Island Pump @ Old River (9), East Orwood Tract Drain (8), and South McDonald Island Pump (8) the exceedances ranged from 0.11 mg/L to 6.84 mg/L (Table 44). Bacon Island Pump @ Old River, East Orwood Tract Drain, Roberts Island @ Whiskey Slough Pump, and South McDonald Island Pump are all pump stations within the Delta islands and pumping is required to remove water from the agricultural 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 are common in this zone due to a lack of flow.

Specific Conductivity

During the 2015 WY, exceedances of the seasonal WQTL for SC occurred at every site except Kellogg Creek along Hoffman Ln. A total of 24 exceedances of the WQTL for SC occurred and ranged from 706 µS/cm to 1,275 µS/cm (Table 44).

E. coli

Seven exceedances of the WQTL for *E. coli* occurred during monitoring in the 2015 WY; all exceedances were from samples collected from Roberts Island @ Whiskey Slough Pump and ranged from 275 to 387

MPN/100 mL, with the exception of a significant spike of 1732 MPN/100 mL in September 2015 (Table 44). Exceedances of the WQTL for *E. coli* occurred during primarily storm and irrigation sampling events; therefore, storm and tailwater runoff could have potentially transported the bacteria into the waterbody.

Arsenic

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. 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). There are no registered products containing arsenic and therefore no associated PUR data.

In Zone 4, a single exceedance of the WQTL for arsenic (12 µg/L) occurred in samples collected during storm monitoring on February 9, 2015 from Roberts Island @ Whiskey Slough Pump. The storm event produced 1.42 inches of rainfall; the stormwater runoff may have contributed to the arsenic concentration in the waterbody.

Water Column Toxicity

During the 2015 WY, seven samples were toxic to *S. capricornutum*. Four of the toxic samples were collected in February, one in March and two in May.

The California Division of Boating and Waterways (DBW) treated the waterways with herbicides to control water hyacinth in the Delta Region encompassing Zone 4 from March 4, 2015 through November 30, 2015. The DBW primarily used glyphosate or 2, 4-D, which are both herbicides registered for aquatic use with California Environmental Protection Agency and the Department of Pesticide Regulation. These herbicide applications could have contributed to the toxicities that occurred in samples collected after February.

S. capricornutum **Toxicity**

Bacon Island Pump @ Old River Rd

Samples collected from Bacon Island Pump @ Old River Rd during storm monitoring on February 9, 2015 were toxic to *S. capricornutum* (9% growth compared to the control; Table 44). Since growth was less than 50%, a TIE was conducted. The TIE results indicated non-polar organics as the cause of toxicity. The Coalition did not collect samples for chemistry analysis during the same event and therefore a Phase III TIE could not be conducted. The PUR data indicate there were no reported applications that could be associated with the toxicity; the last reported applications of herbicides or copper that was potentially associated with the algae toxicity occurred in September 2014.

East Orwood Tract Drain

Samples collected from East Orwood Tract Drain during storm monitoring on February 9, 2015 were toxic to *S. capricornutum* (67% growth compared to the control). A TIE was not required since toxicity was greater than 50% growth compared to the control. The PUR data associated with the February toxicity indicate eight applications of 514 lbs herbicides across 376 acres of alfalfa, asparagus, and processing tomatoes from January 21, 2015 through February 5, 2015. Stormwater runoff may have transported herbicides to the waterway resulting in toxicity.

Samples collected from East Orwood Tract Drain during NM on May 19, 2015 were toxic to *S. capricornutum* (76% growth compared to the control). A TIE was not required since toxicity was greater than 50% algae growth compared to the control. The PUR data associated with the May toxicity indicate two applications on May 19, 2015. The applications totaled 440 lbs of herbicides applied across 316 acres of corn for fodder. The applications occurred during the peak of the irrigation season; therefore, irrigation tailwater runoff may have contributed to the toxicity. Due to the two toxicities, a management plan for *S. capricornutum* is now required at East Orwood Tract Drain.

Roberts Island @ Whiskey Slough Pump

Storm samples collected from Roberts Island @ Whiskey Slough Pump during MPM on February 9, 2015 were toxic to *S. capricornutum* (60% growth compared to the control). A TIE was not required since toxicity was greater than 50% growth compared to the control. The PUR data associated with the February toxicity indicate 150 applications of 4,006 lbs of herbicides (including one application of 505 lbs of copper) across 5,818 acres of alfalfa, wheat, and oat crops from January 12 through 29, 2015. Samples were also analyzed for copper during this monitoring event; there was a detection of copper (2.4 µg/L) that was not an exceedance of the hardness based WQTL. Sediment containing copper were potentially mobilized and transported to the site during the storm event and it is possible the detection of copper in the samples could have potentially contributed to the toxicity.

Samples collected from Roberts Island @ Whiskey Slough Pump during MPM on May 19, 2015 were toxic to *S. capricornutum* (75% growth compared to the control). A TIE was not required since toxicity was greater than 50% growth compared to the control. The PUR data associated with the May toxicity indicate 85 applications of 2,225 lbs of herbicides (including three applications of 55 lbs of copper) applied across 2,474 acres of almonds, asparagus, corn, wine grapes, rice, and tomatoes from March 27, 2015 through May 19, 2015. The Coalition analyzed for a suite of herbicides, including copper, in samples collected during the same event and there were no detections. The Coalition conducted focused outreach in this site subwatershed from 2011 through 2013.

South McDonald Island Pump

Storm samples collected from South McDonald Island Pump during NM on February 9, 2015 were toxic to *S. capricornutum* (44% growth compared to the control). A TIE for the February toxic sample indicated non-polar organics as the cause of toxicity. A Phase III TIE was not performed because the Coalition did not monitor for additional chemistry on the corresponding sampling date. The PUR data associated with the February toxicity indicate 18 applications of 349 lbs of herbicides across 305 acres of wine grapes, as non-ag, and as soil fumigants from January 23, 2015 through February 9, 2015.

Samples collected from South McDonald Island Pump during NM on March 17, 2015 were toxic to *S. capricornutum* (73% growth compared to the control). A TIE was not required since toxicity was greater than 50% growth compared to the control. There were no PUR data associated with the exceedance. Therefore, unreported applications of herbicides could have contributed to the toxicity. Due to two toxicities in the 2015 WY, a management plan is now required for South McDonald Island Pump for toxicity to *S. capricornutum*.

Table 44. Zone 4: Bacon Island Pump @ Old River, East Orwood Tract Drain, Kellogg Creek along Hoffman Ln, Roberts Island @ Whiskey Slough Pump, South McDonald Island Pump.

MPM exceedances indicated by bolded red font.

Zone 4 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and>8.5	SC, >700 µS/cm	*E. coli*, >235 MPN/100mL	Arsenic, 10 µg/L	*S. capricornutum*, % control
Bacon Island Pump @ Old River	Represented	NM	12/4/2014	4.15					
Bacon Island Pump @ Old River	Represented	NM	2/9/2015	4.90					9
Bacon Island Pump @ Old River	Represented	NM	3/17/2015	4.73					
Bacon Island Pump @ Old River	Represented	NM	4/21/2015	4.27					
Bacon Island Pump @ Old River	Represented	NM	5/19/2015	6.78					
Bacon Island Pump @ Old River	Represented	NM	6/16/2015	4.64					
Bacon Island Pump @ Old River	Represented	NM	7/21/2015	2.98	6.46	743			
Bacon Island Pump @ Old River	Represented	NM	8/18/2015	1.10		784			
Bacon Island Pump @ Old River	Represented	NM	9/15/2015	0.66					
East Orwood Tract Drain	Represented	NM	12/18/2014	3.55	6.46	1181			
East Orwood Tract Drain	Represented	NM	2/9/2015	3.87		1131			67
East Orwood Tract Drain	Represented	NM	3/17/2015	0.66					
East Orwood Tract Drain	Represented	NM	4/21/2015	4.66		1028			
East Orwood Tract Drain	Represented	NM	5/19/2015	5.22		919			76
East Orwood Tract Drain	Represented	NM	6/16/2015	0.11		980			
East Orwood Tract Drain	Represented	NM	7/21/2015	1.83		975			
East Orwood Tract Drain	Represented	NM	9/15/2015	0.12					
Kellogg Creek along Hoffman Ln	Represented	MPM	3/17/2015		8.89				
Roberts Island @ Whiskey Slough Pump	Core	NM	10/21/2014	5.71		1219			
Roberts Island @ Whiskey Slough Pump	Core	NM	11/18/2014			984	307.6		
Roberts Island @ Whiskey Slough Pump	Core	NM	12/4/2014	6.17		1158	275.5		
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	1/20/2015	6.24		1170			
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	2/9/2015	2.90		1254	344.8	12	**60**
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	3/17/2015	5.03		1037			
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	4/21/2015	3.83		1195	387.3		
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	5/19/2015	6.25		1164	325.5		**75**
Roberts Island @ Whiskey Slough Pump	Core	NM	6/16/2015	5.17	6.12	1143			
Roberts Island @ Whiskey Slough Pump	Core	NM, MPM	7/21/2015	3.81		1132			
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	8/18/2015	4.05		1275	275.5		

Zone 4 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and>8.5	SC, >700 µS/cm	*E. coli*, >235 MPN/100mL	Arsenic, 10 µg/L	*S. capricornutum*, % control
Roberts Island @ Whiskey Slough Pump	Core	MPM, NM	9/15/2015	5.23			1732.9		
South McDonald Island Pump	Represented	NM	1/20/2015	3.34					
South McDonald Island Pump	Represented	NM	2/9/2015	4.88		1001			44
South McDonald Island Pump	Represented	NM	3/17/2015						73
South McDonald Island Pump	Represented	NM	4/21/2015	6.84		722			
South McDonald Island Pump	Represented	NM	5/19/2015	6.47		706			
South McDonald Island Pump	Represented	NM	6/16/2015	5.16		728			
South McDonald Island Pump	Represented	NM	7/21/2015	5.91		754			
South McDonald Island Pump	Represented	NM	8/18/2015	4.29		868			
South McDonald Island Pump	Represented	NM	9/15/2015	4.79					
			Normal Monitoring Exceedances	36	4	25	7	1	5
			Non-contiguous Waterbody Exceedances	0	0	0	0	0	0
			Management Plan Monitoring Exceedances	NA	NA	NA	NA	NA	**2**
			Total Exceedances	36	4	25	7	1	7

MPM-Management Plan Monitoring
NM-Normal Monitoring
NA-Not applicable; no MPM conducted for constituent

Zone 5: Walthall Slough @ Woodward Ave

Walthall Slough @ Woodward Ave is the Core site in Zone 5 and the only location in the zone scheduled for monitoring.. During the 2015 WY, the Coalition conducted MPM for chlorpyrifos, HCH, and sediment toxicity to *H. azteca* in addition to monthly monitoring for the entire suite of constituents (as indicated in the 2014 MPU, Table 4). The site was dry in March 2015 (Table 14). Samples were collected from the site during non-contiguous water conditions in April 2015 (Table 15).

Table 45 includes all exceedances for Zone 5 for the 2015 WY.

Field Parameters and E. coli

In Zone 5, exceedances of the WQTLs for DO (5), SC (1), and *E. coli* (1) occurred during the 2015 WY (Table 45).

Dissolved Oxygen

Monitoring during the 2015 WY resulted in five exceedances of the WQTL for DO; the exceedances ranged from 0.72 mg/L to 4.86 mg/L (Table 45).

Specific Conductivity

Monitoring during the 2015 WY resulted in a single exceedance of the WQTL for SC in July 2015 (871 µS/cm; Table 45).

E. coli

During the 2015 WY, a single exceedance of the WQTL for *E. coli* (2419.6 MPN/100 mL, Table 45) occurred in samples collected in April 2015. Walthall Slough was non-contiguous during the April sampling event; the conditions of stagnant water, no flow and warm temperatures may have resulted in a higher concentration of bacteria.

Water Column Toxicity

Walthall Slough @ Woodward Ave

Samples collected on May 19, 2015 were toxic to *S. capricornutum* (78% growth compared to the control). A TIE was not required since toxicity was greater than 50% growth compared to the control. The PUR data associated with the toxicity indicate 97 applications of 3,577 lbs of herbicides applied over 2,978 acres of alfalfa, almond, bean, cherry, corn, tomato, and walnut orchards from April 11, 2015 through May 19, 2015. The Coalition also sampled for a suite of herbicides in samples collected during the same event and there were no detections. The Coalition conducted focused outreach in this site subwatershed from 2013 through 2015. This was the first toxicity to *S. capricornutum* in samples collected from Walthall Slough @ Woodward Ave since monitoring was initiated at the site in 2009.

Table 45. Zone 5: Walthall Slough @ Woodward Ave.
MPM exceedances indicated by bolded red font.

Zone 5 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm	*E. coli*, >235 MPN/100 mL	*S. capricornutum*, % control
Walthall Slough @ Woodward Ave	Core	MPM, NM	12/4/2014	4.86			
Walthall Slough @ Woodward Ave	Core	NM, Non-contiguous	4/21/2015			2419.6	
Walthall Slough @ Woodward Ave	Core	NM	5/19/2015				78
Walthall Slough @ Woodward Ave	Core	NM	6/16/2015	2.13			
Walthall Slough @ Woodward Ave	Core	MPM, NM	7/21/2015	1.41	871		
Walthall Slough @ Woodward Ave	Core	NM	8/18/2015	0.72			
Walthall Slough @ Woodward Ave	Core	MPM, NM	9/15/2015	0.95			
Normal Monitoring Exceedances				5	1	0	1
Non-contiguous Waterbody Exceedances				0	0	1	0
Management Plan Monitoring Exceedances				NA	NA	NA	0
Total Exceedances				5	1	1	1

NM-Normal Monitoring
MPM-Management Plan Monitoring
NA-Not applicable; no MPM conducted for constituent

Zone 6: Sand Creek @ Hwy 4 Bypass

The Contra Costa Zone consist of only one site, Sand Creek @ Hwy 4 Bypass, which is neither classified as a Core or Represented site. During the 2015 WY, the Coalition conducted MPM at Sand Creek at Hwy 4 Bypass for dieldrin and sediment toxicity to *H. azteca*. During two of the five scheduled events (August and September), the site was dry (Table 14).

Table 46 includes all exceedances for Zone 6 for the 2015 WY.

Field Parameters

During the 2015 WY, exceedances of the WQTLs for DO (2) and SC (3) occurred at Sand Creek @ Hwy 4 Bypass (Table 46).

Dissolved Oxygen

Monitoring during the 2015 WY resulted in two exceedances of the WQTL for DO (3.21 mg/L and 5.34 mg/L; Table 46). There was no observed flow during 2015 WY monitoring at the site; these no flow conditions most likely contributed to low DO in the waterbody.

Specific Conductivity

Monitoring during the 2015 WY resulted in three exceedances of the WQTL for SC; the exceedances were all much higher than the WQTL (700 µS/cm) ranging from 1679 µS/cm to 2068 µS/cm (Table 46). High concentrations of SC are common at Sand Creek @ Hwy 4 Bypass. The site is located in a growing urban community. Water for municipal and industrial use within the site subwatershed is supplied by Los Vaqueros Reservoir and a large portion of the water is used to irrigate suburban lawns and gardens. This water is then 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 46. Zone 6: Sand Creek @ Hwy 4 Bypass.
MPM exceedances indicated by bolded red font.

Zone 6 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm
Sand Creek @ Hwy 4 Bypass	NA	NM	3/17/2015		1679
Sand Creek @ Hwy 4 Bypass	NA	MPM	5/19/2015	4.75	1990
Sand Creek @ Hwy 4 Bypass	NA	MPM	6/16/2015	3.21	2068
Normal Monitoring Exceedances				2	3
Non-contiguous Waterbody Exceedances				0	0
Management Plan Monitoring Exceedances				NA	NA
Total Exceedances				2	3

MPM-Management Plan Monitoring
NM – Normal Monitoring
NA-Not applicable; no MPM conducted for constituent

Zone 7: Union Island Drain @ Bonetti Rd and Upper Roberts Island Drain

The Union Island Drain @ Bonetti Rd Zone includes the Core site, Union Island Drain @ Bonetti Rd, and one Represented site: Upper Roberts Island Drain. Both sites were new sites during the 2015 WY and no monitoring history had been previously established. Union Island Drain @ Bonetti Rd replaced both Grant Line Canal sites (Grant Line Canal @ Clifton Court Rd and Grant Line Canal near Calpack Rd) and management plans from the two sites were transferred to the Union Island Drain @ Bonetti Rd management plan.

During the 2015 WY, the Coalition conducted MPM at Union Island Drain @ Bonetti Rd for water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca* in addition to monthly monitoring for the entire suite of constituents. The Coalition also monitored for water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca* at Upper Roberts Island Drain based on management plans at the Core site and Represented Site Monitoring requirements.

Table 47 includes all exceedances for Zone 7 for the 2015 WY.

Field Parameters and E. coli

Exceedances of the WQTLs for DO (19), SC (18), and *E. coli* (4) occurred in Zone 7 (Table 47).

Dissolved Oxygen

During the 2015 WY, there were 19 exceedances of the WQTL for DO. Exceedances of the WQTL for DO occurred during all months of monitoring both sites in Zone 7 with the exception of April 2015 at Union Island Drain @ Bonetti Rd. The exceedances ranged from 0.54 mg/L to 4.98 mg/L (Table 47). Both Union Island Drain @ Bonetti Rd and Upper Roberts Island Drain are pump stations within the Delta islands and pumping is required to remove water from the agricultural drains. In most cases there is no flow in the drains unless the pumps are activated. Therefore, exceedances of the WQTL for DO are common in this zone due to a lack of flow. Furthermore, algal production and decay along with stagnant, warm water at these sites can contribute to low DO detections. Throughout the 2015 WY, there was overgrowth of water hyacinth at Union Island Drain @ Bonetti Rd, which potentially contributed to low DO measurements.

Specific Conductivity

Monitoring during the 2015 WY resulted in 18 exceedances of the WQTL for SC. Exceedances occurred during scheduled sampling events at Upper Roberts Island Drain and all but two events at Union Island Drain @ Bonetti Rd; exceedances ranged from 856 µS/cm to 2257 µS/cm (Table 47).

E. coli

During the 2015 WY, there were four exceedances of the WQTL for *E. coli*, all of which occurred at Union Island Drain @ Bonetti Rd. The exceedances ranged from 344.8 MPN/ 100 mL to >2419.6 MPN/ 100 mL (Table 47). Since both sites are pump stations, there was usually no flow unless the pumps were running; no flow conditions potentially contributed to the exceedances.

Arsenic

There were three exceedances of the WQTL for arsenic; all three exceedances occurred during NM at Union Island Drain @ Bonetti Rd. The exceedances occurred during storm sampling in February (24 µg/L), and during the peak months of the irrigation season in July (74 µg/L) and August (22 µg/L) 2015. There are no registered products containing arsenic and therefore no PUR data. Sampling crews noted large water hyacinth overgrowth at the sampling location all year and the plants had to be removed in order to submerge sample bottles during each event. It is possible that arsenic concentrations in the sediment were mobilized during plant removal.

Chlorpyrifos

Monitoring during the 2015 WY resulted in a single exceedance of the WQTL for chlorpyrifos. The exceedance occurred during NM on January 20, 2015 at Union Island Drain @ Bonetti Rd (0.077 µg/L; Table 47). There were no applications of chlorpyrifos 30 days prior to the exceedance. The most recent chlorpyrifos applications occurred on November 4, 2014 (94 lbs across 100 acres of asparagus). Union Island Drain @ Bonetti Rd has been placed into a management plan for chlorpyrifos.

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). 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.

During the 2015 WY, a single exceedance of the WQTL for simazine occurred in storm samples collected from Union Island Drain @ Bonetti Rd in February 2015 (4.5 µg/L; Table 47). Samples collected during the same sampling event were also toxic to *S. capricornutum* (61% growth compared to the control). The PUR data indicated there was no reported use of simazine in the site subwatershed and therefore applications of the chemical could not be sourced. The Coalition will query the PUR database again once all outstanding PUR is available. If there is additional information regarding this exceedance, the Coalition will submit the analysis in an addendum to the AMR on September 1, 2016.

Water Column Toxicity

During the 2015 WY, samples collected from Upper Roberts Island Drain were toxic to *C. dubia* during two monitoring events. Six samples collected from Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum*. Union Island Drain @ Bonetti Rd was overgrown with water hyacinth throughout the 2015 WY. During some sampling events, large water hyacinth were removed in order to successfully collect a sample; this likely stirred up sediment and any chemicals/metals bound to the sediment. The DBW water hyacinth control sprays in the Delta could have also contributed to toxicity to *S. capricornutum* in samples collected after February.

C. dubia Toxicity

Upper Roberts Island Drain

Samples collected on March 17, 2015 from Upper Roberts Island Drain during NM resulted in complete mortality to *C. dubia* (Table 47). The TIE for the March toxicity indicated non-polar organic compounds, specifically organophosphates, as the cause for toxicity. There was no Phase III TIE because the Coalition did not monitor for any other constituent during the corresponding sampling date. The PUR data associated with the toxicity indicated 23 applications of 420 lbs of organophosphates (chlorpyrifos, dimethoate, and cypermethrin) applied over 933 acres of alfalfa from February 23, 2015 through March 9, 2015.

Samples collected on May 19, 2015 from Upper Roberts Island Drain during NM were toxic to *C. dubia* (35% survival compared to the control; Table 47). Since the toxic samples resulted in less than 50% survival compared to the control, a TIE was performed. The samples lost all detectable toxicity prior to the test; therefore, no additional information could be attained from the TIE. The PUR data associated with the toxicity indicated 22 applications of 127 lbs of AI (cypermethrin, zinc phosphide, and methoxyfenozide) applied across 874 acres of alfalfa, almond, and tomatoes from March 9, 2015 through May 15, 2015. Due to the two toxicities, a management plan for toxicity to *C. dubia* is required for the Upper Roberts Island Drain site subwatershed.

S. capricornutum Toxicity

Union Island Drain @ Bonetti Rd

Samples collected during MPM on January 20, 2015 at Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (87% growth compared to the control). Since algal growth was greater than 50% compared to the control, a TIE was not required. The PUR data associated with the toxicity in January indicate 36 applications of 968 lbs of AI applied across 1,080 acres of mainly alfalfa crops. The January samples were also analyzed for herbicides; there were detections of diuron (0.031 µg/L; there were five applications of 226 lbs of diuron over alfalfa) and simazine (0.3 µg/L; there were no associated applications). The concentrations of both diuron and simazine potentially contributed to the toxicity.

Storm samples collected during MPM on February 9, 2015 at Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (61% growth compared to the control; Table 47). Since algal growth was greater than 50% compared to the control, a TIE was not required. The PUR data associated with the toxicity indicate 39 applications of 677 lbs of AI applied across 1,250 acres of alfalfa and wheat crops from January 14, 2015 through February 5, 2015. Stormwater runoff may was a detection of diuron (1.7 µg/L; there were five applications of 226 lbs of diuron over alfalfa), and an exceedance of the simazine WQTL (4.5 µg/L; there were no associated applications). The combined concentrations of these chemicals potentially contributed to the toxicity.

Samples collected during MPM on April 21, 2015 from Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (88% growth compared to the control; Table 47). Since algal growth was greater than 50% compared to the control, a TIE was not required. The PUR data associated with the toxicity indicate 60 applications of 3,882 lbs of AI applied across 2,816 acres of alfalfa, oat, and tomato crops from March 27, 2015 through April 21, 2015. A detection of diuron (0.38 µg/L; there were no associated applications of diuron) occurred during the April event; although it was not an exceedance of the WQTL, the detection could have contributed to the toxicity.

Samples collected during NM on June 16, 2015 from Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (76% growth compared to the control; Table 47). Since algal growth was greater than 50% compared to the control, a TIE was not required. The PUR data associated with the toxicity indicate 63 applications of 2,911 lbs of AI applied across 2,391 acres of tomato, asparagus, and rice from May 19, 2015 through June 14, 2015. Samples from the September monitoring event were also analyzed for other herbicides and metals and there were no detections.

Samples collected during MPM on July 21, 2015 from Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (67% growth compared to the control; Table 47). Since algal growth was greater than 50% compared to the control, a TIE was not required. The PUR data associated with the toxicity indicate six applications of 189 lbs of AI applied across 319 acres of alfalfa and corn from June 24 through July 11, 2015. There was a detection of copper in the July samples (0.37 µg/L; there were no associated applications of copper); although it was not an exceedance of the hardness based WQTL, the detection could have contributed to the toxicity.

Samples collected during NM on September 15, 2015 at Union Island Drain @ Bonetti Rd were toxic to *S. capricornutum* (41% growth compared to the control; Table 47). Since algal growth was less than 50%, a TIE was conducted. The TIE results indicated non-polar organics and/or cationic metals as the potential cause of toxicity. The PUR data associated with the toxicity indicate 13 applications of 728 lbs of AI applied over 651 acres of mostly tomato crop from August 22 through September 15, 2015. No other detections occurred in samples analyzed from the same event.

Sediment Toxicity

Upper Roberts Island Drain

Sediment samples collected from Upper Roberts Island Drain during NM on March 17, 2015 were toxic to *H. azteca* (34% survival compared to the control; Table 47). Since the toxic samples resulted in less than 80% survival compared to the control, an analysis for chlorpyrifos, pyrethroids, and piperonyl butoxide (PBO) was required. The samples had detections of bifenthrin (32 µg/kg), chlorpyrifos (4.2 µg/kg), lambda-cyhalothrin (4.6 µg/kg), and cypermethrin (2.7 µg/kg). The total organic carbon (TOC) concentration was 23,200 mg/kg dw with silt as the primary grain size (0.026 mm median grain size; Table 47).

Concentrations of chlorpyrifos and pyrethroids contributing to sediment toxicity can be evaluated using the toxic units (TUa) calculation based on the LC50s. The Coalition calculated the TUa for chlorpyrifos (0.04) and for pyrethroids (3.40; Table 48). Based on the chemistry results, there were sufficient TUs of pyrethroids present in the March sediment sample to account for the sediment toxicity in samples collected from Upper Roberts Island Drain. The PUR data associated with the *H. azteca* toxicity indicate that there were 205 lbs of chlorpyrifos applied across 497 acres of alfalfa from February 23 through March 9, 2015. There were also 33 lbs of AI pyrethroids (lambda-cyhalothrin and cypermethrin) applied across 1,192 acres of alfalfa from February 23, 2015 through March 16, 2015.

Table 47. Zone 7: Union Island Drain @ Bonetti Rd and Upper Roberts Island Drain.
MPM exceedances indicated by bolded red font.

Zone 6 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	SC, >700 µS/cm	*E. coli*, MPN/100mL	Arsenic, 10 µg/L	Chlorpyrifos, >0.015µg/L	Simazine, 2 µg/L	*C. dubia*, % control	*S. capricornutum*, % control	*H. azteca*, % control
Union Island Drain @ Bonetti Rd	Core	NM	10/21/2014	1.88	1107							
Union Island Drain @ Bonetti Rd	Core	NM	11/18/2014	4.98								
Union Island Drain @ Bonetti Rd	Core	NM	12/4/2014	3.93	1048	770.1						
Union Island Drain @ Bonetti Rd	Core	MPM, NM	1/20/2015	4.48	1907			0.077			**87**	
Union Island Drain @ Bonetti Rd	Core	MPM, NM	2/9/2015	2.76	1625		24		4.50		**61**	
Union Island Drain @ Bonetti Rd	Core	MPM, NM	3/17/2015	3.16	1069							
Union Island Drain @ Bonetti Rd	Core	MPM, NM	4/21/2015		1032						**88**	
Union Island Drain @ Bonetti Rd	Core	MPM, NM	5/19/2015	4.70	998							
Union Island Drain @ Bonetti Rd	Core	NM	6/16/2015	1.19	856	>2419.6					76	
Union Island Drain @ Bonetti Rd	Core	MPM, NM	7/21/2015	4.05	1068	344.8	74				**67**	
Union Island Drain @ Bonetti Rd	Core	MPM, NM	8/18/2015	0.58	997		22					
Union Island Drain @ Bonetti Rd	Core	MPM, NM	9/15/2015	0.54		>2419.6					41	
Upper Roberts Island Drain	Represented	NM	12/19/2014	4.72	1960							
Upper Roberts Island Drain	Represented	NM	1/20/2015	3.56	2000							
Upper Roberts Island Drain	Represented	NM	2/9/2015	3.39	2257							
Upper Roberts Island Drain	Represented	NM	3/17/2015	4.56	1947					0		34
Upper Roberts Island Drain	Represented	NM	4/21/2015	1.70	1791							
Upper Roberts Island Drain	Represented	NM	5/19/2015	1.15	1458					35		
Upper Roberts Island Drain	Represented	NM	8/18/2015	1.24	2002							
Upper Roberts Island Drain	Represented	NM	9/15/2015	0.96	1391							
			Normal Monitoring Exceedances	19	18	4	3	1	1	2	2	1
			Non-contiguous Waterbody Exceedances	0	0	0	0	0	0	0	0	0
			Management Plan Monitoring Exceedances	NA	NA	NA	NA	0	0	0	**4**	0
			Total Exceedances	19	18	4	3	1	1	2	6	1

MPM-Management Plan Monitoring
NM – Normal Monitoring
NA-Not applicable; no MPM conducted for constituent

Table 48. Sediment pesticide results for Upper Roberts Island Drain and associated Toxic Units (TU).
The table includes results associated with the environmental sample. Calculated Toxic Units (TUs) are rounded to the nearest 1000th. The percent TOC is converted to a numerical value for calculation. TUa formula: pesticide concentration/TOC/LC50 Organic Carbon. LC50 values from research by Amweg, et al., 2005 and Weston, et al., 2013.

Station Name	Sample Date	*H. azteca*, % Control	Sediment Pesticide	Concentration (µg/kg dw)	LC50 (µg/kg oc)	Sample TOC (mg/kg dw)	Total Organic Carbon	Calculated TUa
Upper Roberts Island Drain	3/17/2015	34%	Bifenthrin	32	520	23,200	2.32%	2.65
			Chlorpyrifos	4.2	4,160			0.04
			Lambda-cyhalothrin	4.6	450			0.44
			Cypermethrin	2.7	380			0.31
Total TUa of Chlorpyrifos								**0.04**
Total TUa of Pyrethroids								**3.40**

DW-Dry Weight
TUa-Toxic Unit for the acute endpoint.

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 to better understand the potential sources and toxicity of detected constituents, and 3) special studies where they are appropriate and cost effective.

The Coalition also notifies members of all exceedances of WQTLs 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, via 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.

Coalition actions taken to address exceedances of water quality objectives include 1) outreach, education, and collaboration, and 2) performance goals and schedules tracking (described in the sections below).

SUMMARY OF OUTREACH, EDUCATION, AND COLLABORATION ACTIVITIES

Outreach and education activities including member mailings, meetings, and collaboration activities are an integral part of the Coalition's monitoring program. The Coalition continues to provide information to growers through mailings, grower meetings, workshops, and County Agricultural Commissioner's meetings. During 2015, the Coalition held meetings to inform members of progress in achieving water quality goals, site subwatershed specific monitoring results, and management practices effective at reducing agricultural runoff to waterbodies. All outreach and education activities from 2015 are included in Table 49.

The Coalition also manages a website which serves as a clearing house for information on Coalition activities and outreach (http://www.sjdeltawatershed.org). Information provided through the website is useful to supplement regular grower contacts and meetings. On the Coalition's website, interested entities can find information on Farm Evaluation Plans, Nitrogen Management Plans, Sediment and Erosion Control Plans, monitoring results and current management plans, Best Management Practices (BMPs), upcoming grower workshops and meetings, and the ILRP.

Member Mailings

Member mailings in 2015 included newsletters, Farm Evaluations (FEs), Focused Outreach notifications, and Nitrogen Management Plans (NMPs).

Newsletters

The Coalition distributes a newsletter, annually, that is designed to keep growers informed of relevant Coalition news. In 2015, the newsletter was distributed in May and covered new waste discharge requirements for agriculture, chlorpyrifos and herbicide detections, and nitrogen management plans and reports.

Farm Evaluations

The Farm Evaluation is intended to gather information on general site conditions and management practices implemented by members to protect surface and groundwater quality. The Coalition mailed 2014 Farm Evaluations to growers continuously from December 31, 2014, with the last Farm Evaluation mailed on October 5, 2015.

Focused Outreach Notifications

On February 27, 2015, the Coalition mailed follow-up surveys to growers within the 6th priority site subwatershed, Drain @ Woodbridge Rd. The follow-up surveys were intended to document if new management practices were implemented (Table 49).

Nitrogen Management Plans

The Coalition mailed NMP worksheets to all growers within the Coalition. The worksheets were mailed as part of packet that contained information helping growers to complete their NMPs. These packets were mailed monthly, in batches, from January through September 2015 (Table 49).

Member Meetings

The Coalition coordinates with other entities to expand grower audiences, including growers who are not Coalition members. Meetings during 2015 included the annual Spray Safe meeting, meetings to assist growers with completing WDR requirements for FEs, NMPs, and the Annual Growers Meetings (listed below and organized by date).

Spray Safe Meetings

On February 17, 2015, 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. Approximately 300 growers attended the Spray Safe Meeting (Table 49).

Farm Evaluation Meetings

In 2015, the Coalition hosted drop in meetings in which Coalition staff were available to assist growers in completing Farm Evaluations. There were eight open meetings from January 20, 2015 through March 12, 2015 (Table 49).

Nitrogen Management Plan Meetings

In 2015, the Coalition hosted drop in meetings in which Coalition staff were available to assist growers in completing Nitrogen Management Plans. There were six open meetings from May 26, 2015 through June 30, 2015 (Table 49).

The Coalition participated in four meetings hosted by the Nitrogen Management Plan Technical Advisory Workgroup (NMP TAWG) on April 24, 2015, June 26, 2015, July 20, 2015, and September 21, 2015. Topics discussed in these meetings varied, but included nitrogen removal methodologies, public perspective, and reporting timelines.

Annual Member Meetings

The Coalition, in conjunction with the San Joaquin County Agricultural Commissioners' office, conducted several meetings in 2015 to discuss topics on pesticide use and new regulations, water quality exceedances, grower responsibilities, management practices and funding, and implications for members. The 2015 Summer/Fall Continuing Education Meeting was conducted on August 18, 2015 and covered new chlorpyrifos restrictions and pesticides in surface water. From November 18, 2015 through December 15, 2015, there were five Annual Grower Meetings (Table 49). Attendees were tracked by the Coalition and recorded to determine compliance with the requirement for members to attend at least one meeting per year. Growers were required to attend a total of six hours of continuing education meetings in order to obtain or renew a Restricted Materials Permit (chlorpyrifos is now a restricted chemical).

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. Throughout the 2015 WY, the Coalition collaborated with each of these entities as needed to follow-up on exceedances, provide BMP information, and to prepare documents as required in the WDR.

Table 49. SJCDWQC 2015 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
Stockton	2/17/2015	BMP Outreach and Education	Spray Safe Grower Meeting: ~300 attendees. Meeting topics included management practices and water quality, applicable laws and regulations, and new technologies.	San Joaquin Farm Bureau/ Terry Pritchard
Drain @ Woodbridge Rd	2/27/2015	Grower Notification/ Management Practice Tracking	6th Priority Follow-up Mailing: sent to 4 Drain @ Woodbridge Rd members. Mailing included follow up survey with instructions to complete and return the survey to the Coalition	Mike Wackman
Entire Coalition Region	1/20/2015 through 3/12/2015	Farm Evaluations	Drop-in Meetings to assist growers in completing their Farm Evaluations.	Coalition Staff
Central Valley	4/24/2015	Nitrogen Management Plans	Nitrogen Management Plan Technical Advisory Work Group: ~54 attendees. Public Stakeholder meeting to discuss N removed calculations and tools.	NMP TAWG
Entire Coalition Region	May	Grower Notification	Coalition Newsletter	Mike Wackman
Central Valley	6/26/2015	Nitrogen Management Plans	Nitrogen Management Plan Technical Advisory Work Group: Public Stakeholder meeting to discuss stakeholder perspectives.	NMP TAWG

AREA	DATE	CATEGORY	DETAILS	WHO
Entire Coalition Region	5/26/2015 through 6/30/2015	Nitrogen Management Plans	Drop-in Meetings to assist growers in completing their Nitrogen Management Plans.	Coalition Staff
Central Valley	7/20/2015	Nitrogen Management Plans	Nitrogen Management Plan Technical Advisory Work Group: ~54 attendees. Public Stakeholder meeting to discuss methodologies for N removal.	NMP TAWG
San Joaquin County	8/18/2015	BMP Outreach and Education	San Joaquin County Agricultural Commissioner 2015 Summer/Fall Continuing Education (CE) Meetings: discussed chlorpyrifos restrictions, pesticide container requirements, and pesticides in surface water.	Mike Wackman
Entire Coalition Region	1/31/2015 through 9/1/2015	Nitrogen Management Plans	Nitrogen Management Plan Worksheet Packets: Packets mailed to growers to aid in completion of Nitrogen Management Plans	Coalition Staff
Central Valley	9/21/2015	Nitrogen Management Plans	Nitrogen Management Plan Technical Advisory Work Group: Public Stakeholder meeting to discuss timelines for NMP Reporting.	NMP TAWG
Entire Coalition Region	12/31/2014 through 10/5/2015	Farm Evaluations	2014 Farm Evaluation Mailing: Growers in the Coalition region were mailed Farm Evaluations to gather information on general site conditions and management practices.	Coalition Staff
San Joaquin County	11/18/2015, 11/24/2015. 12/02/2015, 12/09/2015, 12/15/2015	BMP Outreach and Education	San Joaquin County Agricultural Commissioner Annual Gower Meeting: growers could only attend one of the five meetings. Reviewed monitoring results and status of management plan strategy. Also discussed updates in regulations and upcoming requirements.	Mike Wackman

MANAGEMENT PLAN ACTIVITIES

The Coalition conducts activities focused on improving water quality in site subwatersheds with management plans. These activities began with the approval of the original SJCDWQC Management Plan (approved on January 23, 2009) 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."

During the 2015 WY, the Coalition conducted management plan activities focused on 6th priority subwatersheds which were prioritized under the original Management Plan. The Coalition submitted a revised Surface Quality Management Plan (SQMP) which was approved on December 18, 2015 and revised its performance goals and measures to meet the 10 year compliance deadline prescribed in the Order. 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 sites where focused outreach occurred in 2015 (sixth priority site subwatersheds) and sites where focused outreach is planned in 2016.

2015 Focused Outreach Activities

Sixth Priority Subwatersheds (2014 – 2016)

The sixth priority site subwatershed is Drain @ Woodbridge Rd. Performance Goals for this site subwatershed were approved November 15, 2013 based on the original Management Plan (Table 50).

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 notifications 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 completed before March 30, 2014 (Table 50).

A total of four growers were contacted representing 1,553 acres or 32% 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 documentation of current management practices for 100% of targeted growers in the sixth priority site subwatershed. One hundred percent of survey responses were recorded in an Access database. A summary of new management practices to be implemented 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 22, 2014 meeting, the Coalition discussed management practices that could potentially reduce the impact of agriculture on downstream waterbodies. The meeting focused on water quality impairments, crops of targeted growers, and efficacy of the various practices. In addition to the meeting in January, the Coalition sent informational letters to the remaining members in the site subwatershed with a summary of the chlorpyrifos exceedances and information on management practices effective in reducing movement of chlorpyrifos and other chemicals from fields and into 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 documentation of newly implemented management practices. The Coalition received follow-up responses from one grower in 2015 (Table 50). The three remaining growers in the site subwatershed are either no longer active members of the Coalition or they transferred their parcels to the dairy program; therefore, follow-up surveys were not required from the three targeted growers.

Performance Goal 4: Evaluate effectiveness of the new management practices implemented.

The Coalition conducted MPM for chlorpyrifos at Drain @ Woodbridge Rd from 2014 through the 2015 WY. Due to effective management practices and improved water quality, the Coalition received approval to complete the management plan for chlorpyrifos on December 18, 2015. The remaining management plan constituents in the site subwatershed are constituents that are not easily sourced and will be addressed in a separate analyses. Therefore, MPM is not scheduled at Drain @ Woodbridge in the 2016 WY. The full analysis of the effectiveness of management practices for this site subwatershed can be found in the following Member Actions Taken to Address Exceedances section of this 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.

All Coalition activities related to outreach including mailings, grower meetings, and individual meetings for the Drain @ Woodbridge Rd site subwatershed are listed in Table 49.

Table 50. Performance Goals status for 2014 - 2016 sixth 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** (33%)
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	**Complete**: November 30, 2015
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**Complete**: May 1, 2015
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	**Complete**: 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.			

2016 Focused Outreach Site Subwatersheds

The Coalition Performance Goals in the SQMP (pages 68 through 72), reflect the steps necessary to guarantee that the objectives of the Management Plan program are met and that water quality improves in the Coalition region. The updated Performance Goals are:

1. Identify members with the potential to discharge to surface waters causing exceedances of WQTLs of constituents identified in the Order.
2. Review the member's Farm Evaluation Plan from the year prior to initiation of Management Plan activities (focused outreach and monitoring) to determine the number/type of management practices currently in place, and determine if additional practices are necessary.
3. Hold grower group meetings to inform members of water quality impairments and recommend additional practices as necessary.
4. Review the member's Farm Evaluation Plan from the year following initiation of Management Plan activities to document the number/type of new management practices implemented.
5. Evaluate the effectiveness of new management practices using water quality data.

These five goals reflect the current SJCDWQC SQMP process and successful completion will incorporate information generated from the Farm Evaluation surveys and NMP Summary Reports, as applicable. Moving forward, the Coalition will apply the updated Performance Goals, beginning with 2016 Focused Outreach site subwatersheds.

Beginning in 2016, the Coalition will conduct focused outreach in site subwatersheds based on the 2015 SQMP management plan process. Site subwatersheds will be addressed for focused outreach based on water quality results and on a case-by-case scenario where constituent compliance deadlines, pesticide use data, and Farm Evaluation results are analyzed to develop the targeted grower lists.

Due to continued water quality impairments related to chlorpyrifos, the Coalition will conduct 2016 Focused Outreach in the French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (Temple Creek) site subwatersheds (Table 7). Coalition meetings are scheduled to inform growers of local water quality concerns and BMPs effective at reducing water quality impairments. During the 2016 Focused Outreach meetings, representatives will assist growers in filling out their focused outreach surveys and determining BMPs for their parcels if necessary. The 2016 Focused Outreach meeting(s) are planned for early summer.

2016 Focused Outreach Subwatersheds (2016 – 2018)

The 2016 Focused Outreach site subwatersheds include French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (Temple Creek). Performance Goals for the 2016 Focused Outreach site subwatersheds were approved on November 24, 2015 in the 2015 Revised SQMP (Table 51).

Performance Goal 1: Identify members with the potential to discharge to surface waters causing exceedances of the WQTLs of management plan constituents.

The Coalition identified site subwatersheds with upcoming 10 year management plan completion deadlines for the constituents chlorpyrifos and diuron: French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (Temple Creek). The Coalition then identified the enrolled parcels that were associated with recent exceedances of the WQTLs for chlorpyrifos and diuron and compiled a targeted growers list.

Performance Goal 2: Review the member's FE from the year prior to initiation of Management Plan activities to determine number/type of management practices currently in place, and determine if additional practices are necessary.

The Coalition reviewed and evaluated member FEs to determine 2016 Focused Outreach targeted grower list in French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (Temple Creek) site subwatersheds. The FEs were used to determine current management practices and the need for additional management practices if necessary. The Coalition is in the process of scheduling meetings with targeted growers in these site subwatersheds to record their current management practices and any planned practices for the future.

Performance Goal 3: Hold meetings as necessary to inform members of water quality problems and recommend additional practices.

In 2016, the Coalition will hold 2016 Focused Outreach meetings for all targeted growers in each of the site subwatersheds. During the meetings, the Coalition will explain recurring water quality impairments and recommend additional management practices to growers. Growers will be asked to complete surveys to confirm current management practices and indicate management practices they plan to implement in the future.

Performance Goal 4: Review the member's FE from the year following initiation of Management Plan activities to document number/type of new management practices implemented.

Management practices implemented by members and reported on the FE surveys are stored an Access database. The Coalition will use FE survey responses from 2016 and 2017 to determine if any new management practices were implemented. The Coalition will also send follow-up surveys to targeted growers that request indication if new management practices were implemented.

Performance Goal 5: Evaluate effectiveness of new management practices.

The Coalition will conduct MPM at all 2016 Focused Outreach site subwatersheds during the 2016 WY and continue through the 2018 WY to assess changes in water quality and evaluate the efficacy of newly implemented management practices.

Table 51. Performance Goals status for 2016–2018 focused outreach site subwatersheds (French Camp Slough @ Airport Way, Lone Tree Creek @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd).

Performance Goal	Performance Measure	Outputs	Who	Annual Report Year		
				2016	2017	2018
1	Performance Measure 1.1. – Perform source analysis, when possible, of constituents causing exceedances of WQTLs.	Identification of members with the potential to discharge to surface waters and cause the observed exceedance.	MLJ-LLC	In Progress		
1	Performance Measure 1.2. – Identify 100% of all members that had the potential to discharge agricultural wastes to surface waters causing exceedances of WQTLs.	Report in Management Plan Progress Report the acreage represented by members with the potential for direct discharge.	MLJ-LLC	In Progress		
2	Performance Measure 2.1 – Review FE (or NMP or SECP as appropriate) from 100% of targeted members.	Received management practices recorded in Access database.	MLJ-LLC	In Progress		
2	Performance Measure 2.2 – Identify management practices used by members that are effective in preventing discharges to surface water.	Record of management practices in place that reduce agricultural impact on water quality.	SJCDWQC and MLJ-LLC	In Progress		
2	Performance Measure 2.3 – Identify management practices not currently used by members that can be recommended to prevent discharges to surface water.	Summary in the Management Plan Progress Report of management practices recommended to members.	SJCDWQC and MLJ-LLC	In Progress	X	
3	Performance Measure 3.1 – Provide monitoring results at meetings with members, and discuss practices that can be used to eliminate exceedances.	Agendas and/or reports of all meetings with members.	SJCDWQC and MLJ-LLC	Pending	X	X
3	Performance Measure 3.2 – When available and appropriate, provide information on the results of the management practices studies.	Provide reports from studies.	SJCDWQC	NA	NA	NA
3	Performance Measure 3.3 - Track attendance at meetings attended by the targeted members.	Report of members attending meetings provided in Management Plan Progress Report.	SJCDWQC and MLJ-LLC	Pending	X	X
4	Performance Measure 4.1 – Document management practice implementation, if needed, by targeted members.	Summary in the Management Plan Progress Report of management practices implemented by members at site subwatershed level.	MLJ-LLC	Pending		X
5	Performance Measure 5.1 – Monitoring at sites with exceedances after implementation of management practices to evaluate effectiveness.	MPM results in Monitoring Plan Progress Report.	MLJ-LLC	Pending	X	X

MEMBER ACTIONS TAKEN TO ADDRESS EXCEEDANCES

MANAGEMENT PRACTICES

The Coalition provides growers with information through mailings and meetings concerning various management practices that are designed to 1) manage discharge of irrigation tailwater, 2) reduce stormwater runoff, 3) manage spray applications, and 4) avoid mobilization of sediments to receiving waterbodies. The Coalition documents current, planned, and newly implemented practices based on survey results obtained from grower during focused outreach.

Table 52 includes a list of applicable management practices categorized by pesticide application or runoff management practices.

Table 52. 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

First through Sixth Priority Subwatersheds

The Coalition completed focused outreach for the first through sixth priority site subwatersheds. Focused outreach to document current management practices and tracking implementation of additional management practices is complete for site subwatersheds in the first priority set from 2008 through 2010, second priority set from 2010 through 2012, third priority set from 2011 through 2013, fourth priority from 2012 through 2014, fifth priority from 2013 through 2015, and sixth priority from 2014 through 2016 (Table 7).

Initial and follow-up surveys are complete for 100% of targeted growers in all site subwatersheds in the first through sixth 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 they planned to implement new management practices in 2009 for first priority, 2010 for second priority, 2012 for third priority, 2013 for fourth priority, 2014 for fifth priority, and 2015 for sixth 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, the 2013 MPUR (Pages 56-65) for third priority site subwatersheds, the 2014 MPUR (Pages 43-55) for fourth priority site subwatersheds, and in the 2015 Annual Report (Pages 137-149) for fifth priority site subwatersheds. A summary of implemented management practices for the sixth priority site subwatershed is presented below.

Sixth Priority Subwatershed Summary of Management Practices (2014-2016)

Focused outreach in the sixth priority site subwatershed, Drain @ Woodbridge Rd, began in 2014; focused outreach surveys and follow-ups were completed for 100% of targeted growers in 2015. Management practices were documented for 32% of the acreage identified as having direct drainage (Figure 15). A full summary of current management practices (2013) and planned management practices (2014) can be found in the 2015 Annual Report (Pages 150-153).

On February 27, 2015, follow-up survey postcards were sent to four targeted growers, farming 1,553 acres in the Drain @ Woodbridge site subwatershed, who indicated on their initial surveys that they planned to implement additional management practices by the end of 2014 (Table 53). Two of the four growers are now members of the dairy program and are no longer members of the Coalition, and one grower who is still a member, transferred the targeted parcels to the dairy program. Therefore, the analysis below includes follow-up results from the remaining targeted grower.

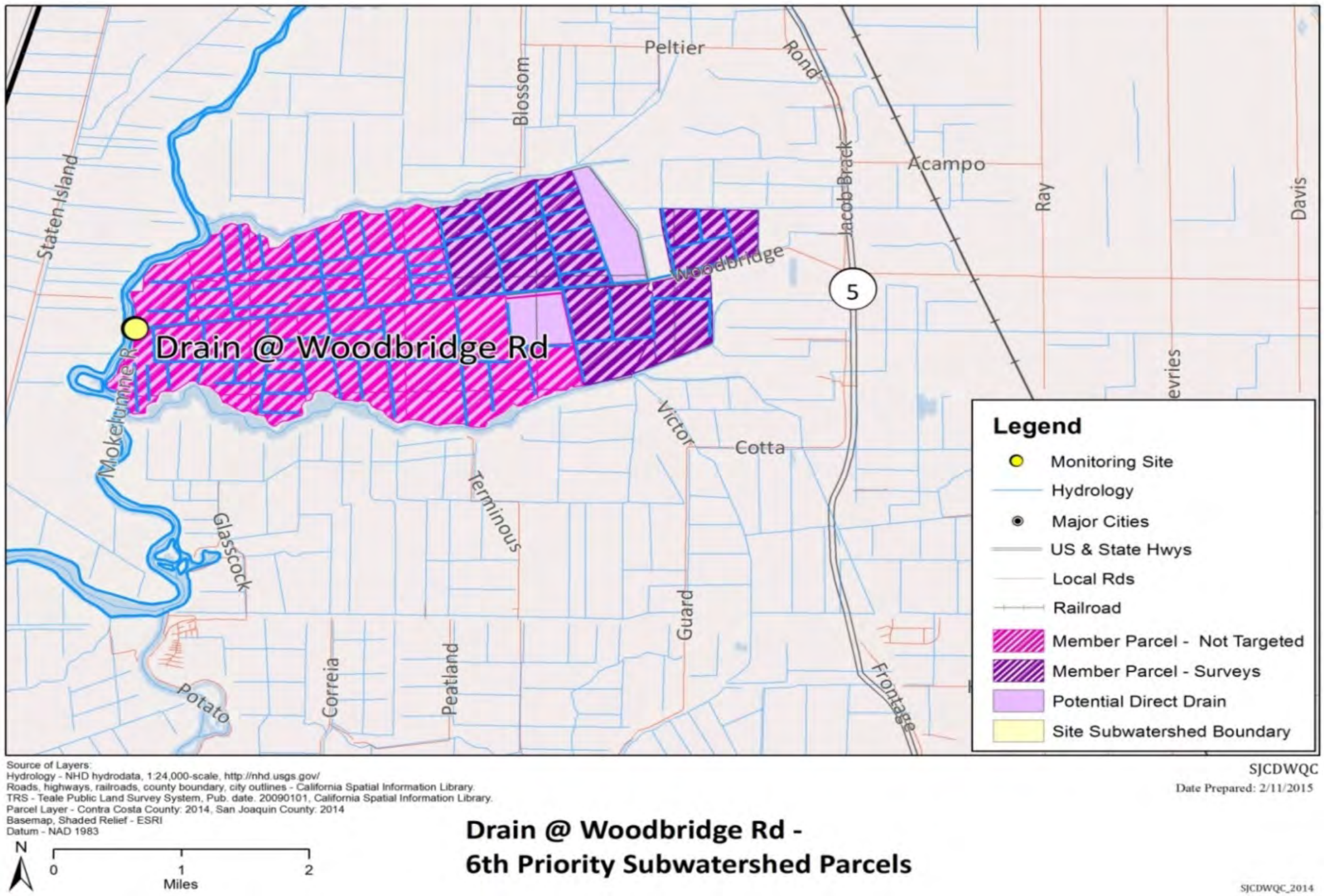
Table 53. Tally of members who participated in focused outreach in the Drain @ Woodbridge Rd sixth priority site subwatershed (2014-2016).

FOCUSED OUTREACH ACTIONS	DRAIN @ WOODBRIDGE RD
Targeted Growers	4
Completed Individual Meeting	4
Follow-up Contacts Required (new management practices planned to be implemented)	1
Completed Follow-up Contact	1
Growers with Newly Implemented Practices	1
Percent Complete (Initial Contact)	**100%**
Percent Complete (Follow-up Contact)	**100%**

Summary of Implemented Management Practices (2014)

One grower was required to complete a follow-up survey recording implemented management practices. The single targeted grower planned to implement one management practice in 2014. The follow-up survey for this grower indicated that the planned management practice, reducing water volumes using irrigation management, was implemented. In the 2015 WY, there were no exceedances of the WQTL for MPM constituents (chlorpyrifos). As a result of improved water quality, the Coalition received approval to complete the management plan for chlorpyrifos at Drain @ Woodbridge Rd on December 18, 2015.

Figure 15. Drain @ Woodbridge Ave member parcels with direct drainage potential.



2016 Focused Outreach

The Coalition will conducted Focused Outreach grower meeting in the summer of 2016. At the meeting, the Coalition will review FEs with growers and document current and planned management practices. The results and analysis of the status of current and planned management practices will be provided in the 2017 Annual Report. The Coalition will conduct MPM at all 2016 Focused Outreach site subwatersheds from 2016 through 2018 to assess changes in water quality and evaluate the effectiveness of newly implemented management practices.

STATUS OF SPECIAL PROJECTS

Special projects include MPM and TMDL compliance monitoring. During the 2015 WY, the Coalition monitored in accordance with the Basin Plan for the Sacramento and San Joaquin River Basins, the WDR (Order No. R5-2008-0005-R1), and the Coalition's SQMP (approved November 24, 2015).

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 in 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.

MANAGEMENT PLANS

When a management plan is developed for a site subwatershed, additional focused effort within the subwatershed is required. Management plan efforts include but are 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 is provided in the Coalition's SQMP as well as an explanation of how the Coalition prioritizes exceedances to meet the 10 year compliance requirements.

After three years of monitoring at a site with no exceedances of the WQTL for a specific management plan constituent, the Coalition may petition to the Regional Board for completion of the management plan. 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 54 includes the number of management plans petitioned and 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, August 22, 2014, and December 18, 2015. Table 55 lists current management plans per site, constituents approved for management plan completion, and reinstated management plans.

Table 54. Number of complete management plans and submittal/approval dates.

Submittal 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
8/6/2015	21	20	12/18/2015

Table 55. Status of SJCDWQC management plan constituents per active site subwatershed.
Active – X, Re-instated—light grey cell; and removed – dark grey cell.

Site Subwatershed	Most Recent Monitoring for Full Suite of Constituents	DO*	pH*	SC*	Ammonia	Nitrate/Nitrite	*E. coli*	Arsenic	Copper	Lead	Chlorpyrifos	DDE	DDT	Diazinon	Dieldrin	Diuron	Disulfoton	HCH, delta	Malathion	Simazine	*C. dubia* Toxicity	*P. promelas* Toxicity	*S. capricornutum* Toxicity	*H. azteca* Toxicity	Total Completed
Bacon Island Pump @ Old River	2014	X		X			X	X																	0
Bear Creek @ North Alpine Rd	2011	X					X																		3
Coyote Creek Tributary @ Jack Tone Rd	NA	X																							0
Drain @ Woodbridge Rd	2010	X		X			X	X																	1
Duck Creek @ Hwy 4	2012	X		X			X				X										X			X	3
East Orwood Tract Drain	NA	X		X																			X		0
Empire Tract @ 8 Mile Rd	2013	X		X			X	X																	0
French Camp Slough @ Airport Way	2015	X					X				X					X									8
Jahant Slough @ Cherokee Ln	NA	X																							0
Kellogg Creek along Hoffman Ln	2008		X	X			X					X	X												7
Littlejohns Creek @ Jack Tone Rd	2008	X					X																		4
Lone Tree Creek @ Jack Tone Rd	2008	X	X		X		X				X											X			6
Mokelumne River @ Bruella Rd	2015		X				X																X		3
Mormon Slough @ Jack Tone Rd	2008	X	X								X														2
Mosher Creek @ North Alpine Rd	NA	X																							0
Pixley Slough @ Furry Rd	NA	X																							0
Rindge Tract Drain	NA	X		X																					0
Roberts Island @ Whiskey Slough Pump	2015	X	X	X			X					X									X		X		3
Sand Creek @ Hwy 4 Bypass	2008	X		X			X					X	X											X	6
South McDonald Island Pump	NA	X		X																			X		0
Staten Island Drain @ Staten Island Rd	NA	X		X																					0
Terminous Tract Drain @ Hwy 12	2015	X		X		X	X	X			X					X								X	2
Union Island Drain @ Bonetti Rd	2015	X		X			X	X			X	X									X		X	X	0
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2008	X					X			X	X					X								X	5
Upper Roberts Island Drain	NA	X		X																	X				0
Walthall Slough @ Woodward Ave	2015	X		X		X	X																		3
Total Approved Management Plan Completion (Grey Cells)		**2**	**3**	**2**	**0**	**0**	**0**	**0**	**6**	**1**	**7**	**0**	**0**	**5**	**2**	**2**	**1**	**1**	**1**	**1**	**6**	**2**	**9**	**5**	**56**
Total Reinstated Management Plans (Light Grey Cells)		**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**
Total Active Management Plan Constituents Remaining (X)		**24**	**5**	**15**	**1**	**2**	**16**	**5**	**0**	**1**	**7**	**4**	**2**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**4**	**1**	**5**	**5**	**100**

*Field parameters will continue to be monitored during Assessment, Core and Management Plan Monitoring events.
[1] Management plans from Grant Line Canal sites were transferred to Union Island Drain @ Bonetti Rd.

Based on the evaluation outlined in the 2015 WY MPU, MPM was conducted for chlorpyrifos, copper, diuron, malathion, HCH, and water column and sediment toxicity at sites in the Coalition region during the 2015 WY.

Each site subwatershed is discussed in detail including water quality exceedances, sourcing of exceedances, outreach, and evaluation of management practice effectiveness in the High Priority Site Subwatershed Analysis (Appendices I and II).

Management Plans Completed Since 2004

Due to improved water quality, the Coalition has received approval for completion of 56 management plans (Tables 54 and 55). Additionally, the Coalition also completed five management plans at sites that are no longer active (four at Grant Line Canal @ Clifton Court and one at Grant Line Canal near Calpack Rd); the five completed management plans are not included in the total count. Of the 56 constituents completed from active site subwatersheds, only one management plan was reinstated due to an exceedance of WQTL for DO (Lone Tree Creek @ Jack Tone Rd) during monitoring in the 2015 WY (Table 55).

Based on the WDR, monitoring for TDS is no longer required. In the 2015 SQMP, the Coalition requested to place all site subwatersheds that were previously in a management plan for TDS into a management plan for SC (approved November 24, 2015).

Historically, the Coalition applied the most conservative trigger limits to DO and SC measurements. On July 1, 2014, the Coalition submitted an amendment to the 2008 Management Plan (approved with the SQMP on November 24, 2015) that proposed to apply the Basin Plan DO and SC objectives to applicable waterbodies in the Coalition region. The Coalition requested to utilize the WQTLs DO based on criteria described in the Fourth Edition of the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins (Page III-5), and the objectives for SC outlined in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Basin Plan (Table 2, Page 13). The approval of the Management Plan amendment included utilizing the lower DO trigger limit of 5 mg/L 'warm' waterbodies and or waterways not considered a resource for fisheries, and utilizing the seasonal criteria of 700 µS/cm from April through August, and 1,000 µS/cm from September through March for SC.

Based on the November 24, 2015 approval, the Coalition applied the lower DO trigger limit of 5 mg/L to all existing data for 10 monitoring sites within the SJCDWQC boundary. The Coalition also applied the seasonal criteria of 700 µS/cm from April through August, and 1,000 µS/cm from September through March to all existing data for all monitoring sites within the SJCDWQC boundary. The original exceedances for DO and SC that were removed due to the changes to the WQTLs can be referenced in Appendix IX, Table IX-2, organized alphabetically by site. Table 56 includes the totals of the overall changes in number of exceedance counts. The approved WQTLs will be utilized in all future assessments of DO and SC exceedances at sites in the SJCDWQC.

Table 56. Changes to exceedance counts of DO and SC after applying new WQTLs.
Values in table reflect results from all present and historical monitoring data and sites.

Constituent	Reported Exceedances (thru Sept 2015)	Exceedances Removed due to new WQTL	Remaining exceedances
DO	759	141	618
SC	531	93	438

On February 12, 2016, the Coalition sent an amendment to the MPU to the Regional Board indicating changes to Coalition MPM schedule based on the updated definition of sediment toxicity as defined within SWAMP protocol. The SWAMP protocol indicates that sediment toxicity should be evaluated based on the following criteria: 1) sediment samples resulting in 80% survival compared to the control, or above, should not be considered toxic and 2) sediment samples resulting in 79% survival compared to the control or below should be considered toxic if they are also considered statistically significant.

The Coalition reviewed all past reported sediment toxicity results and evaluated sediment toxicity management plans on a case-by-case basis. In some instances, removing a sediment toxicity result affected the management plan status of a site subwatershed. Table 57 below includes the site subwatershed where a management plan was no longer required based on these changes. Appendix IX, Table IX-1 includes a table of all past reported sediment toxicity results that are no longer considered toxic.

Table 57. SJCDWQC changes to sediment toxicity management plans based on the SWAMP protocol.

Site	Site Type	Management Plan Updates
Upper Roberts Island Drain	Represented	No management plan required; one toxicity remaining.

Table 58 is a tally of exceedance counts from 2004 through September 2015. Table 59 is a tally of exceedance counts from the 2015 WY. In both Tables 58 and 59, cells with blue highlights indicate constituents that are currently in management plans. In Table 58, dark grey cells indicate sites/constituents where management plans were approved for completion and light grey cells indicate sites/ constituents where management plans were previously completed but were reinstated due to recent exceedances. In Table 59, green highlights indicate new sites/constituents that have been added to management plans and light green highlights indicate sites/ constituents previously completed management plans but were reinstated due to exceedances during the 2015 WY.

Table 58. SJCDWQC exceedance tally for active site subwatersheds based on all results through September 2015.

Sites 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). Management plan constituents are highlighted blue, completed management plans are highlighted dark grey, and reinstated managements are highlighted in 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	Ammonia	Nitrate as N	Nitrate + Nitrite as N	*E. coli*	Arsenic	Copper Dissolved†	Copper Total†	Lead	Molybdenum	Azinphos methyl	Carbofuran	Chlorpyrifos	Cypermethrin	DDD (p,p')	DDE (p,p')	DDT (p,p')	Diazinon	Dichlorvos	Dieldrin	Dimethoate	Disulfoton	Diuron	Endrin	HCH, delta	Malathion	Methidathion	Methomyl	Methyl parathion	Thiobencarb	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Bacon Island Pump @ Old River	17	2	3	1			3	2				1													1										1	1	
Bear Creek @ North Alpine Rd	27	2					2								3													3									
Coyote Creek Tributary @ Jack Tone Rd	4	1																																			
Drain @ Woodbridge Rd	21		15				2	14							1																						
Duck Creek @ Hwy 4	25	3	1				7		1						20					1								1						7		3	3
East Orwood Tract Drain	8	1	6																																	2	
Empire Tract @ 8 Mile Rd	15		7				2	7																											1	1	
French Camp Slough @ Airport Way	27	7		1			42			12	2		1	1	14					2		2	1		4				1			2	1	2		3	2
Jahant Slough @ Cherokee Ln	3																																				
Kellogg Creek along Hoffman Ln[1]	2	17	3		1		4			3					1			3	2															2	1	4	6
Littlejohns Creek @ Jack Tone Rd	8	3*					6		2	5				1	9					1															1	5	1*
Lone Tree Creek @ Jack Tone Rd	6	6		4			26			7	1				10	1		1	1	2					3							2	1	1	2	7	
Mokelumne River @ Bruella Rd	5	15					6			3									1															5		14	
Mormon Slough @ Jack Tone Rd	20	15					1								9																1		1	2		4	
Mosher Creek @ North Alpine Rd	1																																				
Pixley Slough @ Furry Rd	1																																				
Rindge Tract Drain	2		1																																		
Roberts Island @ Whiskey Slough Pump[2]	34	1	40			1	12	1													1													1	1	4	
Sand Creek @ Hwy 4 Bypass	17		68				17								2		1	5	3	2		6		3		1				1				3	1	3	13
South McDonald Island Pump	8		6																																	2	
Staten Island Drain @ Staten Island Rd	2		2																																		
Terminous Tract Drain @ Hwy 12[3]	78	1	44			2	23	8							4				1						2			1						1	1	5	2
Union Island Drain @ Bonetti Rd	11		10				4	3							1																		1			6	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	4	1	1				10		2	5	2			1	22			1							4				1			3	2	5		5	7
Upper Roberts Island Drain	8		8																															2			1
Walthall Slough @ Woodward Ave	48		2	1		7	7								2			1									3									2	1
Grand Total	**402**	**73**	**217**	**7**	**1**	**10**	**174**	**35**	**5**	**35**	**5**	**1**	**1**	**3**	**98**	**1**	**1**	**11**	**8**	**8**	**1**	**8**	**1**	**3**	**14**	**1**	**3**	**5**	**2**	**1**	**1**	**7**	**6**	**31**	**9**	**71**	**36**

[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.

Management Plans Implemented in 2016

As a result of monitoring from the 2015 WY, several new site/constituent specific management plans are required or were reinstated. New management plans were most common for the field parameters, DO and SC; the new sites with no past monitoring data account for the most new management plans, including DO and SC. Reinstated managements include only DO at Lone Tree Creek @ Jack Tone Rd due to a single exceedance during the 2015 WY (Table 59).

Table 59. SJCDWQC exceedance tally based on 2015 WY monitoring results.
Sites 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 cells are new management plans; blue cells are constituents already in a management plan; light green cells are reinstated management plans due to 2015 WY exceedances. The tally only includes field duplicate exceedances if no exceedance occurred in the environmental sample.

	F			I		B	M	P			T			
Site Name	DO	pH	SC	Ammonia	Nitrate + Nitrite	*E. coli*	Arsenic	Chlorpyrifos	Diuron	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Bacon Island Pump @ Old River	9	1	2										1	
Bear Creek @ North Alpine Rd	11													
Coyote Creek Tributary @ Jack Tone Rd	4	1												
Drain @ Woodbridge Rd	3		2											
Duck Creek @ Hwy 4	4		1					2						
East Orwood Tract Drain	8	1	6										2	
Empire Tract @ 8 Mile Rd	3		2											
French Camp Slough @ Airport Way	6			1		4		1	1					
Jahant Slough @ Cherokee Ln	3													
Kellogg Creek along Hoffman Ln		1												
Littlejohns Creek @ Jack Tone Rd	1													
Lone Tree Creek @ Jack Tone Rd	1													
Mokelumne River @ Bruella Rd		3											3	
Mormon Slough @ Jack Tone Rd	4	3						1						
Mosher Creek @ North Alpine Rd	1													
Pixley Slough @ Furry Rd	1													
Rindge Tract Drain	2		1											
Roberts Island @ Whiskey Slough Pump	11	1	10			7	1						2	
Sand Creek @ Hwy 4 Bypass	2		3											
South McDonald Island Pump	8		6										2	
Staten Island Drain @ Staten Island Rd	2		2											
Terminous Tract Drain @ Hwy 12	9		2		1	5		1	2		1		1	
Union Island Drain @ Bonetti Rd	11		10			4	3	1		1			6	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	1							2						
Upper Roberts Island Drain	8		8								2			1
Walthall Slough @ Woodward Ave	5		1			1							1	
Grand Total	**118**	**11**	**56**	**1**	**1**	**21**	**4**	**8**	**3**	**1**	**3**	**0**	**20**	**1**

Evaluation of Management Practice Effectiveness

Since the initiation of focused outreach, growers have implemented new management practices in first through sixth priority site subwatersheds listed in Table 60. In addition, water quality results were collected for two or more years during MPM (Table 60). The Coalition assesses monitoring results to evaluate the effectiveness of current and newly implemented management practices. The following evaluation of management practice effectiveness includes the first through sixth priority site subwatersheds.

Table 60. Years of MPM and current and newly implemented management practices in first through sixth priority site subwatersheds.

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	2009-2015
	Lone Tree Creek @ Jack Tone Rd	2008	2009-2010, 2012	2009-2015
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	2008	2009-2010, 2012	2009-2015
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	2010-2015
Third (2011-2013)	French Camp Slough @ Airport Way	2010	2011	2011-2015
	Mokelumne River @ Bruella Rd	2010	2011	2011-2015
	Terminous Tract Drain @ Hwy 12	2010	2011	2011-2015
Fourth (2012-2014)	Kellogg Creek along Hoffman Ln	2011	2012	2012-2015
	Mormon Slough @ Jack Tone Rd	2011	2012	2012-2015
	Sand Creek @ Hwy 4 Bypass	2011	2012	2012-2015
Fifth (2013-2015)	Bear Creek @ North Alpine Rd	2012	2013	2013-2015
	Roberts Island @ Whiskey Slough Pump	2012	2013	2013-2015
	Walthall Slough @ Woodward Ave	2012	2013	2013-2015
Sixth (2014-2016)	Drain @ Woodbridge Rd	2013	2014	2013-2016

MPM-Management Plan Monitoring

Summary of Management Practices

As part of the Coalition's Management Plan process, all management practices implemented by members are documented in FEs, NMPs, SECPs, and Focused Outreach surveys. Practices implemented by growers are divided into two groups, runoff management and pesticide application management. Management practices specific to runoff management include: installing retention ponds or holding basins, installing sprinkler or micro spray irrigation, reducing runoff water volume, implementing center grass rows, grass waterways or grass filter strips, and treating runoff water with Polyacrylamide (PAM) or other materials. Management practices specific to pesticide application management includes: reducing the use of products containing chemicals found in exceedances of WQTLs (i.e. chlorpyrifos and diuron).

From 2008 through the 2015 WY, the Coalition addressed water quality impairments by targeting growers for focused outreach. The total number of targeted growers and newly implemented management practices are included in (Table 61). Due to continued exceedances of the WQTL for chlorpyrifos, additional focused outreach occurred for 25 growers within first priority sites as well as Littlejohns Creek @ Jack Tone Rd (second priority) during 2010 and 2012 (Tables 61 and 62).

Four members farming 1,553 acres were targeted for focused outreach within the sixth priority Drain @ Woodbridge Rd site subwatershed (Table 61). Three of the four targeted growers did not return follow up surveys or implement additional practices because they are either no longer members of the Coalition or they transferred their enrolled parcels to the diary program and therefore follow-up surveys were not required. The single targeted grower who remains in the Coalition and returned a follow-up survey implemented the planned management practice documented on their survey, reduce water volumes to prevent runoff into the nearby waterbody. This management practice was applied to 47% (732 acres) of the targeted acreage in the Drain @ Woodbridge site subwatershed. Reducing water runoff volumes through irrigation management, accounted for 61% of the targeted acreage in first through sixth priority site subwatersheds (Table 62). Members in these site subwatersheds primarily reduced the use of pesticides, such as chlorpyrifos, across 23,375 acres (65% targeted acreage). The third most commonly implemented management practice was the installation of sprinkler or micro irrigation systems, which was implemented on 11,342 acres in the first through sixth priority site subwatersheds.

Table 61. Percentage of new management practices for first through sixth 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)	Total[1]
# of Targeted Members	112	20	29	40	22	4	227
# Members with New Practices	54	17	28	33	17	1	150
Percent of Contacted Members with New Practices	48%	85%	97%	90%	77%	25%	66%
Acreage of Targeted Members	15,183	6,496	6,482	2,307	3,763	1,553	35,784
Acreage with New Practices	8,282	6,256	6,463	2,005	2,583	732	26,321
Percent of Targeted Acreage with New Practices	55%	96%	94%	93%	69%	47%	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 62. First through sixth 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)	Sixth Priority (2013-2015)	Sum of Targeted Acreage	Percent of Targeted Acreage
Targeted Acres	15,183	6,496	6,482	2,307	3,763	1,553	35,784	NA
Management Practices								
Installation of retention pond / holding basin / return systems	704	87	205	0	0	0	996	3%
Installation of sprinkler or micro irrigation when an option	4,998	1,643	3,509	765	427	0	11,342	32%
Reduce runoff water volumes using irrigation management	4,376	6,948	5,892	1,245	2,674	732	21,867	61%
Reduce use of the pesticide types found in exceedance	8,398	6,521	4,460	1,523	2,473	0	23,375	65%
Use of center grass rows, grass waterways, or grass filter strips	2,310	2,572	2,130	133	366	0	7,511	21%
Treat runoff waters with PAM or other materials	0	1,748	0	0	766	0	2,514	7%

Beginning in 2009, the Coalition conducted MPM to evaluate the effectiveness of newly implemented management practices. Management plan constituents monitored during the 2015 WY include: organophosphates (chlorpyrifos and diazinon), herbicides (diuron and simazine), and toxicity (water column toxicity to *C. dubia* and *S. capricornutum,* and sediment toxicity to *H. azteca*). Since 2009, monitoring results indicate the number of exceedances of these constituents has significantly decreased (Table 63 and Table 64). The improved water quality in the first through sixth priority site subwatersheds, where focused outreach is complete, demonstrates the effectiveness of the Coalition's Management Plan. Due to the implementation of new management practices by growers aimed at reducing the offsite movement of constituents, the Coalition has completed 59 management plans from site subwatersheds within the first through sixth priorities.

Table 63 and Table 64 include the number of exceedances per year (from 2006 through the 2015 WY) and the ratio of the number of exceedances relative to the number of samples collected (as a percentage) for the first through sixth priority site subwatersheds; the percentage is graphed in Figures 16 and 17. The number of samples collected for these constituents varied from year to year due to changes in the monitoring schedule. A summary of results for each constituent is provided below for the first through sixth priority site subwatersheds.

Table 63. Exceedances, samples, and pounds AI applied for chlorpyrifos, diazinon, copper, diuron, and simazine in first through sixth priority site subwatersheds.
PUR data only complete through July 2015 for San Joaquin County; PUR data are complete through September 2015 for all other counties.

	CHLORPYRIFOS				DIAZINON				COPPER[1]				DIURON				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
2006	14	84	17%	79,861	1	84	1%	5,807	9	35	26%	375,363	0	66	0%	47,715	0	55	0%	42,666
2007	15	123	12%	61,061	4	112	4%	3,807	22	76	29%	336,256	7	113	6%	26,158	2	95	2%	40,935
2008	30	125	24%	40,071	3	109	3%	4,442	11	121	9%	247,351	4	109	4%	13,500	2	105	2%	23,676
2009	8	55	15%	70,681	0	34	0%	2,789	0	44	0%	280,211	0	22	0%	16,269	0	22	0%	36,721
2010	13	93	14%	57,761	0	67	0%	7,741	2	73	3%	312,303	0	40	0%	8,066	0	38	0%	18,926
2011	15	91	16%	27,168	0	70	0%	2,719	2	92	2%	284,339	0	52	0%	28,413	0	50	0%	28,356
2012	1	80	1%	41,178	0	43	0%	2,989	1	33	3%	266,613	1	20	5%	13,417	0	14	0%	16,533
2013	3	92	3%	41,494	0	28	0%	2,917	0	40	0%	280,305	0	30	0%	28,897	0	24	0%	16,683
2014 WY	0	65	0%	28,824	0	32	0%	3,252	0	36	0%	258,907	1	29	3%	3,954	1	27	4%	5,854
2015 WY	7	96	7%	26,507	0	60	0%	4,950	0	26	0%	344,651	3	72	4%	8,299	1	60	0%	6,922
Total	**106**	**904**	**12%**	**474,606**	**8**	**639**	**1%**	**41,413**	**47**	**576**	**8%**	**2,986,299**	**16**	**553**	**3%**	**194,688**	**5**	**490**	**1%**	**237,272**

[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).

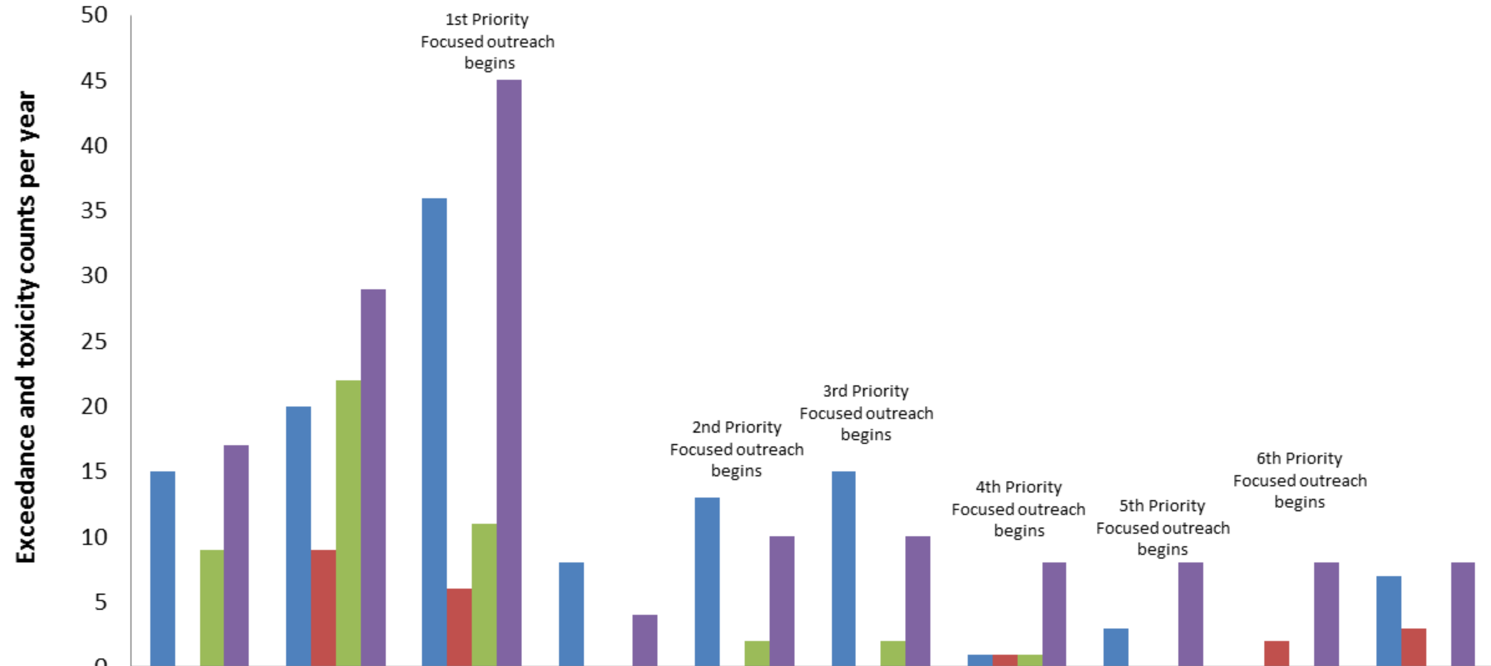
Table 64. Toxicity count and samples collected for toxicity analysis in the first through sixth priority site subwatersheds.

	C. DUBIA TOXICITY			*S. CAPRICORNUTUM* TOXICITY			*H. AZTECA* TOXICITY		
YEAR	Toxicities	Samples[1]	% Toxic	Toxicities	Samples[1]	% Toxic	Toxicities	Samples[1]	% Toxic
2006	8	85	9%	1	80	1%	8	20	40%
2007	5	117	4%	13	115	11%	11	31	35%
2008	8	113	7%	30	119	25%	7	30	23%
2009	2	34	6%	1	26	4%	1	2	50%
2010	1	54	2%	1	55	2%	8	14	57%
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 WY	1	34	3%	7	42	17%	0	22	0%
2015 WY	1	65	2%	7	70	10%	0	22	0%
Total	**28**	**619**	**5%**	**64**	**672**	**10%**	**55**	**202**	**27%**

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

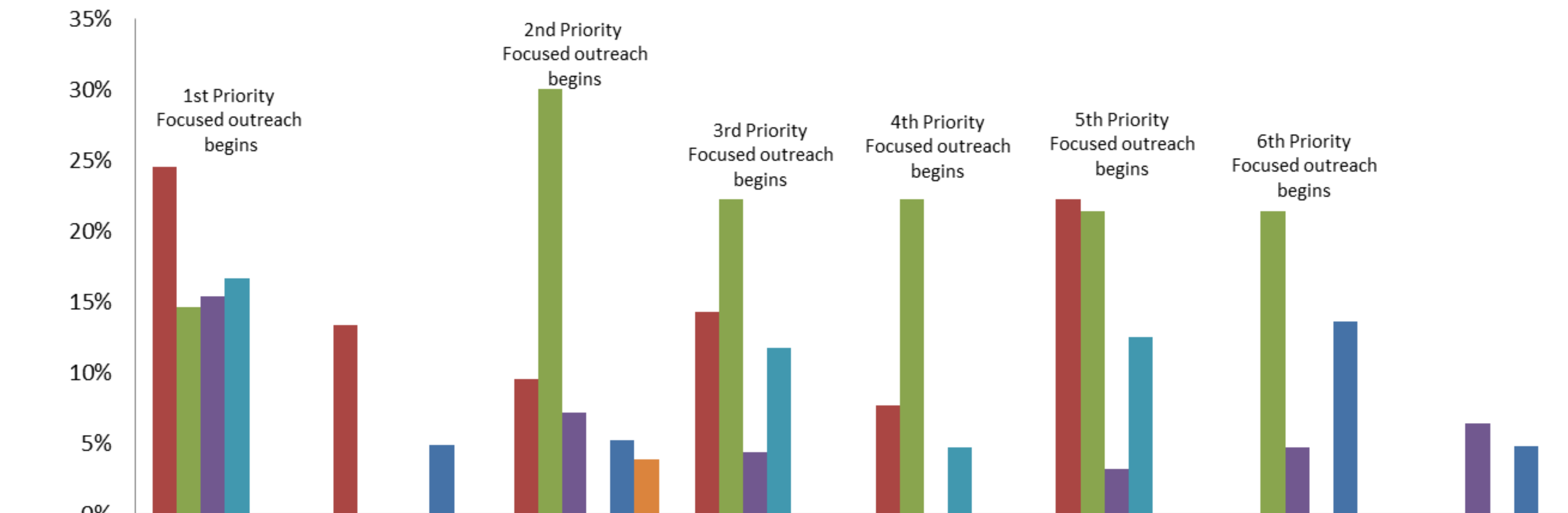
Figure 16. Number of exceedances of applied constituents and toxic samples from 2006 through September 2015 in first through sixth priority site subwatersheds.

Organophosphates include results of chlorpyrifos and diazinon. Herbicides include results of diuron and simazine. 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	2015
Organophosphates	15	20	36	8	13	15	1	3	0	7
Herbicides	0	9	6	0	0	0	1	0	2	3
Copper	9	22	11	0	2	2	1	0	0	0
Toxicity	17	29	45	4	10	10	8	8	8	8

Figure 17. Percentage of toxicity relative to the number of samples collected by priority since focused outreach began in first through sixth priority site subwatersheds.



	2008	2009	2010	2011	2012	2013	2014	2015
Priority 1	25%	13%	10%	14%	8%	22%	0%	0%
Priority 2	15%	0%	30%	22%	22%	21%	21%	0%
Priority 3	15%	0%	7%	4%	0%	3%	5%	6%
Priority 4	17%	0%	0%	12%	5%	13%	0%	0%
Priority 5	0%	5%	5%	0%	0%	0%	14%	5%
Priority 6	0%	0%	4%	0%	0%	0%	0%	0%

Chlorpyrifos

Management plans for chlorpyrifos were implemented within all first through sixth priority site subwatersheds, with the exception of Mokelumne River @ Bruella Rd subwatershed where no exceedances of the WQTL has occurred. Since 2006, 12% of the samples collected at first through sixth priority site subwatersheds resulted in exceedances of the WQTL for chlorpyrifos (106 of 904 samples, Table 63). Of those samples with exceedances, 56% of them were collected between 2006 and 2008 prior to the start of focused outreach; the most exceedances of the WQTL for chlorpyrifos occurred in 2008 (30 exceedances, Table 63). By the start of 2015, the first through sixth 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. Management plans for chlorpyrifos are complete for nine site subwatersheds within the first through sixth priorities. During the 2015 WY, there were seven exceedances of the WQTL for chlorpyrifos in the first through sixth priority site subwatersheds; this is significantly less than in 2008, prior to the initiation of focused outreach (Figure 16). Chlorpyrifos is still the most widely applied pesticide in first through sixth priority site subwatersheds; however, the amount applied has continued to decrease over time.

Diazinon

From 2009 through the 2015 WY, 334 samples were collected to analyze for the presence of diazinon in the first through sixth priority site subwatersheds and no exceedances of the WQTL for diazinon occurred (Table 63). The greatest number of exceedances of the WQTL for diazinon (4) occurred in first priority site subwatersheds in 2007. Management plans for diazinon are complete for five site subwatersheds within the first through sixth priorities. The Coalition believes that management practices implemented as a result of focused outreach contributed to water quality improvements, (Figure 16). Currently, there are no active management plans for diazinon in the Coalition region.

Copper

From 2006 through 2008, there were 42 exceedances of the hardness based WQTL for copper in first through sixth priority site subwatersheds. Since focused outreach was initiated in 2009, only five exceedances have occurred: two in 2010, two in 2011, and one in 2012 (Table 63). Management plans for copper are complete for seven site subwatersheds within the first through sixth priorities. Currently, there are no active management plans for copper in the Coalition region.

Diuron

From 2006 through the 2015 WY, there were 16 exceedances of the WQTL for diuron in first through sixth priority site subwatersheds; 11 of the 16 exceedances occurred from 2006 through 2008, prior to the initiation of focused outreach. During the 2015 WY, there were a total of three exceedances of the WQTL for diuron representing 4% of the 72 samples collected (Table 63). Applications of diuron have steadily declined since focused outreach began in 2008; there were a total of 13,500 lbs of AI applied in 2008, compared to 8,299 lbs of AI applied in 2015 (Table 63). Management plans for diuron are complete for two site subwatersheds within the first through sixth priorities, while management plans are remain active for diuron for Terminous Tract Drain @ Hwy 12 and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd.

Simazine

Since 2006, only 1% of the samples collected exceeded the WQTL for simazine (5 out of 490 samples, Table 63). Management plans for simazine are complete for the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed. In the 2015 WY, there was an exceedance of the WQTL for simazine (4.5 µg/L) at Union Island Drain @ Bonetti Rd. Currently, there are no active management plans for simazine within the Coalition region. The Coalition believes that management practices implemented as a result of focused outreach contributed to the improved water quality results, as well as the decreasing use of products containing simazine (Figure 16).

C. dubia Toxicity

Across the SJCDWQC region, water column 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. From 2006 through the 2015 WY, there were 28 toxicities to *C. dubia* in first through sixth priority site subwatersheds; 21 of the toxicities occurred from 2006 through 2008, prior to the initiation of focused outreach. Since focused outreach began in 2009, the number of samples collected that were toxic to *C. dubia* has steadily declined (Figure 17). During the 2015 WY, one out of 65 total samples (2%, Table 64) was toxic to *C. dubia;* the sample was collected from Terminous Tract Drain @ Hwy 12 (Table 64). Management plans for water column toxicity to *C. dubia* are complete in six site subwatersheds within the first through sixth priorities site subwatersheds. Toxicity to *C. dubia* remains in an active management plan for Duck Creek @ Hwy 4 and Roberts Island @ Whiskey Slough Pump.

S. capricornutum Toxicity

From 2006 through the 2015 WY, there were 64 toxicities to *S. capricornutum*; 53 toxicities occurred from 2006 through 2008, prior to the initiation of focused outreach. Since focused outreach began in 2009, the number of samples collected that were toxic to *S. capricornutum* has steadily declined (Figure 17). During the 2015 WY, seven out of 70 samples (10%, Table 64) collected within first through sixth priority site subwatersheds were toxic to *S. capricornutum*. Management plans for water column toxicity to *S. capricornutum* toxicity are complete for seven site subwatersheds within the first through sixth priorities. Toxicity to *S. capricornutum* remains in an active management plan for the French Camp Slough @ Airport Way, Mokelumne River @ Bruella Rd, Roberts Island @ Whiskey Slough Pump, and Terminous Tract Drain @ Hwy 12 site subwatersheds.

H. azteca Toxicity

From 2006 through the 2015 WY, there were 55 toxicities to *H. azteca*; 26 toxicities occurred from 2006 through 2008, prior to the initiation of focused outreach. Since the Coalition initiated focused outreach in 2009, there were a total of 29 out of 121 samples (24%, Table 64) collected within first through sixth priority site subwatersheds, which were toxic to *H. azteca*. During the 2015 WY, one sample was toxic to *H. azteca* occurred; the toxic sample was collected from Upper Roberts Island Drain, a new site where no focused outreach has occurred. The number of toxic events has steadily declined in recent years from 57% of samples collected in 2010 to 0% of samples collected in 2015 (Figure 17). Management plans for sediment toxicity to *H. azteca* are completed for five site subwatersheds within the first through sixth priorities. Sediment toxicity to *H. azteca* remains in an active management plan for five site subwatersheds in the first through sixth priority site subwatersheds.

Management Plans Approved for Completion

Three years of monitoring at a site subwatershed with no exceedances of the WQTL for 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. On December 18, 2015, the Coalition received approval for the completion of 20 management plans from 10 site subwatersheds. Table 55 lists all of the sites and constituents approved for management plan completion.

TMDL CONSTITUENTS

The Coalition monitors to evaluate compliance with USEPA approved TMDL discharge limitations based on TMDL monitoring and reporting requirements in the WDR and the Fourth Edition of the Water Quality Control Plan (Basin Plan) for the Sacramento-San Joaquin River Basins (Revised June 2015). Approved TMDLs within the Coalition region include chlorpyrifos and diazinon, DO, methyl mercury, salt (electrical conductivity), and boron. Table 65 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 65. 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
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 a single exceedance of the WQTL occurs for an approved TMDL constituent during monitoring at a site subwatershed, a management plan is required for that constituent. Coalition efforts to address exceedances of TMDL constituents include: 1) additional monitoring and source identification, 2) focused outreach within the site subwatershed (including 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 for the chlorpyrifos and diazinon TMDL. Intensive outreach and documentation of implemented management practices occur throughout the Coalition every year. 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 water quality impairments and meet the TMDL requirements in the Basin Plan.

The following sections include a narrative related to 1) each USEPA approved TMDL constituent, 2) the Coalition's strategy for achieving TMDL compliance, and 3) actions taken to meet the TMDL requirements during the 2015 WY.

Chlorpyrifos and Diazinon TMDL

The SJCDWQC is responsible for compliance with the Sacramento and San Joaquin Delta chlorpyrifos and diazinon TMDL (Table 65). The Lower San Joaquin River chlorpyrifos and diazinon TMDL includes one compliance point within the Coalition boundary (San Joaquin River @ Vernalis). However, this compliance point receives most of its drainage from areas outside of the Coalition region. Therefore, the East San Joaquin Water Quality Coalition (ESJWQC) and the Westside San Joaquin River Watershed Coalition monitor for TMDL compliance at this location.

The Coalition collaborated with the Regional Board to establish a monitoring and reporting strategy to demonstrate compliance with the Sacramento and San Joaquin Delta 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 to which implementation of management practices 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 impairments.
6. Determine whether discharge contributes to toxicity impairment due to additive or synergistic effects of multiple pollutants.
7. Demonstrate that management practices technically and economically achieve the lowest pesticide levels.

On March 15, 2013, the Coalition received approval to conduct TMDL monitoring at four Delta monitoring locations to assess compliance with loading capacity: 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 66 and Figure 18). 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.

Table 66. Loading capacity sites used to assess loading capacity of Chlorpyrifos and Diazinon during the 2015 WY 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

Site Name	Delta Segment Represented	Latitude	Longitude
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 segment is addressed in the Lower San Joaquin River Diazinon and Chlorpyrifos TMDL and is associated with the compliance location San Joaquin River @ Vernalis. This segment was delisted from the 303(d) list for diazinon in 2008.

To assess compliance with load allocation during the 2015 WY, the Coalition sampled 15 tributary sites for chlorpyrifos and diazinon as part of the Coalition monitoring strategy outlined in the 2015 MPU (Table 67 and Figure 18). Sites monitored for load allocation include named Delta waterways and tributaries that drained 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 of the Coalition's sampling sites are located upstream of the legal Delta; therefore, compliance was evaluated by utilizing 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 using French Camp Slough @ Airport Way (most downstream waterbody) monitoring data.

During the 2015 WY, the timing and location of monitoring at load allocation sites varied depending on the site's monitoring type. The chlorpyrifos and diazinon monitoring schedule for both loading capacity and load allocation sites is detailed in Table 68.

Table 67. Monitoring sites used to assess chlorpyrifos and diazinon load allocation compliance during the 2015 WY, and the Delta segments that they represent; sorted by Delta Segment.

Delta Segment	Site Name	Monitoring Type	Latitude	Longitude	Constituent monitored	Map key
Delta eastern portion, outside legal Delta	Bear Creek @ North Alpine Rd	MPM	38.07386	-121.21215	C	1
	Duck Creek @ Highway 4	MPM	37.94949	-121.18208	C	2
	French Camp Slough @ Airport Way	CSM, MPM	37.88172	-121.24933	C, D	3
	Mokelumne River @ Bruella Rd	CSM	38.16022	-121.20643	C, D	4
	Mormon Slough @ Jack Tone Rd	MPM	37.96470	-121.14880	C	5
Drain to Delta waterways (eastern portion)	Drain @ Woodbridge Rd	MPM	38.15256	-121.50095	C	6
	Empire Tract @ 8 Mile Rd	RSM	38.06012	-121.49912	C	7
	Rindge Tract Drain	RSM	38.04553	-121.46933	C	8
	Terminous Tract Drain @ Hwy 12	CSM, MPM	38.11558	-121.49380	C, D	9
Drain to Delta Waterways (central portion)	Bacon Island Pump @ Old River	RSM	37.97916	-121.57023	C	10
	East Orwood Tract Drain	RSM	37.92857	-121.56067	C	11
	Roberts Island @ Whiskey Slough Pump	CSM, MPM	37.96737	-121.46434	C, D	12
	South McDonald Island Pump	RSM	37.98928	-121.46285	C	13
Drain to Delta waterways (southern portion)	Union Island Drain @ Bonetti Rd	CSM	37.87170	-121.52551	C, D	14

C – Chlorpyrifos; D - Diazinon
CSM – Core Site Monitoring, conducted monthly.
MPM - Management Plan Monitoring, conducted during months of past exceedances.
RSM – Represented Site Monitoring

Figure 18. Loading capacity sites (green) and load allocation sites (yellow, refer to number key in Table 67) used by the SJCDWQC to evaluate Chlorpyrifos and Diazinon TMDL compliance during the 2015 WY.

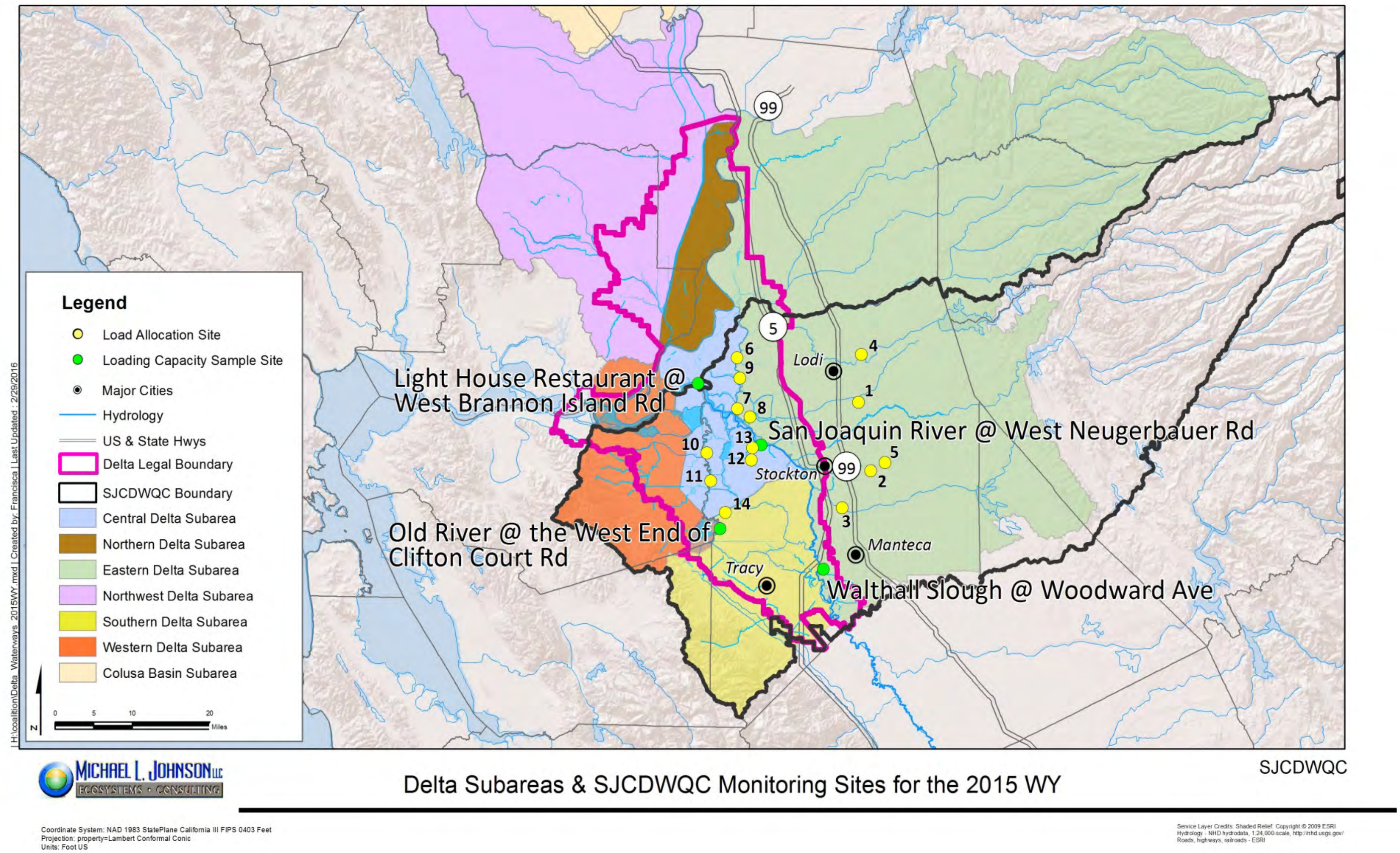


Table 68. Monitoring schedule for the 2015 WY loading capacity and load allocation sites.
Sites were monitored for chlorpyrifos (C) and/or diazinon (D).

Site Name	Site Type	10/21/2014	11/18/2014	12/4/2014	1/20/2015	2/9/2015	3/17/2015	4/21/2015	5/19/2015	6/16/2015	7/21/2015	8/18/2015	9/15/2015
Bacon Island Pump @ Old River	Load Allocation								C			C	
Bear Creek @ North Alpine Rd	Load Allocation	C			C						C	C	C
Drain @ Woodbridge Rd	Load Allocation							C					
Duck Creek @ Highway 4	Load Allocation							C	C	C	C	C	C
East Orwood Tract Drain	Load Allocation					C					C		C
Empire Tract @ 8 Mile Rd	Load Allocation											C	C
French Camp Slough @ Airport Way	Load Allocation	C, D	C, D	C, D	C, D	C, D	C, D	C, D	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	
Mokelumne River @ Bruella Rd	Load Allocation	C, D	C, D	C, D	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
Old River @ the West End of Clifton Court Rd	Loading Capacity					C, D			C, D	C, D	C, D	C, D	
Rindge Tract Drain	Load Allocation						C					C	C
Roberts Island @ Whiskey Slough Pump	Load Allocation	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D
San Joaquin River @ West Neugerbauer Rd	Loading Capacity					C, D			C, D	C, D	C, D	C, D	
South McDonald Island Pump	Load Allocation								C	C			C
Terminous Tract Drain @ Hwy 12	Load Allocation	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D
Union Island Drain @ Bonetti Rd	Load Allocation	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D	C, D
Walthall Slough @ Woodward Ave	Loading Capacity	C				C, D			C, D	C, D	C, D	C, D	C

Compliance with Chlorpyrifos and Diazinon WQOs

During the 2015 WY, the Coalition evaluated compliance with chlorpyrifos and diazinon WQOs by reviewing monitoring results from the sites listed in Table 68. There were six exceedances of the WQO for chlorpyrifos in tributaries within the Coalition region (Table 69). Diazinon was not detected in any sample collected during the 2015 WY.

Table 69. SJCDWQC 2015 WY 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 during the 2015 WY.

Station Name	TMDL Compliance Type	Sample Date	Analyte	Result	WQO
Duck Creek @ Hwy 4	Load Allocation	4/21/2015	Chlorpyrifos	0.016 µg/L	0.015 µg/L
Duck Creek @ Hwy 4*	Load Allocation	8/18/2015	Chlorpyrifos	0.022 µg/L	0.015 µg/L
French Camp Slough @ Airport Way*	Load Allocation	1/20/2015	Chlorpyrifos	0.075 µg/L	0.015 µg/L
Mormon Slough @ Jack Tone Rd*	Load Allocation	7/21/2015	Chlorpyrifos	0.029 µg/L	0.015 µg/L
Terminous Tract Drain @ Hwy 12	Load Allocation	1/20/2015	Chlorpyrifos	0.074 µg/L	0.015 µg/L
Union Island Drain @ Bonetti Rd	Load Allocation	1/20/2015	Chlorpyrifos	0.077 µg/L	0.015 µg/L

*Samples collected from non-contiguous waterbody.

Compliance with Chlorpyrifos and Diazinon Loading Capacity and Load Allocations

A TMDL is a calculation of the maximum amount of a pollutant (load) that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. 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
CD = diazinon concentration in µg/L
CC = chlorpyrifos concentration in µg/L
WQOD = diazinon water quality objective; 0.1 µg/L
WQOC = chlorpyrifos water quality objective; 0.015 µg/L

The Coalition assessed load capacity compliance from the sites listed in Table 66. There were no exceedances of the WQTLs for chlorpyrifos or diazinon at any load capacity sites during the 2015 WY; therefore, all samples collected during the 2015 WY are in compliance with the established loading capacity for the chlorpyrifos and diazinon TMDL (Table 70).

The Coalition assessed load allocation compliance at monitoring sites listed in Table 67, and detected chlorpyrifos and/or diazinon in nine samples during the 2015 WY. Exceedances of the WQTL for chlorpyrifos occurred six times in samples collected from load allocation sites, and thus were out of compliance with the established load allocation (Table 71). Diazinon was detected in a single sample, but the concentration did not exceed the 0.1 µg/L WQTL for diazinon. Table 72 provides a summary of loading capacity and load allocation compliance by Delta subarea and waterbody from October 2014 through September 2015.

Table 70. Sacramento-San Joaquin Delta Waterways TMDL load capacity compliance calculations for diazinon and chlorpyrifos runoff for nonpoint source discharges during the 2015 WY.
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 either dry or too shallow to collect samples.

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load Capacity	Load Capacity Compliance
Light House Restaurant @ West Brannon Island Rd	2/9/2015	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	2/9/2015	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	2/9/2015	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	2/9/2015	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	5/19/2015	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	5/19/2015	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	5/19/2015	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	5/19/2015	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	6/16/2015	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	6/16/2015	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	6/16/2015	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	6/16/2015	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	7/21/2015	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	7/21/2015	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	7/21/2015	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	7/21/2015	<0.0026	<0.004	0	In compliance
Light House Restaurant @ West Brannon Island Rd	8/18/2015	<0.0026	<0.004	0	In compliance
Old River @ the West End of Clifton Court Rd	8/18/2015	<0.0026	<0.004	0	In compliance
San Joaquin River @ West Neugerbauer Rd	8/18/2015	<0.0026	<0.004	0	In compliance
Walthall Slough @ Woodward Ave	8/18/2015	<0.0026	<0.004	0	In compliance

Table 71. Sacramento-San Joaquin Delta Waterways TMDL load allocation compliance calculations for diazinon and chlorpyrifos runoff for nonpoint source discharges during the 2015 WY.
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 either dry or too shallow to collect samples during the event.

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load Capacity	Load Capacity Compliance
Bear Creek @ North Alpine Rd	10/21/2014	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	10/21/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	10/21/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	10/21/2014	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	10/21/2014	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	10/21/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	11/18/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	11/18/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	11/18/2014	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	11/18/2014	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	11/18/2014	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	12/4/2014	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	12/4/2014	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	12/4/2014	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	12/4/2014	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	12/4/2014	<0.0026	<0.004	0	In Compliance

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load Capacity	Load Capacity Compliance
Bear Creek @ North Alpine Rd	1/20/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	1/20/2015	0.075	0.069	5.69	Not In Compliance
Mokelumne River @ Bruella Rd	1/20/2015	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	1/20/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	1/20/2015	0.074	<0.004	4.9	Not In Compliance
Union Island Drain @ Bonetti Rd	1/20/2015	0.077	<0.004	5.1	Not In Compliance
East Orwood Tract Drain	2/9/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	2/9/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	2/9/2015	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	2/9/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	2/9/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	2/9/2015	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	3/17/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	3/17/2015	<0.0026	<0.004	0	In Compliance
Rindge Tract Drain	3/17/2015	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	3/17/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	3/17/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	3/17/2015	<0.0026	<0.004	0	In Compliance
Drain @ Woodbridge	4/21/2015	<0.0026	NS	0	In Compliance
Duck Creek @ Hwy 4	4/21/2015	0.016	NS	1.1	Not In Compliance
French Camp Slough at Airport Way	4/21/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	4/21/2015	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	4/21/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	4/21/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	4/21/2015	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	5/19/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	5/19/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	5/19/2015	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	5/19/2015	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	5/19/2015	<0.0026	<0.004	0	In Compliance
South McDonald Island Pump	5/19/2015	<0.0026	NS	0	In Compliance
Terminous Tract Drain @ Hwy 12	5/19/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	5/19/2015	<0.0026	<0.004	0	In Compliance
French Camp Slough at Airport Way	6/16/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	6/16/2015	<0.0026	<0.004	0	In Compliance
Roberts Island @ Whiskey Slough Pump	6/16/2015	<0.0026	<0.004	0	In Compliance
South McDonald Island Pump	6/16/2015	<0.0026	NS	0	In Compliance
Terminous Tract Drain @ Hwy 12	6/16/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	6/16/2015	<0.0026	<0.004	0	In Compliance
Bear Creek @ North Alpine Rd	7/21/2015	<0.0026	NS	0	In Compliance
Duck Creek @ Hwy 4	7/21/2015	<0.0026	NS	0	In Compliance
East Orwood Tract Drain	7/21/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	7/21/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	7/21/2015	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	7/21/2015	0.029	NS	1.9	Not In Compliance
Roberts Island @ Whiskey Slough Pump	7/21/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	7/21/2015	<0.0026	<0.004	0	In Compliance

Station Name	Sample Date	Chlorpyrifos	Diazinon	Load Capacity	Load Capacity Compliance
Union Island Drain @ Bonetti Rd	7/21/2015	<0.0026	<0.004	0	In Compliance
Bacon Island Pump @ Old River	8/18/2015	<0.0026	NS	0	In Compliance
Bear Creek @ North Alpine Rd	8/18/2015	<0.0026	NS	0	In Compliance
Duck Creek @ Hwy 4	8/18/2015	0.022	NS	1.5	Not In Compliance
Empire Tract @ 8 Mile Rd	8/18/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	8/18/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	8/18/2015	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	8/18/2015	0.012	NS	0.8	In Compliance
Rindge Tract Drain	8/18/2015	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	8/18/2015	<0.0026	<0.004	0	In Compliance
Terminous Tract Drain @ Hwy 12	8/18/2015	<0.0026	<0.004	0	In Compliance
Union Island Drain @ Bonetti Rd	8/18/2015	<0.0026	<0.004	0	In Compliance
Bear Creek @ North Alpine Rd	9/15/2015	<0.0026	NS	0	In Compliance
Duck Creek @ Hwy 4	9/15/2015	<0.0026	NS	0	In Compliance
East Orwood Tract Drain	9/15/2015	<0.0026	NS	0	In Compliance
Empire Tract @ 8 Mile Rd	9/15/2015	<0.0026	NS	0	In Compliance
French Camp Slough at Airport Way	9/15/2015	<0.0026	<0.004	0	In Compliance
Mokelumne River @ Bruella Rd	9/15/2015	<0.0026	<0.004	0	In Compliance
Mormon Slough @ Jack Tone Rd	9/15/2015	0.008	NS	0.5	In Compliance
Rindge Tract Drain	9/15/2015	<0.0026	NS	0	In Compliance
Roberts Island @ Whiskey Slough Pump	9/15/2015	<0.0026	<0.004	0	In Compliance
South McDonald Island Pump	9/15/2015	<0.0026	NS	0	In Compliance
Terminous Tract Drain @ Hwy 12	9/15/2015	0.009	<0.004	0.6	In Compliance
Union Island Drain @ Bonetti Rd	9/15/2015	<0.0026	<0.004	0	In Compliance

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

Table 72. Summary of load capacity and allocation compliance in the Sacramento-San Joaquin Delta Subareas during the 2015 WY.

Type of Load Compliance	Delta Segment Represented	Site Name	In Compliance	Out of Compliance	Total TMDL Samples Collected
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	5	0	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	7	0	7
Load Allocation	Delta eastern portion, outside legal Delta	Bear Creek @ North Alpine Rd	5	0	5
		Duck Creek @ Hwy 4	4	2	6
		French Camp Slough at Airport Way	11	1	12
		Mokelumne River @ Bruella Rd	12	0	12
		Mormon Slough @ Jack Tone Rd	3	1	4
	Drain to Delta waterways (eastern portion)	Drain @ Woodbridge Rd	1	0	1
		Empire Tract @ 8 Mile Rd	2	0	2
		Rindge Tract Drain	3	0	3
		Terminous Tract Drain @ Hwy 12	11	1	12
	Drain to Delta Waterways (central portion)	Bacon Island Pump @ Old River	2	0	2
		East Orwood Tract	3	0	3
		Roberts Island @ Whiskey Slough Pump	12	0	12
		South McDonald Island Pump	3	0	3
	Drain to Delta waterways (southern portion)	Union Island Drain @ Bonetti Rd	11	1	12
		Total	**105**	**6**	**111**

Implementation and Effectiveness of Management Practices to Reduce Chlorpyrifos and Diazinon Offsite Movement

The Coalition evaluates the efficacy of implemented management practices across the entire SJCDWQC region by tracking newly implemented management practices and assessing water quality on a site-by-site and zone-by-zone basis (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 agriculturally applied constituents, including chlorpyrifos and diazinon. By the start of 2015, the first through sixth priority sites received focused outreach. The Coalition documented new management practices implemented in site subwatersheds that have received focused outreach since 2008. Additional focused outreach occurred with targeted growers in four site subwatersheds in 2010 and 2012 due to continued exceedances of the chlorpyrifos WQTL.

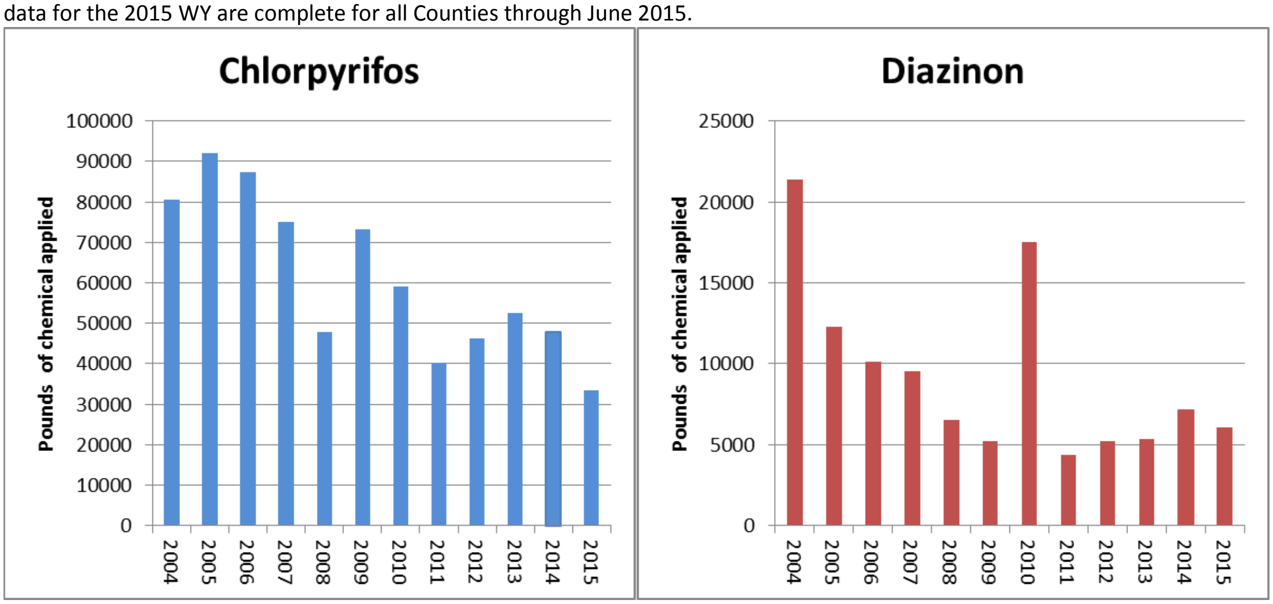
Nine out of thirteen chlorpyrifos management plans, and all of the diazinon management plans have been approved for completion in the Coalition region. From 2009 through September 2015, 356 samples were collected to analyze for diazinon in the first through sixth priority site subwatersheds; no exceedances of the WQTL for diazinon have occurred in the Coalition since 2008 (Table 63).

Alternatives to Chlorpyrifos and Diazinon

The pounds of diazinon and chlorpyrifos applied in the SJCDWQC region have declined since 2004 (Figure 19). With the exception of a spike in use in 2010, the use of diazinon has steadily declined over the years (Figure 19). 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 19. Pounds of diazinon and chlorpyrifos applied in the SJCDWQC region from 2004 through September 2015.

All PUR data are considered preliminary until received from CalPIP; CalPIP data are available through December 2013. The PUR data for the 2015 WY are complete for all Counties through June 2015.



Several alternative pesticides and products exist as alternatives to chlorpyrifos and diazinon (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, need/timing of applications, 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 2015. Table 73 lists these top five commodities for counties in the SJCDWQC (Contra Costa, San Joaquin, and Stanislaus Counties) with PUR data indicating total pounds of pesticide. For these five commodities the Coalition identified the pests of major concern 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 pests of concern (CA DWR 2013; Elliott et al., 2004; IRAC, 2005; Summers et al., 2007; UC ANR; Zalom et al., 1999).

Table 73.Commodities in the SJCDWQC region with the most pounds of chlorpyrifos and diazinon applied from 2004 through September 2015.

All PUR data are considered preliminary until received from CalPIP; CalPIP data are available through December 2013. The PUR data for the 2015 WY are complete for all Counties through June 2015.

Commodity	Total Pounds Chlorpyrifos	Total Pounds Diazinon
Alfalfa	141,844	0
Almonds	82,588	33,308
Cherries	766	36,600
Grapes	74,014	2,812
Walnuts	370,622	1,876

Several alternatives exist to manage the pests of concern for each commodity (Table 74). For example, over 10 different classes of pesticides are used to manage pests of high concern for almonds. In addition, the timing of applications varies for both the pesticide choice and the target pest (Table 74). For example, in almonds, pyrethroids may be applied during August to treat navel orange worms, and in November through February to target peach twig borers. In walnuts, spinosyns may be applied in March through May, August, and October to treat codling moths, and in June through August to manage walnut husk flies.

Table 74. 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
			Unclassified	Buprofezin	Tourismo	Apr

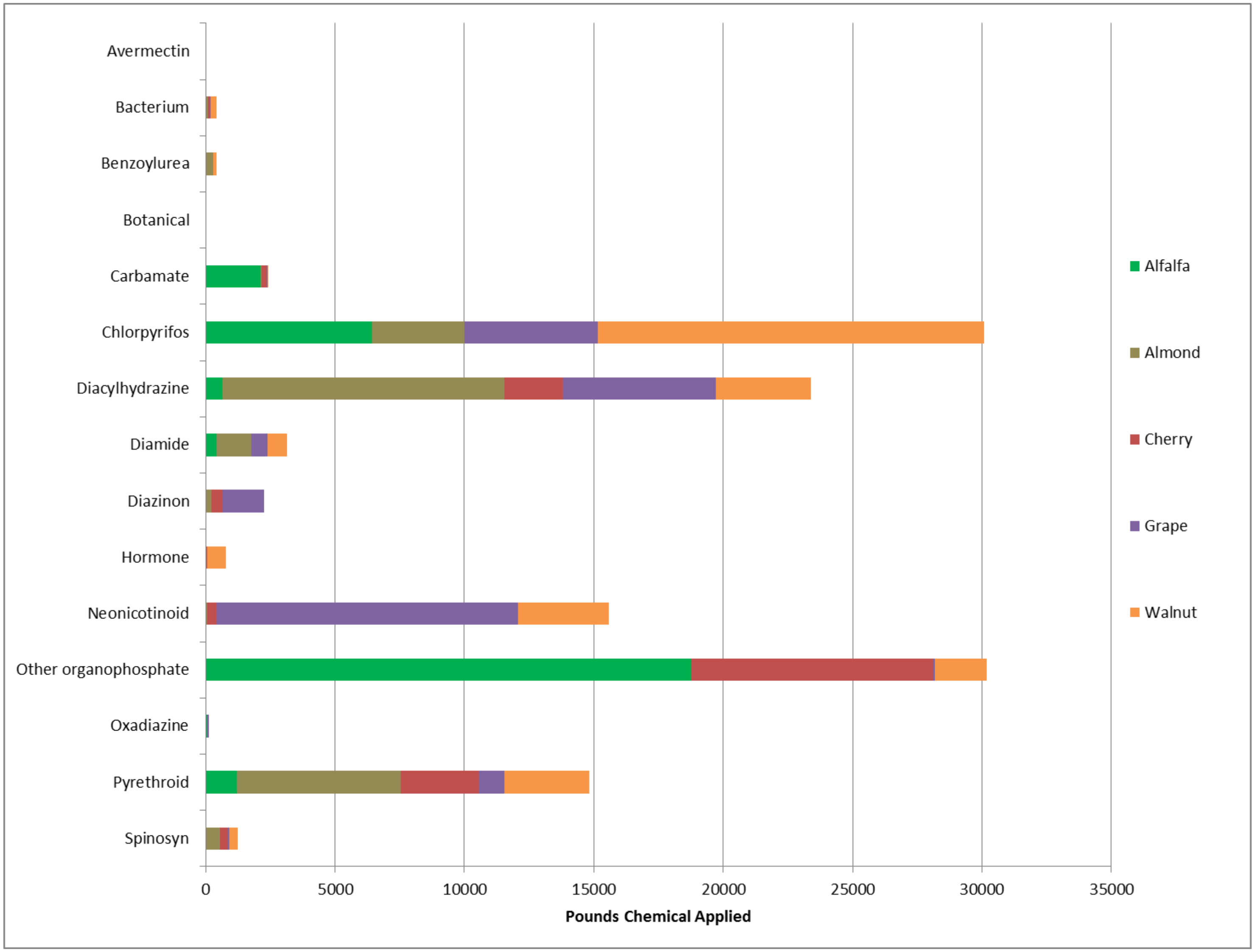
Commodity	Pest	Pest Appearance	Pesticide Class[1]	Active Ingredient	Common Product Name	Recommended Application Period
				Pyriproxyfen	NA	Nov-Jan, Apr
Cherry	Cherry leafhopper	Apr-Oct	Neonicotinoid	Thiamethoxam	Cruiser	Nov-Jan, Jun-Aug
			Organophosphate	Methidathion	Supracide	Nov-Jan
			Pyrethroid	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 to determine the total pounds of chlorpyrifos, diazinon, and alternative pesticides (Table 74) applied to the top five commodities identified in Table 73. The PUR data for the 2015 WY are complete through June for all counties in the SJCDWQC. Total pounds of chlorpyrifos, diazinon, and alternative pesticides used during the 2015 WY are graphically represented in Figure 20.

As depicted in Figure 19, both chlorpyrifos and diazinon use have declined substantially since 2004. A total of 2,273 lbs. of diazinon was applied in the Coalition region during the 2015 WY, and made up 2% of the total insecticides (chlorpyrifos + diazinon + alternatives) applied to the top five commodities (Figure 20). Chlorpyrifos use has declined over the years, but is still the most heavily applied insecticide among the top five commodities. During the 2015 WY, 30,081 lbs. of chlorpyrifos were applied to the top five commodities, which accounted for 24% of the total pounds of insecticides (chlorpyrifos + diazinon + alternatives)(Figure 20).

Figure 20. Pounds of major pesticides applied to the top five commodities with the most chlorpyrifos and/or diazinon applications during the 2015 WY. The PUR data for the 2015 WY are complete for all Counties through June 2015.



During the 2015 WY, the Coalition assessed the concentration of organophosphates, carbamates, and pyrethroids to effectively characterize the water quality in each zone (Table 75). The Coalition also evaluated sediment and water column toxicity related to pesticide use. Table 75 lists the sites monitored for a specific pesticide or toxicity and whether monitoring was Core Site Monitoring (CSM), Represented Site Monitoring (RSM), or Management Plan Monitoring (MPM).

During Normal Monitoring from October 2014 through September 2015, there were 13 detections of pesticides in French Camp Slough @ Airport Way, Roberts Island @ Whiskey Slough Pump, Terminous Tract Drain @ Hwy 12, and Union Island Drain @ Bonetti Rd. Ten of these detections were of diuron, an herbicide that cannot be considered an alternative to chlorpyrifos or diazinon. The other three detections of insecticides were of dimethoate (organophosphate) and methomyl (carbamate); which were both detected in Union Island Drain @ Bonetti Rd. All dimethoate and methomyl detections were below the WQTL and not exceedances.

Table 75. Sites monitored for organophosphates and carbamates during the 2015 WY, including alternatives to chlorpyrifos and diazinon, and for toxicity in the sediment and 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	*C. dubia*	*P. promelas*	*H. azteca*[1]
Bacon Island Pump @ Old River																		R		R
Bear Creek @ North Alpine Rd						M														
Drain @ Woodbridge Rd																				R
Duck Creek @ Hwy 4																		M		M
East Orwood Tract Drain																		R		R
Empire Tract @ 8 Mile Rd																				R
French Camp Slough at Airport Way	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M
Kellogg Creek along Hoffman Ln																				M
Mokelumne River @ Bruella Rd	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Mormon Slough @ Jack Tone Rd																		M		R
Rindge Tract Drain																				R
Roberts Island @ Whiskey Slough Pump	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M[2]	C	M
Sand Creek @ Hwy 4 Bypass																				M
South McDonald Island Pump																		R		R
Staten Island Drain at Staten Island Rd																				R
Terminous Tract Drain @ Hwy 12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M
Union Island Drain @ Bonetti Rd	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M[2]	C	M
Upper Roberts Island Drain																		R		R
Walthall Slough @ Woodward Ave	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M

C – Core Site Monitoring, conducted monthly.

M - Management Plan Monitoring, conducted during months of past exceedances.

R – Represented Site Monitoring

[1] If Hyalella survival is less than 80% compared to the control, the following pesticides will be analyzed for: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, fenpropathrin, chlorpyrifos and Piperonyl butoxide(PBO).

[2] Monitoring occurred monthly due to Core Site Monitoring.

Table 76. Detections of potential alternative pesticides during SJCDWQC tributary monitoring during the 2015 WY

Site Name	Sample Date	Analyte	Concentration (µg/L)	WQO (µg/L)
Union Island Drain @ Bonetti Rd	3/17/2015	Dimethoate, Total	0.16	1
Union Island Drain @ Bonetti Rd	9/15/2015	Dimethoate, Total	0.4	1
Union Island Drain @ Bonetti Rd	3/17/2015	Methomyl, Total	0.082	0.52

* Detection was in exceedance of the WQTL

Toxicity Impairment Due to Additive or Synergistic Effects of Multiple Pollutants

In order to determine whether there is additivity or synergy in toxicity caused by different chemicals in an ambient sample, the Coalition needs to identify the number of TUs of each chemical in the ambient sample. Based on the chemicals detected in the water column or sediment, and their TUs, a determination is made of whether the potential cause(s) of the toxicity can be 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 through mass spectrometry analysis. When required, the Coalition performs a Phase I and Phase III TIEs 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 was sufficient in determine BMPs. Consequently, unidentified chemicals may be contained in the samples. In addition, Phase I TIEs are not performed on sediment.

If all chemicals in a sample are quantified with confidence, and the LC50 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 TUs of the chemicals in the sample. If the TUs are accounted for by the TUs of the individual chemicals and the chemicals have the same mode of action, the toxicity is additive. If the number of TUs quantified from the ambient sample is greater than the sum of the TUs 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 TUs calculated from the concentrations of the chemicals known to be present in the sample is lower than the number of TUs in the ambient sample, and if there are unknown chemicals in the ambient sample, it cannot be determined if synergy among chemicals is present. Given the limited chemical analyses performed by the Coalition on each sample, it is unlikely that true synergy can be identified.

During the 2015 WY tributary monitoring events, no samples were toxic to *P. promelas*, and three samples were toxic to *C. dubia*. In addition, one sediment sample was toxic to *H. azteca*.

Toxicity to *C. dubia* was observed in one sample (15% survival compared to the control) collected from Terminous Tract Drain @ Hwy 12 on October 21, 2014; a TIE indicated that cationic metals and organophosphate insecticides as the causes of toxicity. The other two samples that were toxic to *C. dubia* were collected from Upper Roberts Island Drain on March 17, 2015 (0% survival compared to the control) and May 19, 2015 (35% survival compared to the control); a TIE indicated organophosphate insecticides as the cause of toxicity for the March sample and there was no TIE for the May sample.

Toxicity to *H. azteca* was observed in one sediment sample collected from Upper Roberts Island Drain on March 17, 2015 (34% survival compared to the control); there was a detection of chlorpyrifos (4.2 ng/g) in the sediment chemistry analysis. All toxicity results are listed in detail in Table 37 and discussed further in the Summary of Exceedances section of this report.

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. The implementation of management practices may be required to improve water quality. However, 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 the offsite movement of chemicals through irrigation and stormwater runoff. Marginally profitable operations may not afford these practices. The Coalition publicizes available funding information through the NRCS offices in Coalition counties 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 therefore improvements to their farming operations are not possible through Coalition efforts.

Within the Coalition region, the percentage of samples with exceedances of the WQTL for chlorpyrifos during the 2015 WY (5.3%) has increased compared to the past three years (1.4% in 2012, 1.1% in 2013, and 1.3% in 2014). From 2012 to 2014, there were a total of four exceedances of the WQTL for chlorpyrifos, compared to eight exceedances during the 2015 WY; three of the eight exceedances occurred in samples collected from non-contiguous waterbodies. However, the increase in the percentage of samples with exceedance level detections in the 2015 WY is still significantly less than years prior to 2012 (9.8% in 2009, 13.9% 2010, and 14.4% in 2011). Exceedances of the WQO for diazinon have not occurred in the Coalition region since 2008. Management practices implemented by growers are resulting in an overall reduction of discharges, and growers are in the process of achieving the lowest pesticide levels technically and economically achievable. With the adoption of the WDR, the Coalition has received many new members that were not previously contacted for focused outreach in the past. During the 2016 WY the Coalition will conduct focused outreach with members targeted in the site subwatersheds where chlorpyrifos exceedances have occurred in the recent past (Duck Creek @ Hwy 4, French Camp Slough @ Airport Way (and both upstream locations Lone Tree Creek @ Jack Tone Rd and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd), Mormon Slough @ Jack Tone Rd, Terminous Tract Drain @ Hwy 12, Union Island Drain @ Bonetti Rd,).

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 Coalition will apply the seasonal criteria of 700 µS/cm from April through August, and 1,000 µS/cm from September through March to all monitoring sites within the SJCDWQC boundary.

The Coalition recognizes that salt and nitrate 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 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 and nitrate in six zones (Table 77). The Coalition includes these constituents in general outreach discussions with growers about water quality impairments and applicable management practices.

Table 77. SJCDWQC sites monitored for salts, measured as specific conductance (SC), and nitrate during the 2015 WY.

Zone	Site Name	SC	Nitrate + Nitrite (as N)
Zone 1	Mokelumne River @ Bruella Rd	C	C
	Bear Creek @ North Alpine Rd	F	
	Coyote Creek Tributary @ Jack Tone Rd	F	
	Jahant Slough @ Cherokee Ln	F	
	Mosher Creek @ North Alpine Rd	F	
	Pixley Slough @ Furry Rd	F	
Zone 2	French Camp Slough at Airport Way	C	C
	Duck Creek @ Hwy 4	F	
	Littlejohns Creek @ Jack Tone Rd	F	
	Lone Tree Creek @ Jack Tone Rd	F	
	Mormon Slough @ Jack Tone Rd	F	
	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	F	
Zone 3	Terminous Tract Drain @ Hwy 12	C	C
	Drain @ Woodbridge rd	F	
	Empire Tract @ 8 Mile Rd4	F	
	Rindge Tract Drain	F	
	Staten Island Drain at Staten Island Rd	F	
Zone 4	Roberts Island @ Whiskey Slough Pump	C	C
	Bacon Island Pump @ Old River	F	
	Kellogg Creek along Hoffman Ln	F	
	South McDonald Island Pump	F	
	East Orwood Tract Drain	F	
Zone 5	Walthall Slough @ Woodward Ave	C	C
Zone 6	Sand Creek @ Hwy 4 Bypass	F	
Zone 7	Union Island Drain @ Bonetti	C	C
	Upper Roberts Island Drain	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	

C–Constituent monitored as part of Core Site Monitoring.
F–Constituent monitored as part of field parameter data collected at sites scheduled for MPM, RSM or TMDL monitoring.

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.

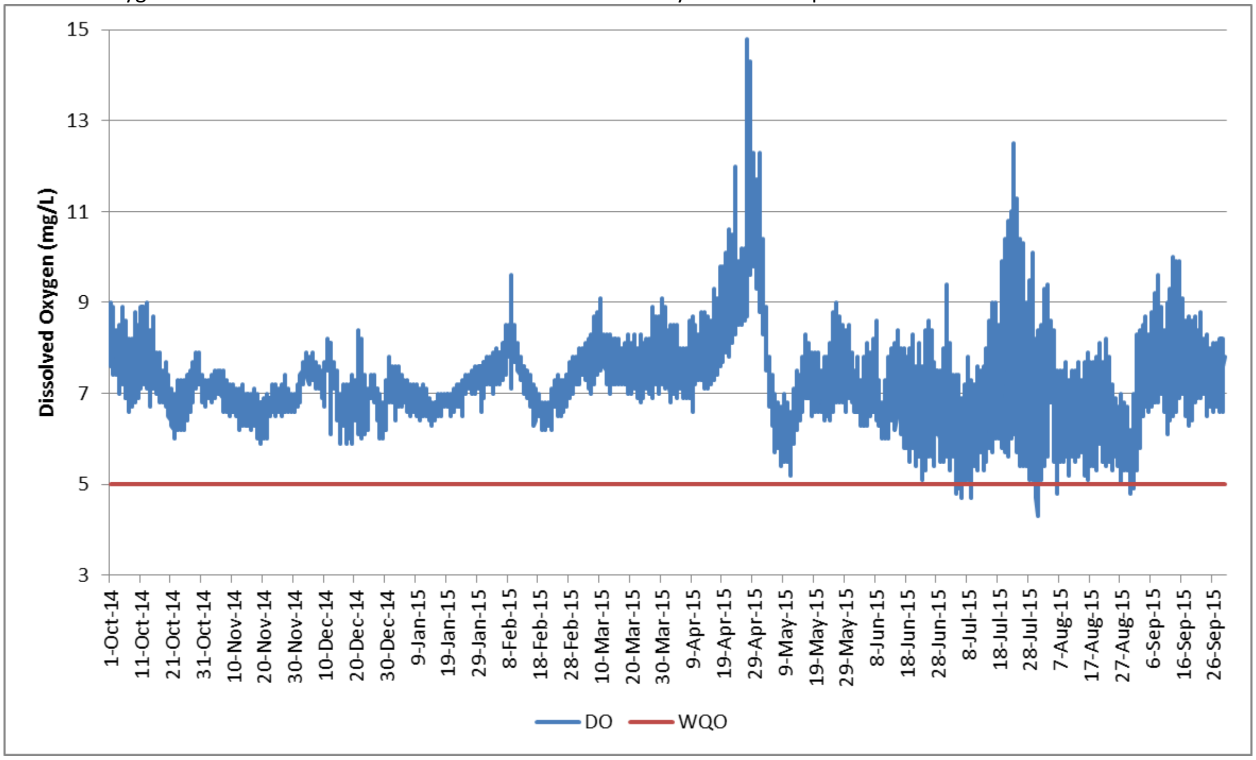
The Coalition reviews DO monitoring results in the Stockton DWSC and from within its tributaries to assess compliance with the DO WQOs required in the TMDL. The DO Basin Plan Amendment specifies that DO concentrations in the Stockton DWSC shall not be reduced below 5.0 mg/L from December through August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

The Coalition reviewed monitoring data from the CDEC Rough and Ready Island station to evaluate DO concentrations in the Stockton DWSC from October 2014 through September 2015 (Figure 21). 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 during 15 minute 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 twelve days with exceedances of the WQO for DO in the Stockton DWSC during the 2015 WY (Figure 21). A few isolated non-compliant DO concentrations below 5 mg/L occurred in November 2014 (one day), July (six days) 2015, and August 2015 (three days); and there were multiple recurrent non-compliant DO concentrations in September 2015, some over three hours long.

In addition, the Coalition reviewed tributary DO monitoring results from Zone 2, which contains agriculturally-influenced tributaries that could possibly drain to the Stockton DWSC. The Coalition monitored for DO in Zone 2 at four site subwatersheds in July, August, September, and November, taking into account the non-compliant dates in the Stockton DWSC (Table 75). Among the 21 DO measurements conducted by the Coalition in November 2014 and July through September 2015, there were 10 exceedances of the WQTL for DO (Table 78). Out of those 10 exceedances, only four were detected in flowing water. All others measurements were taken from waterbodies with no flow or stagnant non-contiguous waterbodies. Given the changing flow rates and hydrology, it is unlikely that these low DO levels contributed to the noncompliant measurements of DO in August and September at the Rough and Ready Island monitoring location.

Figure 21. Rough and Ready Island (RRI) Dissolved Oxygen measurements and WQO during the 2015 WY.
Dissolved oxygen is measured at the station on 15-minute intervals by an auto sampler.



Source: CA DWR, n.d.1. Data generated on January 28 2016

Table 78. 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 during the 2015 WY.
Exceedances of the DO WQO based on the DWSC criteria are highlighted in bold.

Sample Date	Station Name	Discharge (cfs)	DO (mg/L)	Temperature (C)
11/18/2014	French Camp Slough at Airport Way	0	**4.76**	7.6
11/18/2014	Littlejohns Creek @ Jack Tone Rd	0	6.64	8.9
11/18/2014	Mormon Slough @ Jack Tone Rd	0	**2.15**	9.8
11/18/2014	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	0	8.26	7.7
7/21/2015	Duck Creek @ Hwy 4	0	**1.17**	24.4
7/21/2015	Littlejohns Creek @ Jack Tone Rd	0	6.13	21.2
7/21/2015	French Camp Slough at Airport Way	19.27	6.73	26
7/21/2015	Lone Tree Creek @ Jack Tone Rd	15.08	7.02	24
7/21/2015	Mormon Slough @ Jack Tone Rd	0	9.35	28.6
7/21/2015	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	1.4	7.66	27.1
8/18/2015	Duck Creek @ Hwy 4	0	**1.22**	22.5
8/18/2015	Littlejohns Creek @ Jack Tone Rd	0	**2.14**	22.3
8/18/2015	French Camp Slough at Airport Way	14.04	**4.66**	22.7
8/18/2015	Lone Tree Creek @ Jack Tone Rd	19.24	7.25	22.7
8/18/2015	Mormon Slough @ Jack Tone Rd	0	7.51	27.9
8/18/2015	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	0.2	6.69	23.2
9/15/2015	Duck Creek @ Hwy 4	0	**2.56**	20.8
9/15/2015	French Camp Slough at Airport Way	12.6	6.11	22.1
9/15/2015	Littlejohns Creek @ Jack Tone Rd	0	9.13	20.4
9/15/2015	Mormon Slough @ Jack Tone Rd	0.3	6.08	22.5
9/15/2015	Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	0.85	**5.8**	27.7

The Coalition addresses exceedances of the WQTL for DO through its management plan process. However, due to the non-conserved nature of DO, and the complex interaction of factors that influence

DO concentrations, the cause of low DO is difficult to source. The Coalition attempted to determine the sources of exceedances of the WQTL for DO in a preliminary analysis (submitted February 22, 2016). In addition, 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.

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.

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 Work plans, 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 Work plan on April 19, 2013. There were no additional NPS Workgroup meetings or deliverables scheduled during the 2015 WY.

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.

SUMMARY OF REQUIRED WDR SUBMITTALS AND APPROVALS

The Coalition submitted multiple documents for approval by the Regional Board during the 2015 WY to meet the requirements of the WDR. Table 79 includes a list of all SJCDWQC submittals and approvals to date, as well as any upcoming due dates related to specific timetables outlined in Regional Board approval letters and the WDR.

During the 2015 WY, the Coalition submitted documents to the Regional Board pertaining to the Farm Evaluations, Groundwater Monitoring, Nitrogen Management, and Sediment and Erosion Control. Items submitted and approved are discussed in further detail in the Annual Report in the sections below titled: Farm Evaluations, Groundwater Quality Assessment and Programs, Nitrogen Management Plan, and Sediment Discharge and Erosion Control Plan.

Farm Evaluations

By June 15, 2015, the Coalition received Farm Evaluations (FEs) from growers with parcels in High and Low Vulnerability Areas. Growers in High Vulnerability Areas (HVAs) will resubmit their FEs annually and growers in Low Vulnerability Areas (LVAs) will resubmit their FEs once every five years. An analysis of returned 2015 Farm Evaluation surveys is included in the Farm Evaluation section below.

Groundwater

On December 18, 2015, the Coalition received official approval for the Groundwater Assessment Report (GAR) phase I and II that was resubmitted on April 25, 2015. As required by the WDR, the Coalition submitted the Groundwater Quality Management Plan (GQMP) within 60 days of the GAR approval on February 16, 2015 (approval pending). Based on the GAR approval and upcoming submittal due dates, the Coalition will prepare and submit the Groundwater Quality Trend Monitoring (GQTM) Work Plan by December 18, 2016.

Another component for evaluating groundwater quality and protection is the implementation of the Management Practice Evaluation Program (MPEP). During the 2015 WY, the five Coalitions that opted for the MPEP Group option identified technical experts (June 30, 2015) and a program administrator (November 1, 2015) to guide MPEP studies. Additionally, on July 31, 2015, the Coalitions submitted a Conceptual Study Design for the draft MPEP Work Plan. Further details on the groundwater program are included in the Groundwater Quality Assessment and Programs section below.

Nitrogen Management

The Coalitions resubmitted the Nitrogen Management Plan (NMP) template on December 18, 2014 (approved December 23, 2014). The NMP Technical Advisory Workgroup description was submitted on March 13, 2015 and additional information was provided on May 27, 2015 based on the May 12, 2015 Regional Board memo. The NMP Summary Report template was submitted on November 18, 2015 (approved December 23, 2015). The Coalition collaborated with other Central Valley coalitions and technical experts to write the Crop Nitrogen Knowledge Gap Study Plan and Guidance Documents, submitted on December 18, 2015. In response to the January 19, 2016 Regional Board memo, an outline for the revised Crop Nitrogen Knowledge Gap Study Plan was submitted February 19, 2016 (approval pending). Coalition members with parcels in high vulnerability areas will complete and returned their 2015 NMP Summary Reports by June 15, 2016. A complete analysis of the 2015 NMP Summary Reports will be included in the Coalition's 2017 Annual Report.

Sediment and Erosion Control

The SJCDWQC resubmitted the Sediment Discharge and Erosion Assessment Report (SDEAR) on August 11, 2015 (conditionally approved August 12, 2015). The Sediment and Erosion Control Plan Template submitted on April 11, 2013 was revised and resubmitted on October 9, 2015 (approved December 1, 2015). The Coalition addressed proximity to surface waters in the risk analysis submitted on December 15, 2015 (conditionally approved January 22, 2016). A document identifying large tributaries in the Coalition region with the potential to discharge sediment was submitted on April 22, 2016. Further details are included in the Sediment Discharge and Erosion Control Plan section below.

Table 79. SJCDWQC WDR related due dates, submittals, and approvals.

The SJCDWQC WDR (R5-2014-0029-R1) was approved March 12, 2014, revised April 17, 2015.

Document Description	Submittal/ Due Date	Approval Date
Farm Evaluations		
Farm Evaluation Template (All Coalitions)	April 11, 2013 December 6, 2013	December 9, 2013
Farm Evaluation Template Comments	July 7, 2014	August 21, 2014
2015 FE Summary – 2016 Annual Report	May 1, 2016	Approval Pending
FE (High Vuln Areas-all members)	June 15, 2016	NA
FE (Low Vuln Area-all members)	Due every 5 years	NA
Groundwater Management		
GAR Outline	July 24, 2014	Approved at December 22, 2014 meeting with Regional Board
GAR (Phase 1 and 2)	April 26, 2015	December 18, 2015
GQMP	February 16, 2016	Approval Pending
GQTM Work Plan (Phase1 and 2)	December 18, 2016	NS
GQTM QAPP	December 18, 2016	NS
MPEP- Group Agreement	January 14, 2014, September 23, 2014	March 13, 2014 (conditional) June 17, 2015 (official)
MPEP- Identify Technical Experts	September 23, 2014 and June 30, 2015	NA
MPEP- Identify Program Administrator	November 1, 2014	NA
MPEP- Conceptual Study Design	July 31, 2015	NA
MPEP- Draft Work Plan	March 1, 2016	NA
MPEP QAPP	June 4, 2016	NS
MPEP- Final Work Plan	June 4, 2016	NS
Nitrogen Management		
Nitrogen Management Plan Template (All Coalitions)	April 11, 2013, December 18, 2014	December 23, 2014
NMP TAWG Work Plan	March 13, 2015 and May 27, 2015	May 12, 2015 (conditional)
NMP Summary Report Template (all Coalitions)	November 18, 2015	December 24, 2015
NMP Guidance Documents	December 18, 2015	January 19, 2016 (conditional)
NMP Crop Nitrogen Knowledge Gap Study Plan	December 18, 2015	January 19, 2016 (conditional)
NMP TAWG response to RB comments on Gap Study	February 19, 2016	Approval Pending
NMP Work Plan for expanding/revising Y/R conversions	July 1, 2016	NS
NMP (HVA GW)	June 15, 2015[1]	NA
NMP Summary Report (HVA GW)	June 15, 2016	NA
NMP Worksheet (low vulnerability)	June 15, 2017	NA

DOCUMENT DESCRIPTION	SUBMITTAL/ DUE DATE	APPROVAL DATE
Sediment and Erosion Control		
Sediment and Erosion Control Plan Template (All Coalitions)	April 11, 2013, October 9, 2015	December 1, 2015
Sediment Discharge and Erosion Assessment Report (SDEAR)	April 26, 2015, August 11, 2015	August 12, 2015 (conditional)
SDEAR – Proximity to Surface Water Work Plan	December 15, 2015	January 22, 2016 (conditional)
SECP (HVAs)	February 8, 2016	NA
SECP (LVAs)	Not Required	NA
Identify Large Tributaries with potential for sediment discharge	April 22, 2016	Approval Pending
Identify Secondary Tributaries with potential for sediment discharge	July 22, 2016	NS
Identify Remaining Waterbodies with potential for sediment discharge	September 22, 2017	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).

FARM EVALUATIONS

As outlined in the WDR, all Coalition members were sent Farm Evaluation surveys to complete and return by June 15, 2015; practices documented were for the 2014 calendar year. The Farm Evaluation is intended to gather information on general site conditions and management practices implemented by members to protect surface and groundwater quality.

The Farm Evaluations are designed to collect information in four survey “parts”:

- Part A: whole farm evaluation.
- Part B: specific field evaluation.
- Part C: irrigation well information.
- Part D: sediment and erosion control practices.

Management practices designed to protect the quality of surface and groundwater should be implemented, where applicable, by members in high or low vulnerability areas. The survey parts gather information from growers specific to both surface and groundwater management practices:

1. Identification of crops grown and the irrigated 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 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 irrigation wells and abandoned wells, and
7. Applied wellhead protection and backflow prevention practices and devices.

While all members were required to submit a Farm Evaluation for the 2014 crop year, requirements for survey updates differ based on vulnerability designations (Table 79). High vulnerability areas are the geographic regions within the Coalition area where there are management plans due to surface water or groundwater quality impairments, or where the area has been determined to be highly vulnerable for groundwater in the GAR. Survey responses were recorded in a Coalition maintained Access database and linked to an Assessor Parcel Number (APN) and acreage. The responses were queried out of the Farm Evaluation database on a Township level without member specific information and exported to a separate Access database which is being submitted with this report.

Growers and members were offered assistance with completing their surveys by SJCDWQC and third-party staff. The following actions were taken to encourage accurate data collection and reporting:

- A dedicated phone line was created to assist growers in completing the survey.
- Workshops were held at the SJCDWQC office to provide in-person help and ensure survey accuracy.
- Surveys were categorized into high or low priority groups for individual follow up based on the missing survey information. Not all issues could be resolved prior to the submission of this

report due to lack of response, lack of phone number/email for the member, or timing of when the survey was returned.

  - High priority follow up surveys contained blank or incomplete management practice question responses or were missing any of the four survey "parts" (i.e. Part A, B, C or D).

- Data were reviewed in the database to reduce errors by:
  - Comparing acreages provided by the members on the surveys versus acreages enrolled with the Coalition;
  - Ensuring all questions were answered for each survey; and
  - Reviewing comments in order to group them with standard responses where applicable.

During the data entry process, reviewing responses indicated several areas where accuracy could be improved:

- Some parcels were not marked to be included on returned surveys or groups of parcels were unclear. These surveys were marked for follow up and as many members as possible were contacted to resolve these issues.
  - For example, the same parcel/fields were included in multiple management units without any explanation or change in acreage or crop (potential duplication of information).
- Some parcels were non-agriculture and therefore did not require a survey. These surveys were left blank and returned but not clearly marked as not farmed. This issue was identified during follow up phone calls.
  - For example, one parcel was not marked on the survey, but the member confirmed that the parcel was used as an equipment yard during a follow up call.
- In cases where there were different crops on the same APN and each crop was associated with different farm management practices, some members did not clearly indicate how much acreage is associated with each Site ID/Field ID. It is unclear whether this was due to a lack of understanding of how to subdivide their APNs, the Site ID/Field IDs were unfamiliar to the grower, or if they simply failed to complete the subdivision as requested. This issue affects the accuracy of the acreage associated with each management practice. If acreage was not filled in by the member and they could not be reached for clarification, the default became the enrolled acreage.
  - For example, a parcel was reported as containing "pasture/orchard" and multiple irrigation and nitrogen management practices were marked without notes indicating which responses were associated with which crop. Management units were created by entry staff if the member was contacted or enough information was given for staff to make an educated guess.
- Surveys were returned without all questions completed. Members associated with incomplete surveys were followed up with by phone or email. Not all members could be reached for follow up and in those situations the answers were marked as "No Selection" in the database.
  - For example, the irrigation efficiency practices question was skipped without any note to indicate "none apply".

Survey Status

Surface water vulnerability (high or low) was assigned to each member parcel based on SJC SQMP at the time of survey generation. Groundwater vulnerability (high or low) was assigned to each parcel based on the conditionally approved SJCDWQC GAR. All members, regardless of overall vulnerability designations, were required to complete a Farm Evaluation for 2014 management practices. Members failing to return a 2014 Farm Evaluation were sent a reminder notice in an effort to reach 100% compliance. The SJCDWQC received surveys from 76% of the members, representing 84% of the acreage (Figure 22 and Table 80). A small percentage (6%) of members who were mailed surveys were later determined to not require a returned survey due to one of the following reasons: 1) the member had no irrigated acreage enrolled in the Coalition during 2014, 2) the member did not farm in 2014, or 3) the member became inactive after the survey was mailed (Figure 22).

Figure 23 illustrates the parcels for which surveys were returned and the groundwater vulnerability designations. Some memberships have both high and low vulnerability parcels. Of the assessor parcel numbers (APNs) associated with the returned Farm Evaluations, 14 of 8147 parcels could not be mapped. Reasons for the inability to map include: 1) the member assigned the parcel to an incorrect county, 2) the parcel number has been recently updated however the mapping layers have not been updated yet, 3) the member reported an old parcel number and the mapping layer has been updated recently or 4) the member has reported an incorrect parcel number (e.g. missing a digit, transposed digits).

Table 80. Acreage and membership totals of required 2014 Farm Evaluations. Membership information is from December 2014.

Required 2014 Farm Evaluations	Sum of Acreage	Count of Members
Returned	399,632	2,751
Not Returned	77,142	892
Total Expected	476,774	3,643
% Returned of Total Expected	**84%**	**76%**

Figure 22. Overview of the memberships requiring Farm Evaluation surveys compared to the number of memberships mailed surveys and the reasons why some mailed surveys were not actually required.

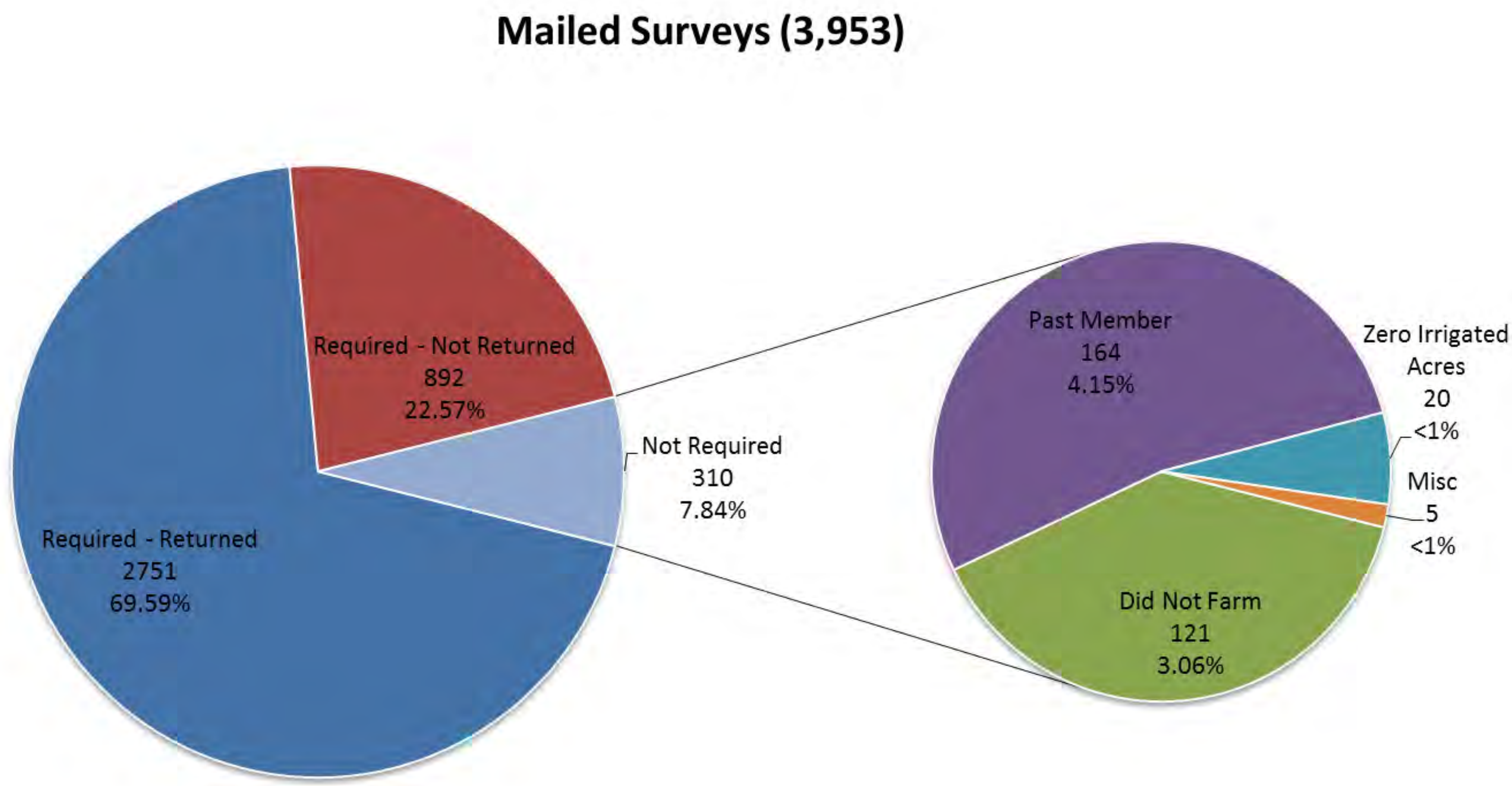
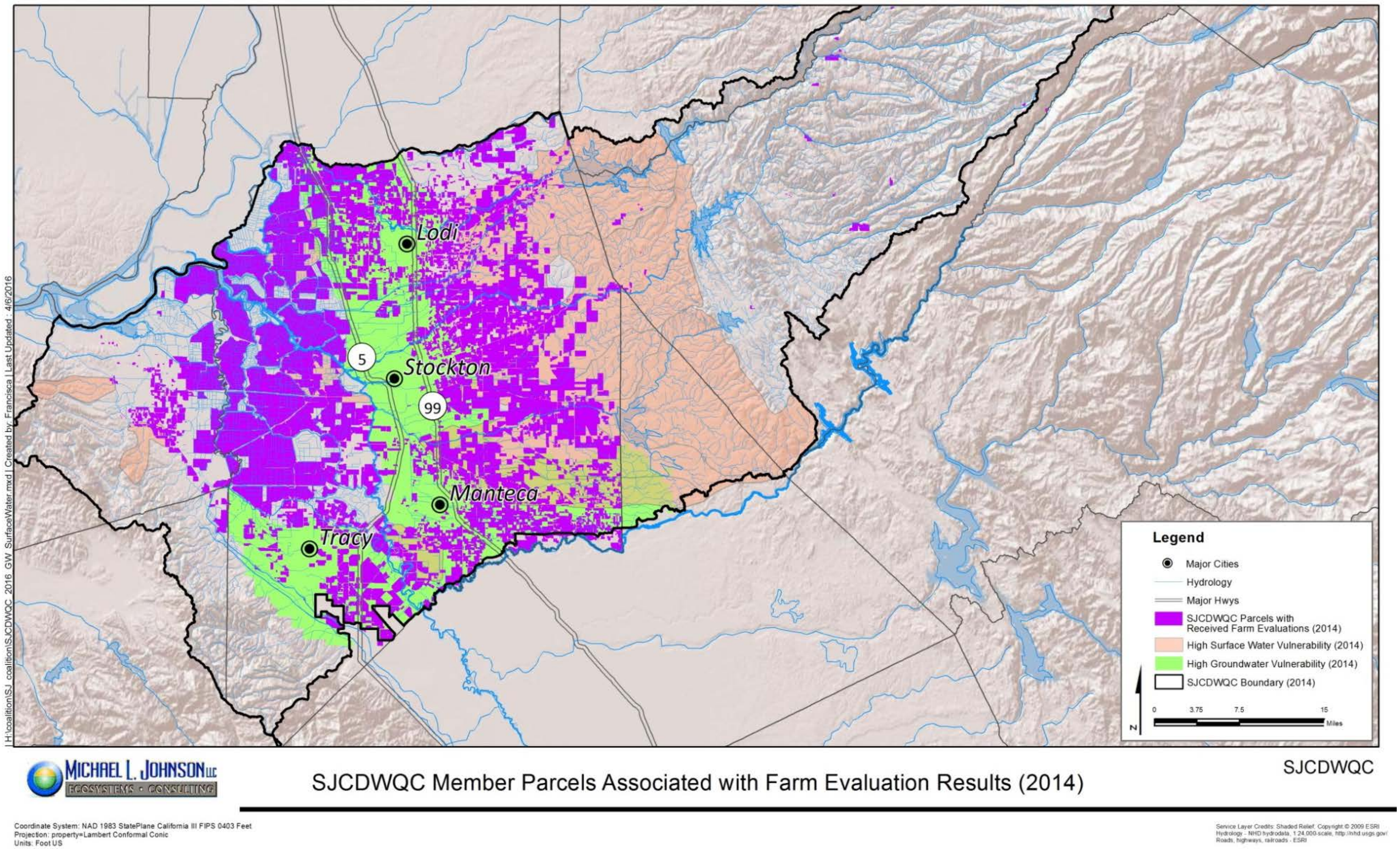


Figure 23. SJCDWQC member parcels associated with one or more farm evaluation shown with groundwater and surface water high vulnerability areas.



Crop Summary

Most members reported parcel specific crop information on their Farm Evaluation for 2014. In the case where multiple crops were listed for a parcel or field, the first crop listed was recorded as the primary crop (Crop 1), and the remaining crops as Crop 2, Crop 3, etc. Primary crops were grouped into general and sub categories to look at crop trends within the Coalition. Table 81 lists the categories and primary crop designations used to standardize the responses. Figure 24 illustrates the percentage of total reported acreage for each General Category of crop listed by members on 2014 Farm Evaluations. Orchards comprise nearly 30% of the acreage and a majority of these are a type of nut tree (Figure 24 and Figure 26). The acreage within the "Nut Tree" subcategory is split almost evenly between walnuts (57%) and almonds (43%; Figure 26). Almonds were the most common secondary crop reported for walnuts; conversely, walnuts were the most common secondary crop for almonds.

Row crops cover approximately a quarter of the acreage, half of which is corn (Figure 24 and Figure 27). Vineyards are the third most reported general category of crop, with close to 20% of the acreage (Figure 24). Grapes make up nearly 100% of the vineyard crops, with kiwi fruit as less than 1% of the acreage (Figure 28). General categories included in the "other" grouping (less than 3% of the reported acreage) are shown in Figure 25.

Table 81. Crop standardization table used for analysis of reported crops.

General Category	Sub Category	Crop 1	Sum of Acres
Feed/Forage	Feed/Forage	Alfalfa	39,531
Feed/Forage	Feed/Forage	Clover	449
Feed/Forage	Feed/Forage	Forage	1,582
Feed/Forage	Feed/Forage	Hay	1,800
Feed/Forage	Feed/Forage	Pasture	10,456
Grains	Grains	Barley	167
Grains	Grains	Grains	211
Grains	Grains	Milo	253
Grains	Grains	Oat	4,844
Grains	Grains	Rice	1,998
Grains	Grains	Rye	219
Grains	Grains	Sudan	158
Grains	Grains	Teff	97
Grains	Grains	Triticale	1,086
Grains	Grains	Wheat	16,854
Mixed Fruit/Vegetable Row Crop	Asparagus	Asparagus	3,460
Mixed Fruit/Vegetable Row Crop	Berries	Blueberries	1,440
Mixed Fruit/Vegetable Row Crop	Berries	Strawberries	474
Mixed Fruit/Vegetable Row Crop	Bulb Vegetables	Garlic	208
Mixed Fruit/Vegetable Row Crop	Bulb Vegetables	Onion	584
Mixed Fruit/Vegetable Row Crop	Cabbage	Cabbage	20
Mixed Fruit/Vegetable Row Crop	Corn	Corn	48,998
Mixed Fruit/Vegetable Row Crop	Cucumbers	Cucumbers	1,182
Mixed Fruit/Vegetable Row Crop	Fruiting vegetables	Bell Peppers	96
Mixed Fruit/Vegetable Row Crop	Fruiting vegetables	Peppers	278
Mixed Fruit/Vegetable Row Crop	Fruiting vegetables	Tomatoes	30,065
Mixed Fruit/Vegetable Row Crop	Legumes	Beans	1,559

General Category	Sub Category	Crop 1	Sum of Acres
Mixed Fruit/Vegetable Row Crop	Legumes	Green beans	30
Mixed Fruit/Vegetable Row Crop	Melons	Melons	580
Mixed Fruit/Vegetable Row Crop	Melons	Watermelons	957
Mixed Fruit/Vegetable Row Crop	Mixed Fruits/Vegetables	Miscellaneous crops	4
Mixed Fruit/Vegetable Row Crop	Mixed Fruits/Vegetables	Mixed Fruits/Vegetables	2,971
Mixed Fruit/Vegetable Row Crop	Root/Tuber Vegetables	Carrots	681
Mixed Fruit/Vegetable Row Crop	Root/Tuber Vegetables	Potatoes	1,519
Mixed Fruit/Vegetable Row Crop	Squash	Pumpkins	1,923
Mixed Fruit/Vegetable Row Crop	Squash	Squash	369
No Crop	No Crop	Dry	11,412
No Crop	No Crop	No Crop	8,271
No Crop	No Crop	Pond	1
Orchard	Fruit Trees	Fruit Trees	71
Orchard	Miscellaneous Trees	Persimmons	38
Orchard	Miscellaneous Trees	Pomegranates	155
Orchard	Nut Trees	Almonds	39,116
Orchard	Nut Trees	Chestnuts	8
Orchard	Nut Trees	Nut Trees	13
Orchard	Nut Trees	Pecans	18
Orchard	Nut Trees	Pistachios	175
Orchard	Nut Trees	Walnuts	52,040
Orchard	Pome fruit	Apples	1,484
Orchard	Pome fruit	Jujube	3
Orchard	Pome fruit	Pears	160
Orchard	Pome fruit	Quince	0
Orchard	Stone fruit	Apricots	237
Orchard	Stone fruit	Cherries	15,822
Orchard	Stone fruit	Nectarines	14
Orchard	Stone fruit	Olives	3,117
Orchard	Stone fruit	Peaches	1,477
Orchard	Stone fruit	Plums	14
Orchard	Stone fruit	Pluots	3
Orchard	Stone fruit	Stonefruit	54
Orchard	Trees	Eucalyptus	3
Orchard	Trees	Trees	562
Other	Cotton	Cotton	187
Other	Dry Crop	Dry beans	466
Other	Dry Crop	Dry crop	95
Other	Dry Crop	Dry pasture	314
Other	Flowers	Flowers	26
Other	Herbs	Basil	160
Other	Herbs	Parsley	38
Other	Miscellaneous plants	Trees	9
Other	Miscellaneous plants	Various nursery plants	805
Other	Native vegetation	Native vegetation	1,539
Other	Not Provided	Not Provided	4,200
Other	Oilseed Group	Safflower	1,773
Other	Oilseed Group	Sunflower	14
Vineyard	Vine Fruit	Grapes	78,652
Vineyard	Vine Fruit	Kiwi	21

Figure 24. Crop trends by General Category as shown in percent acreage.

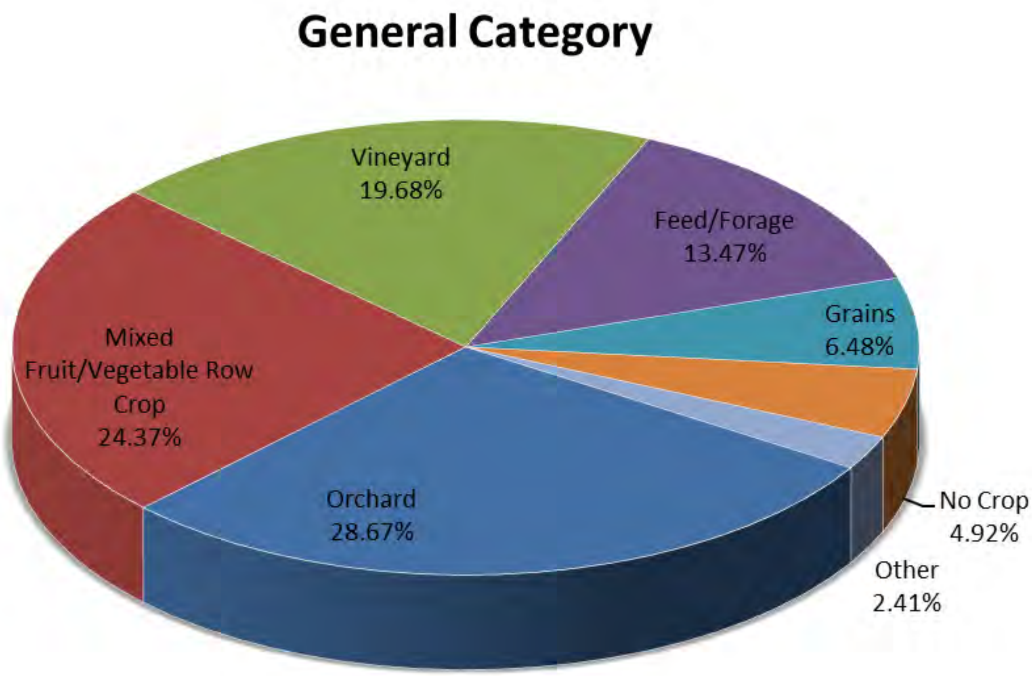


Figure 25. Sub category breakdown for the General Category: Other.

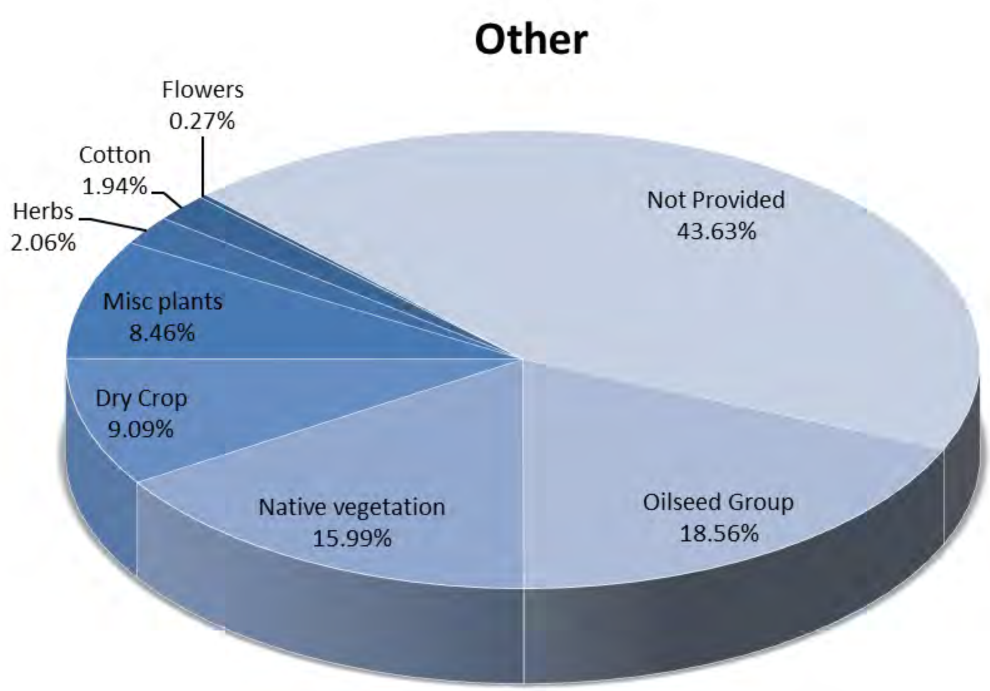


Figure 26. Sub category and primary crop breakdown for the General Category: Orchard.

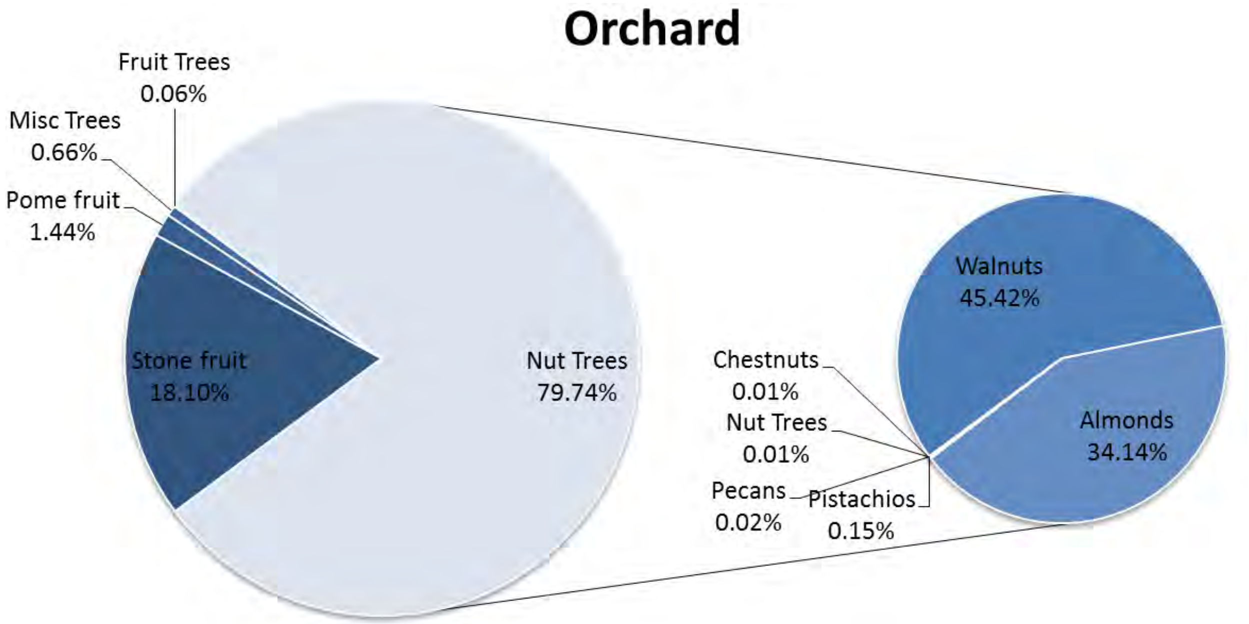


Figure 27. Sub category breakdown of the General Category: Mixed Fruit/Vegetable Row Crop.

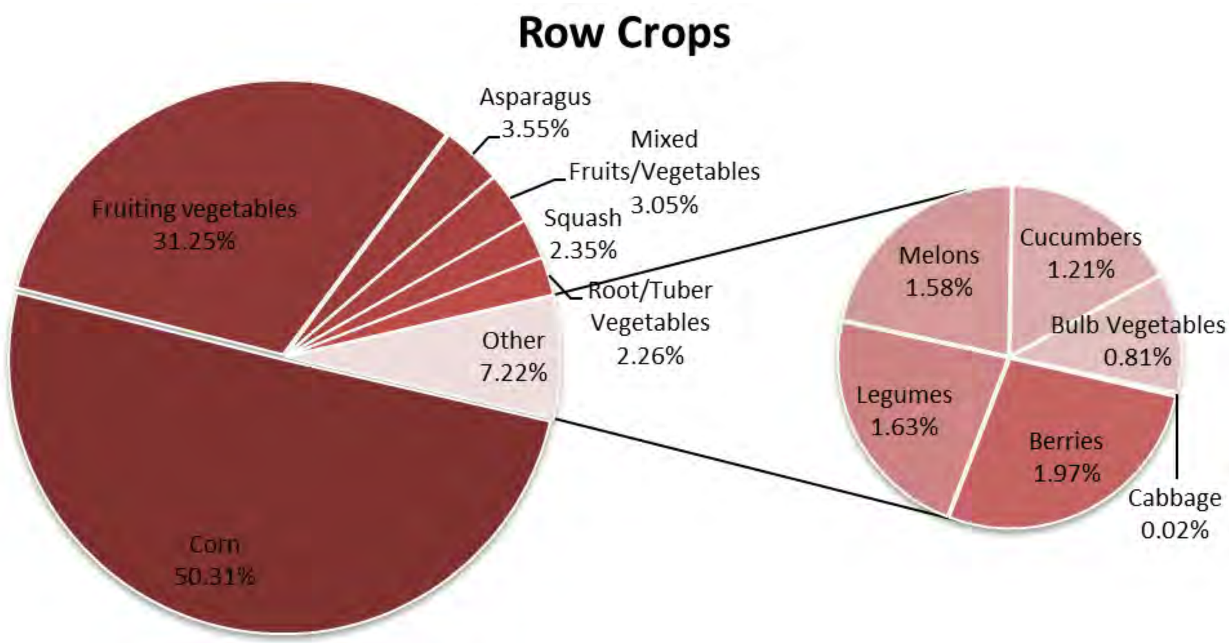
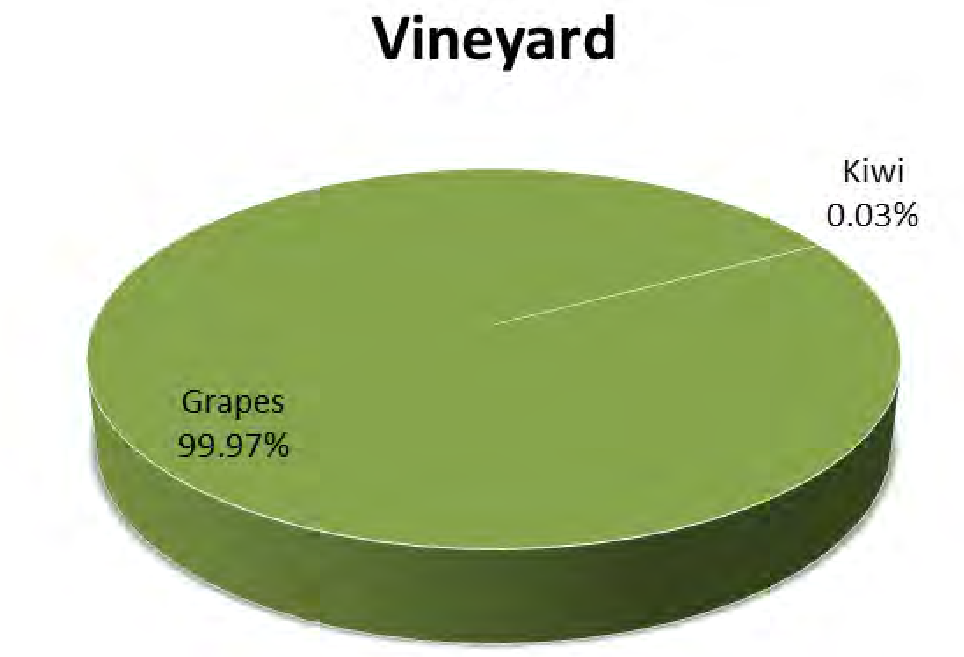


Figure 28. Sub Category Breakdown for the General Category: Vineyard.



Irrigation Management Practices

Practices to efficiently manage irrigation were utilized on a large portion of the Coalition region. Using current field conditions to schedule irrigation events was the most reported method of improving irrigation efficiency (Table 82, Figure 29). This irrigation management practice comprises 98% of the reported acreage (Table 80).

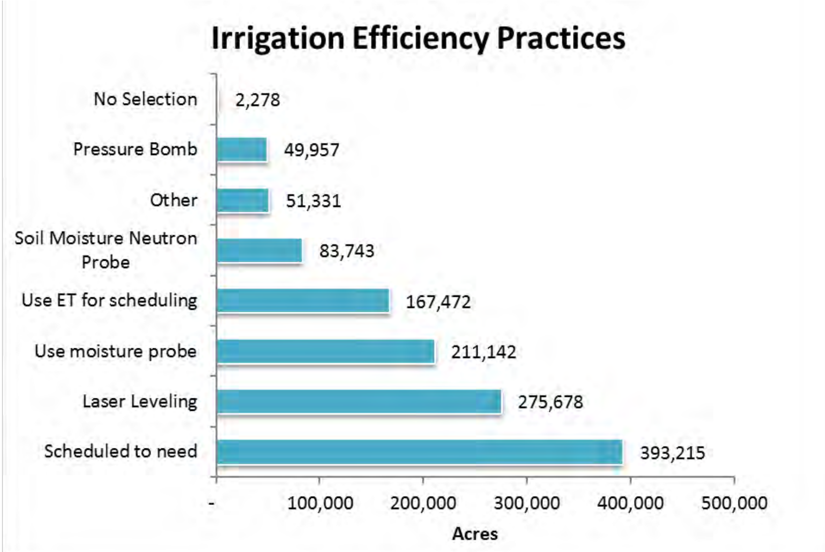
Drip irrigation was the most common primary irrigation type and was utilized on 162,395 acres (Table 82). Furrow and flood irrigation were also commonly reported (109,738 and 97,446 acres, respectively). Most members utilize only one irrigation method, as shown by the large acreage reported with no secondary irrigation practice. When secondary irrigation practices were reported, sprinkler was most common (Table 82, Figure 29).

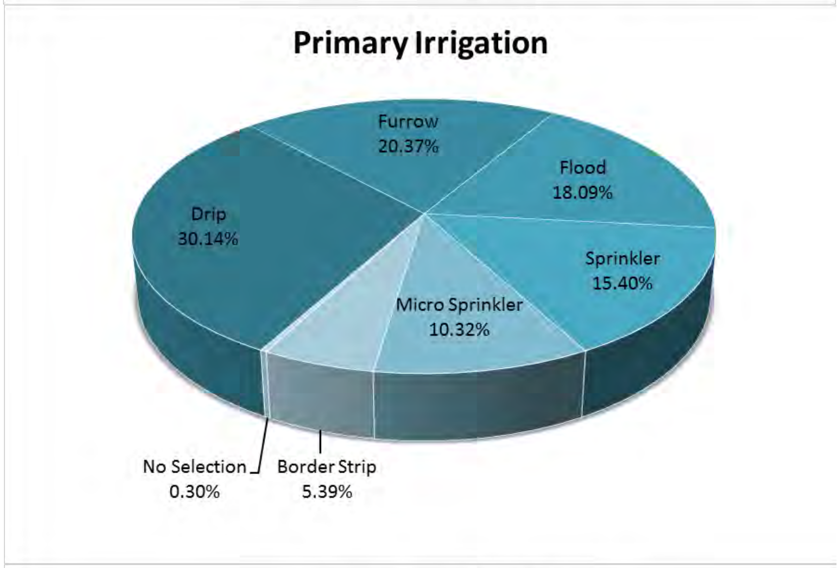
Table 82. Acreage associated with 2014 irrigation management questions and responses.

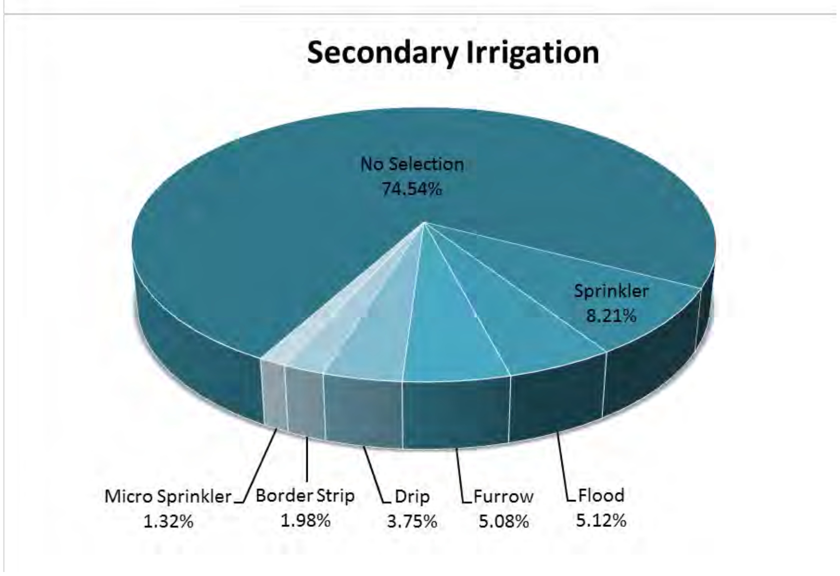
Survey Section	Question	Response	Member Count
B	Irrigation Efficiency Practices		
		Scheduled to need	3,023
		Laser Leveling	1,656
		Use moisture probe	1,091
		Use ET for scheduling	935
		Soil Moisture Neutron Probe	384
		Other	444
		Pressure Bomb	227
		No Selection	60
B	Primary Irrigation Practices		
		Drip	1,182
		Furrow	387
		Flood	760

Survey Section	Question	Response	Member Count
		Sprinkler	772
		Micro Sprinkler	570
		Border Strip	109
		No Selection	27
B	Secondary Irrigation Practices		
		No Selection	2,873
		Sprinkler	201
		Flood	183
		Furrow	109
		Drip	102
		Border Strip	18
		Micro Sprinkler	78

Figure 29. Percent acreage associated with each irrigation efficiency practice and type of irrigation practice (primary and secondary).







Sediment Management Practices

When asked if their parcel have the potential to discharge sediment to off-farm surface waters, 70% of members responded saying there is no potential. Even though the original intention was to have one response per membership for this question, a small percentage of growers responded separately to this question for each management unit (Table 83). The majority of Coalition members used management practices to control the movement of sediment; members typically employed more than one method on a parcel (Table 83). The most common methods to reduce sediment discharge and/or erosion included carefully timing irrigation events with respect to pesticide applications, increasing soil water penetration through amendments, minimizing tillage, and utilizing pressurized irrigation systems (Figure 30 and Figure 31).

Table 83. Members self-reporting the potential to discharge sediment and the acreage associated with 2014 sediment management practices.

Survey Section	Question	Response	Acreage	Member Count
A	Does your farm have the potential to discharge sediment to off-farm surface waters?			
		No	271,884	2,327
		No Selection	6,714	94
		Yes	107,754	350
D	Cultural Practices to Manage Sediment and Erosion			
		Soil water penetration increased through amendments.	263,783	1,803
		Minimum tillage incorporated to minimize erosion.	224,968	1,780
		Cover crops or native vegetation are used to reduce erosion.	214,157	1,881
		Crop rows are graded to optimize rain and irrigation water.	172,180	937
		Vegetated ditches to remove sediment, pesticides, & fertilizers.	135,831	669
		No storm drainage due to field or soil conditions.	111,594	1,680
		Berms capture runoff and trap sediment.	99,483	607
		Storm water is captured using field borders.	84,031	743
		Creek banks and stream banks have been stabilized.	80,162	611
		Field is lower than surrounding terrain.	80,050	413
		Vegetative filter strips and buffers are used to capture flows.	62,906	376
		Hedgerows/trees help stabilize soils & trap sediment movement.	57,802	436
		Subsurface pipelines are used to channel runoff water.	46,850	193
		Sediment basins/holding ponds settle out sediment & pesticides.	30,170	199
		No Selection.	22,717	166
D	Irrigation Practices for Managing Sediment and Erosion			
		The time increased between pesticide applications and irrigation.	267,639	1,930
		Use drip or micro-irrigation to eliminate irrigation drainage.	193,428	1,792
		Shorter irrigation runs with checks manage and capture flows.	161,020	1,024
		No irrigation drainage due to field or soil conditions.	139,134	1,794
		In-furrow dams used to increase infiltration and settle sediment.	87,673	356
		Tailwater Return System.	46,940	208
		Catchment Basin.	33,657	230
		Use of flow dissipaters to minimize erosion at discharge point.	29,800	165
		PAM used to bind sediment & increase infiltration.	19,170	59
		No Selection	18,825	103

Figure 30. Acreage of 2014 cultural practices implemented to manage sediment and erosion.

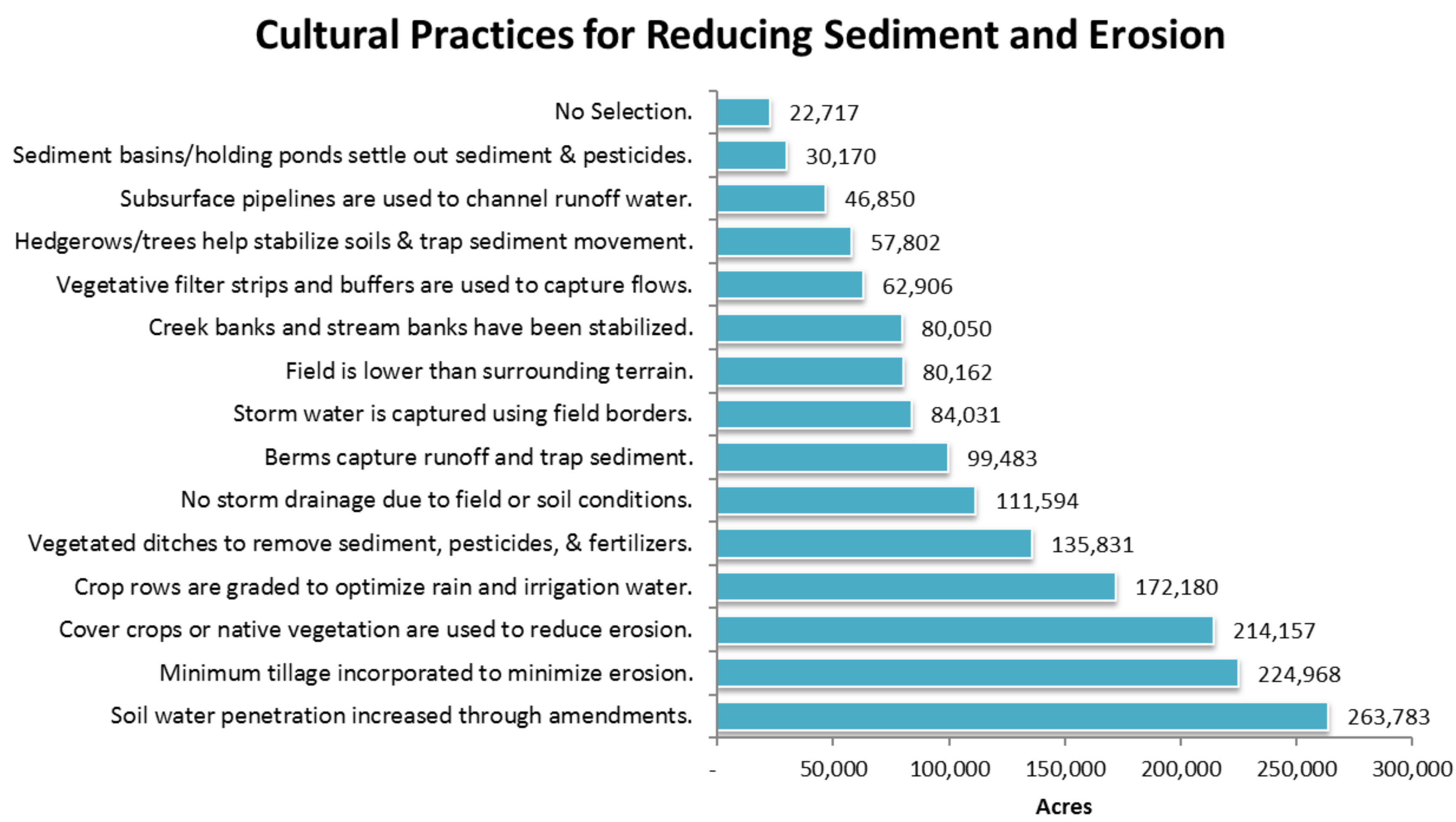
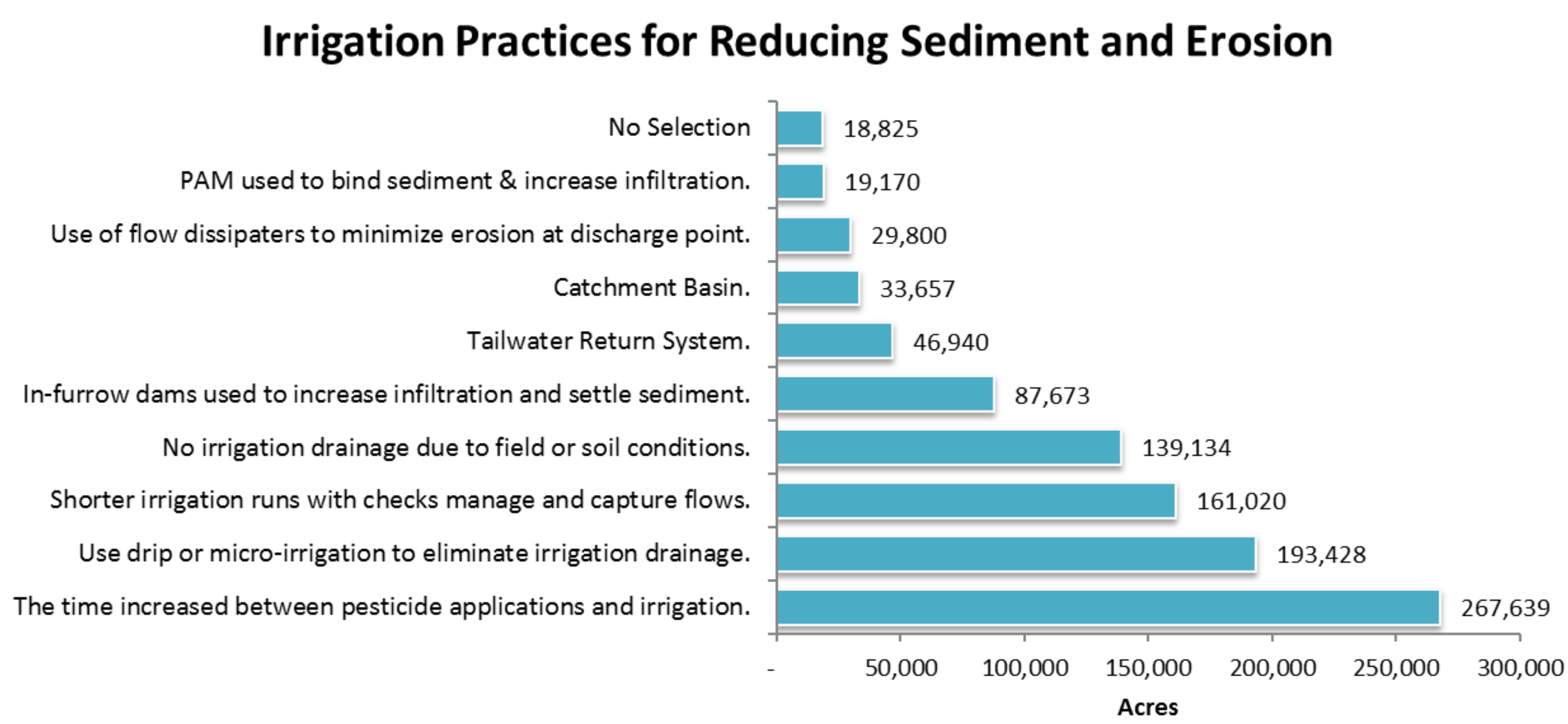


Figure 31. Acreage of 2014 practices implemented to manage sediment and erosion.



Out of all management practices included the Farm Evaluation template, the largest number of reported practices are associated with pesticide and nutrient management. Members employ several practices to reduce the movement of pesticides and nutrients to surface waters (Table 84, Figure 32, Figure 33, Figure 34). No single pesticide management practice was used significantly more than others; the relative consistency among practices with respect to the member count and reported acreage indicates that most members employ as many as six to 10 pesticide management practices.

The majority of members engage a professional in nutrient management to prepare their fertility plan, most often with a PCA certification. The three most reported nitrogen management practices were soil testing, splitting fertilizer applications throughout the growing season, and tissue testing (Table 84). Members were able to write-in responses in an "Other" option on the survey. The most common notes written in under "Other" for Nitrogen Management were "None", applying to 8,090 acres, and minimal or pre-planting fertilizer, which applied to 10,594 acres.

Table 84. Member count associated with 2014 pesticide application practices and acreage associated with 2014 nitrogen management practices.

Survey Section	Question	Response	Acreage	Member Count
A	Pesticide Application Practices			
		Follow Label Restrictions	425,602	3,201
		Monitor Wind Conditions	422,460	3,124
		County Permit Followed	422,302	3,135
		Attend Trainings	412,761	2,960
		Use PCA Recommendations	412,097	2,933
		End of Row Shutoff When Spraying	405,016	2,896
		Avoid Surface Water When Spraying	401,014	2,762
		Monitor Rain Forecasts	375,825	2,747
		Use Drift Control Agents	374,186	2,423
		Use Appropriate Buffer Zones	373,212	2,480
		Reapply Rinsate to Treated Field	273,057	1,748
		Sensitive Areas Mapped	233,991	1,291
		Use Vegetated Drain Ditches	201,725	830
		Chemigation	162,680	873
		Target Sensing Sprayer used	106,339	542
		Other	33,962	353
		No Pesticides Applied	4,514	186
		No Selection	587	16
A	Who helps develop the crop fertility plan?			
		Pest Control Advisor (PCA)	407,944	2,970
		Certified Crop Advisor (CCA)	188,904	1,289
		Professional Agronomist	142,386	728
		Professional Soil Scientist	133,920	713
		Independently Prepared by Member	92,304	516
		UC Farm Advisor	91,548	616
		Certified Technical Service Providers by NRCS	9,383	77
		None of the above	7,481	295
		No Selection	998	18
B	Nitrogen Management Practices			

Survey Section	Question	Response	Acreage	Member Count
		Soil Testing	327,208	2429
		Split Fertilizer Applications	287,520	2,432
		Tissue/Petiole Testing	265,522	1,964
		Fertigation	165,369	1,305
		Foliar N Application	161,437	1,348
		Cover Crops	136,420	1,205
		Irrigation Water N Testing	134,495	954
		Variable Rate Applications using GPS	20,712	450
		No Selection	9,778	112
		Other	41,443	137

Figure 32. The count of members and percent of memberships there reported each type of crop fertility plan assistance.

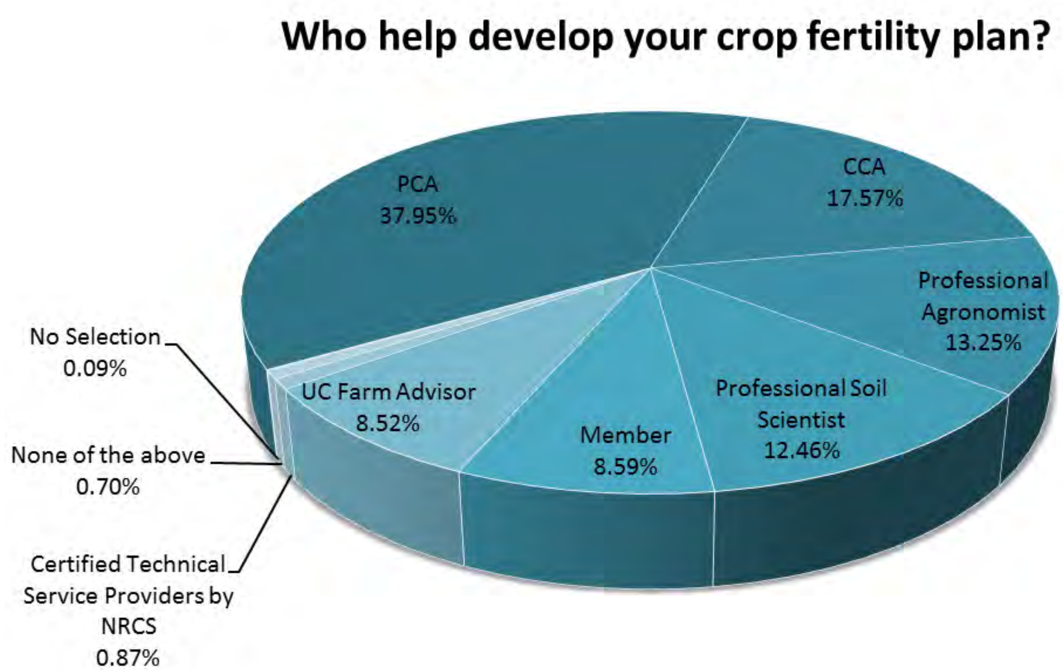


Figure 33. Count of members reporting 2014 pesticide application practices.

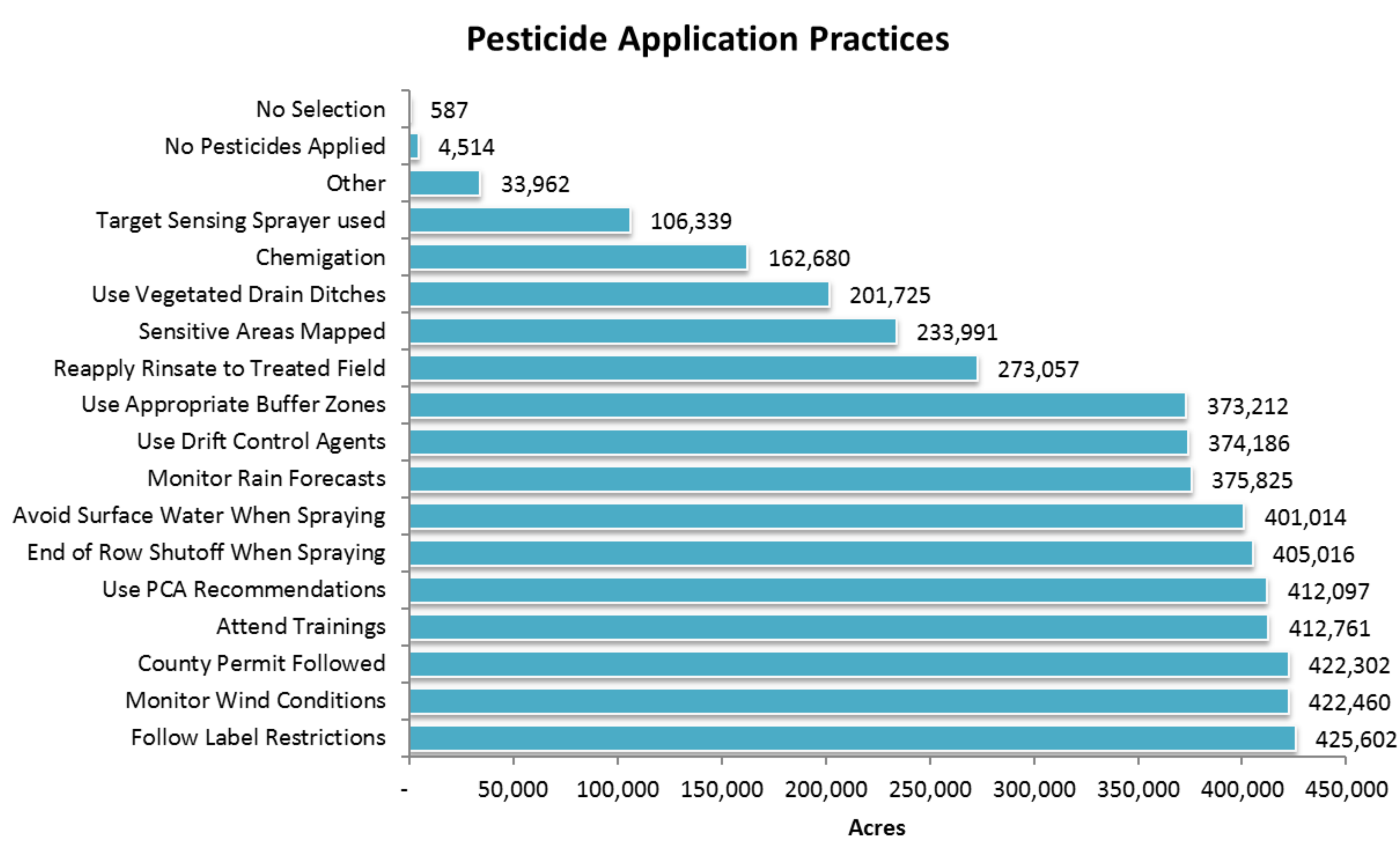
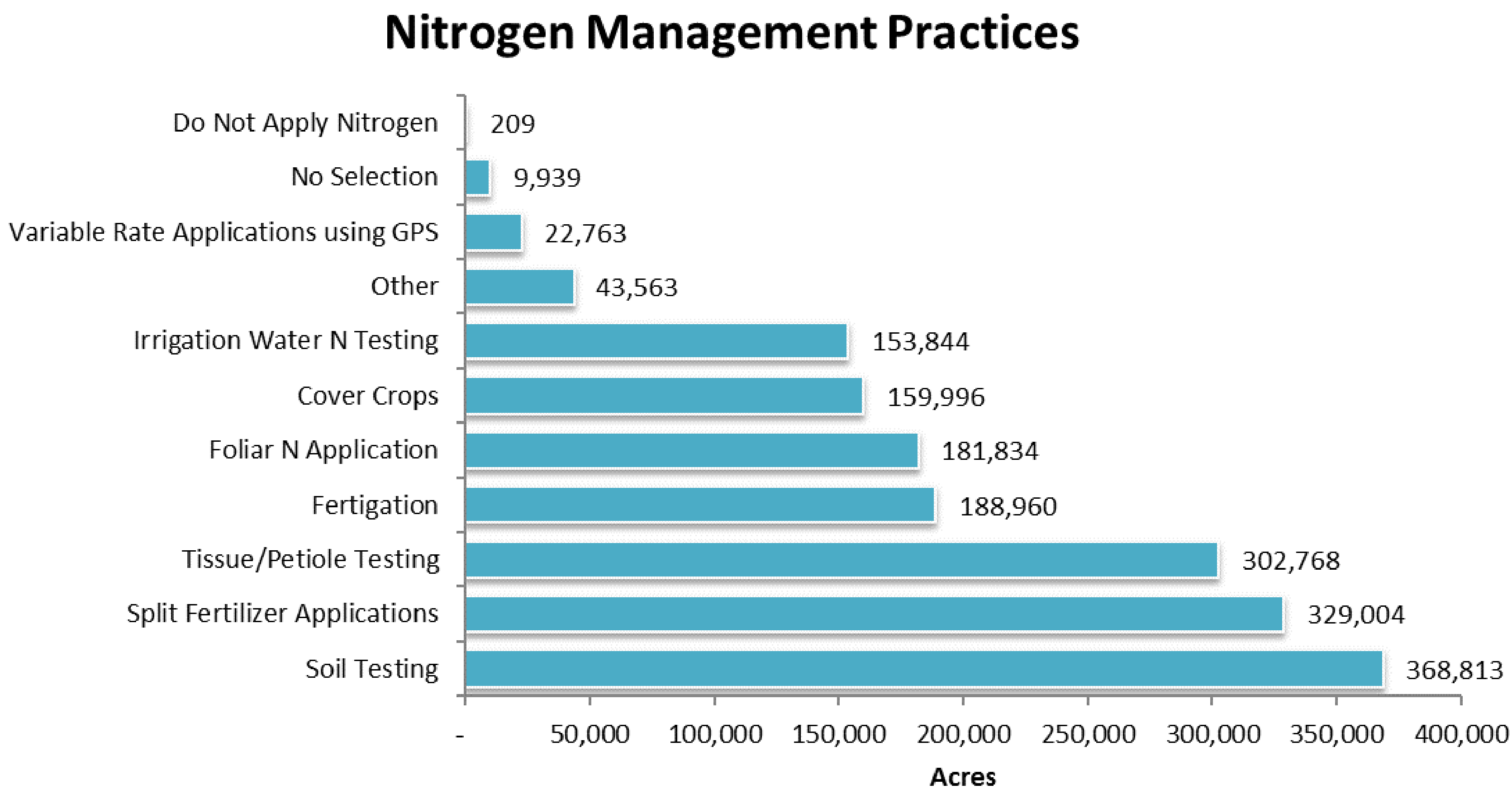


Figure 34. Members who reported 2014 nitrogen management methods.



Well Management Practices

Irrigation Wells

The majority of members have at least one irrigation well, maintained with two to four specific wellhead protection practices (Table 85, Figure 35 and Figure 36). Many members chose to write in "cement pad" as a wellhead protection practice, which prompted the Coalition to incorporate that option in the 2015 Farm Evaluation Surveys.

Table 85. Acreage associated with 2014 wellhead protection practices.

SURVEY SECTION	QUESTION	RESPONSE	COUNT
C	Do you have any irrigation wells on parcels associated with this Farm Evaluation?		Member
		Yes	1,758
		No	941
		No Selection	52
C	Wellhead Protection Practices		Well
		Good "Housekeeping" Practices	3,462
		Standing water avoided around wellhead	3,410
		Ground Sloped Away from Wellhead	3,371
		Backflow Preventive / Check Valve	2,996
		Air Gap (for non-pressurized systems	1,359
		No Data Entered	103
		Unique Irrigation Wells	**3,554**

Figure 35. Percent acreage associated with members who have irrigation wells.

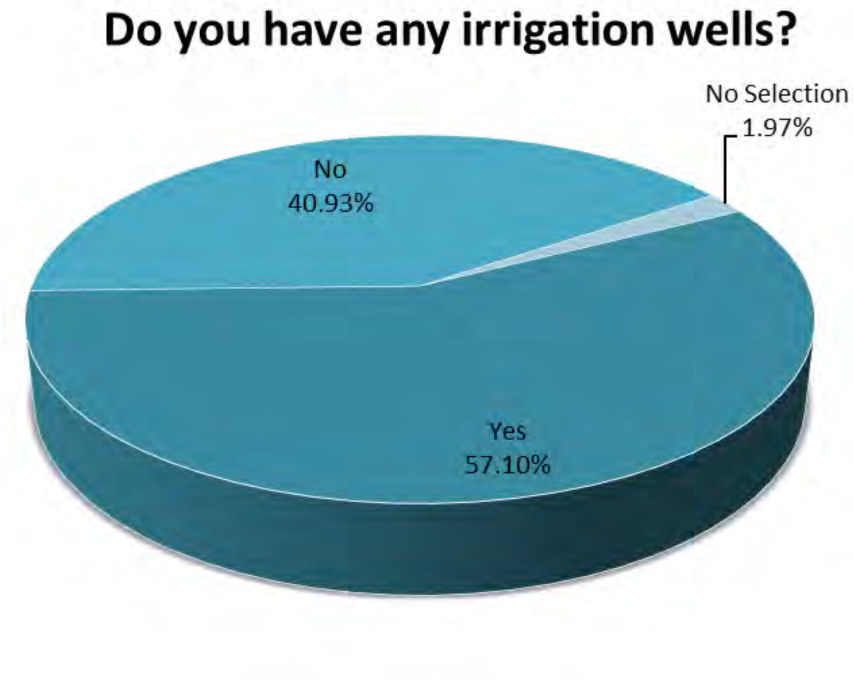
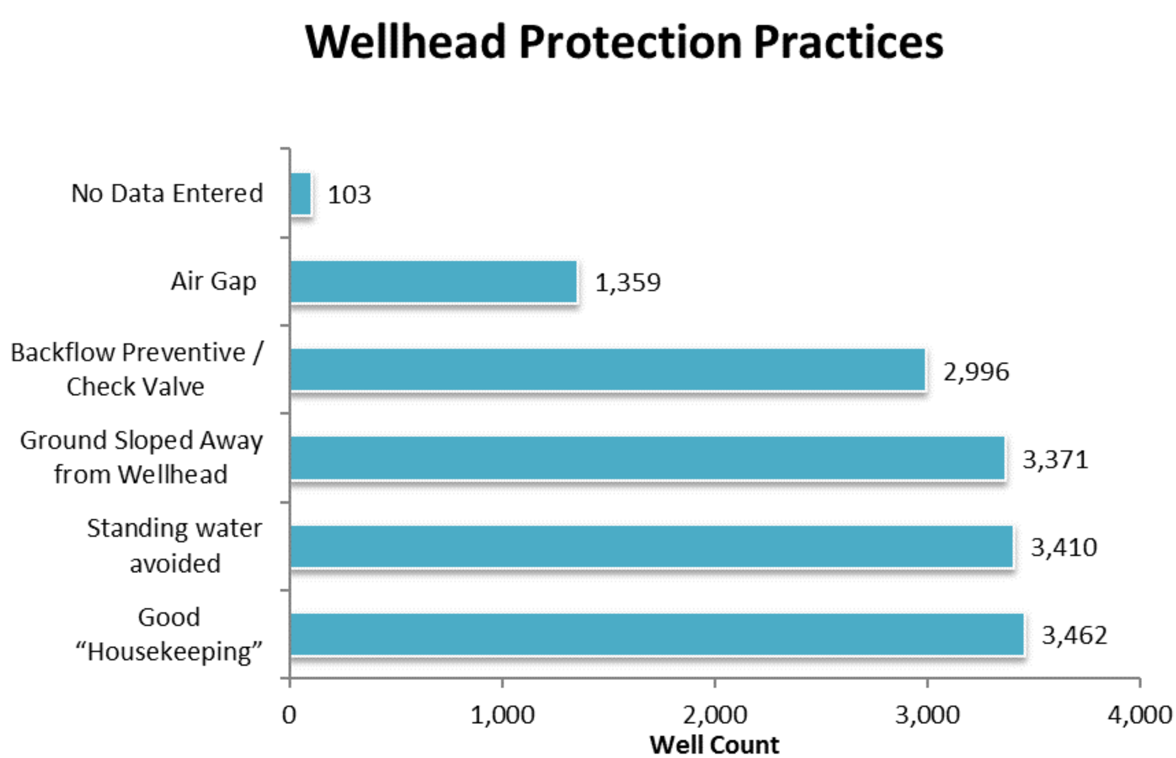


Figure 36. Wellhead protection practices per well by unique well count.



Abandoned Wells

Only five percent of members (105 members) reported the presence of known abandoned wells on their property (Table 86). Of these abandoned wells, the majority were properly destroyed either by a licensed professional or certified by the county (46 of 113 reported abandoned wells). However, most growers did not know what method was used to destroy the well (Table 86 and Figure 37). It is unclear whether this is due to a misunderstanding of the question, inadequate options in the survey, or members reporting on abandoned wells that were destroyed by previous owners.

Table 87 lists the year that growers reported the wells were abandoned. When a decade was given by the grower, the first year of the decade was used for totaling purposes. There is no clear pattern with respect to quantity of wells abandoned through time.

Table 86. Acreage associated with abandoned well practices.

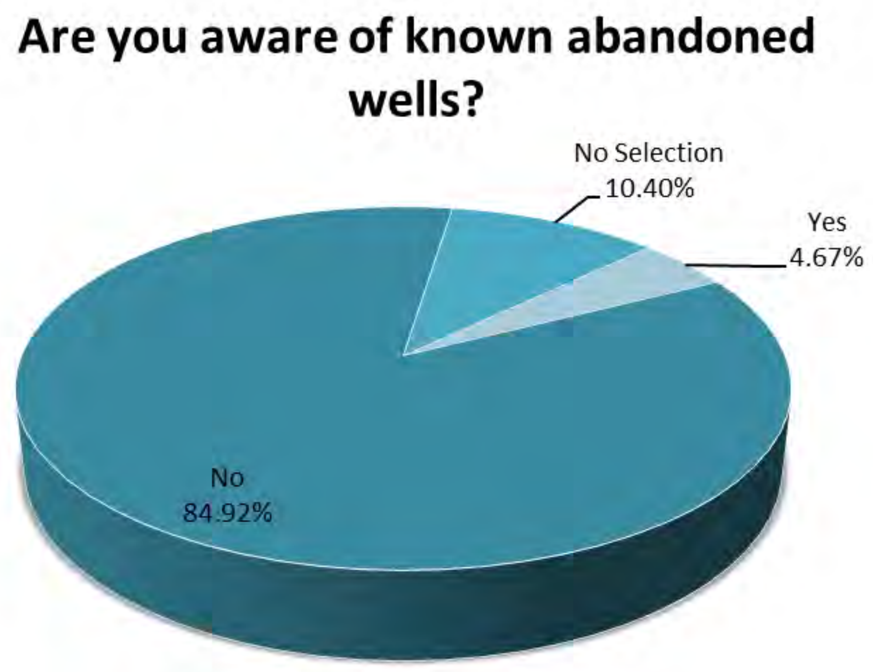
Survey Section	Question	Response	Count
C	Are you aware of any known abandoned wells associated with this Farm Evaluation?		Member
		No	2,387
		No Selection	259
		Yes	105
C	Abandoned Well Practices		Wells
		Destroyed - Unknown method	50
		No Data Entered	53
		Destroyed by licensed professional	41
		Destroyed – certified by county	52

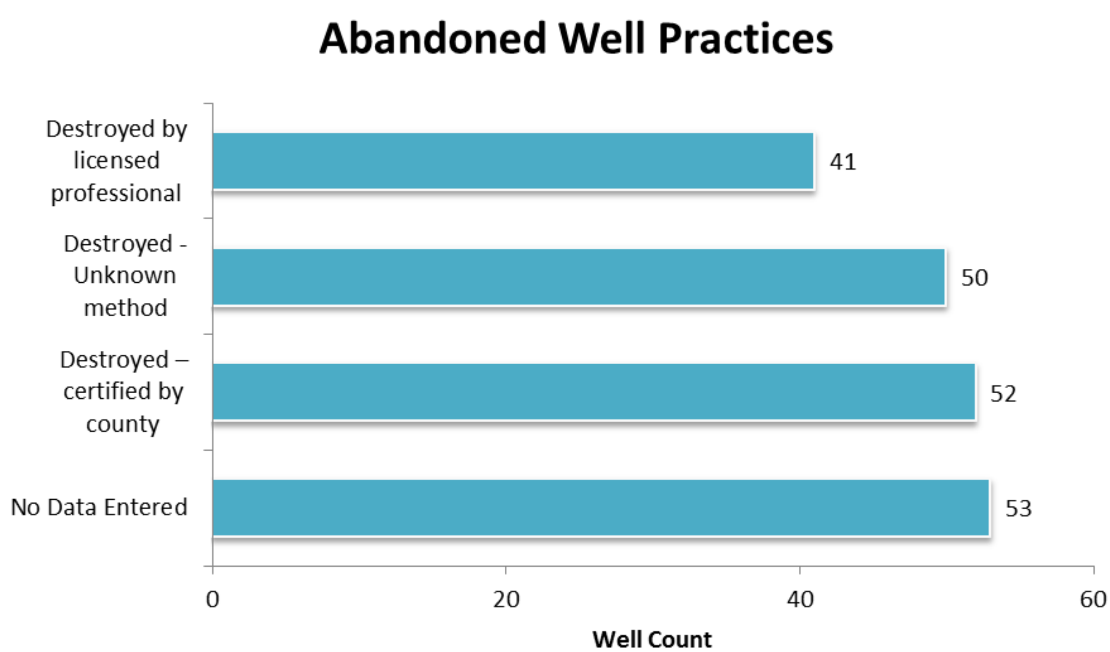
Table 87. Count of wells abandoned in specific years.

Survey Section	Question	Response	Count of Wells
C	Well Abandoned Year	1940	1
		1960	5
		1962	1
		1970	3
		1972	1
		1973	1
		1976	2
		1978	1
		1979	1
		1983	1
		1984	1
		1985	2
		1987	2
		1988	3
		1989	4
		1990	5
		1991	3
		1992	2
		1993	3
		1994	2
		1995	3
		1996	2

SURVEY SECTION	QUESTION	RESPONSE	COUNT OF WELLS
		1999	1
		2000	1
		2002	2
		2005	3
		2007	1
		2008	1
		2009	2
		2010	4
		2012	2
		2013	2
		2014	1
		Year Unknown	39
		Unanswered	6
		Total	**113**

Figure 37. Percentage of acreage with abandoned wells and practices associated with those wells.





GROUNDWATER QUALITY ASSESSMENT AND PROGRAMS

For groundwater protection, the WDR requires 1) a Groundwater Quality Assessment Report (GAR), 2) a Management Practices Evaluation Program (MPEP), 3) a Groundwater Quality Trend Monitoring Program (GQTMP), and 4) a Groundwater Quality Management Plan (GQMP). Table 79 includes all deadlines associated with the GAR and Monitoring Work plans.

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." All submittal/approval dates associated with the GAR are included in Table 79. The Coalition submitted the GAR outline on July 23, 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 (conditionally approved December 18, 2015; Table 79). The Regional Board staff recommendations and associated compliance dates stipulated within the conditional approval of the GAR are to be addressed in the 2020 GAR update and in the GQTMP.

The GAR was prepared in accordance with the outline submitted to the Regional Board on July 23, 2014 and contains details on the approach and methods applied to determine high and low vulnerability areas (HVAs and LVAs) in the SJCDWQC region. The Coalition's GQMP was submitted on February 16, 2016, 60 days after the conditional approval of the GAR.

The GAR is designed to provide information necessary for the design of the MPEP, the GQTMP, and the GQMP. Therefore, the GAR includes the following:

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

The HVAs and LVAs were established in the GAR using existing hydrogeological characteristics, groundwater quality data, models, and current studies. The HVAs were then prioritized based on extent and spatial frequency of nitrate exceedances of the WQTL in groundwater, groundwater modeling results, presence of disadvantaged communities (DACs) and disadvantaged unincorporated communities (DUCs), and current land use. The HVA boundaries were used in the development of the GQMP, GQTMP, and MPEP.

GROUNDWATER QUALITY MANAGEMENT PLAN

All submittal/approval dates associated with the GQMP are included in Table 79. With the approval of the GAR, the deadline for the GQMP was established and the Coalition submitted its GQMP on February 16, 2016. Approval of the GQMP by the Regional Board is pending at the time of the submission of this Annual Report. The purpose of the GQMP is to develop a strategy for eliminating/reducing impairments of beneficial uses of groundwater due to agricultural practices. The SJCDWQC strategy is informed by the GAR, MPEP, the Nitrogen Management Plan Technical Advisory Work Group (NMP TAWG) efforts, grower management practice and land use documentation, and groundwater monitoring. The GQMP approach involves three activities 1) a broad spectrum method of identification of whether or not constituents of concern are related to agricultural practices, 2) outreach to all members whose parcels lay above groundwater identified as exceeding water quality parameters, providing recommendations of management practices with the potential to be effective in managing discharges, and 3) monitoring to evaluate the efficacy of those implemented management practices.

GROUNDWATER QUALITY TREND MONITORING WORK PLAN

The Coalition is required to develop a GQTM work plan as part of the GQTMP and a QAPP for Trend Monitoring one year after the conditional approval of the GAR (conditional approval December 18, 2015). All submittal/approval dates associated with the GQTMP are included in Table 79. The Coalition is currently developing the GQTM work plan for submittal on December 18, 2016. The QAPP will be submitted 30 days after the GQTM work plan is approved by the Regional Board.

As stated in the WDR, the objectives of the GQTMP are to determine current water quality conditions of groundwater relevant to irrigated agriculture, and to develop long-term groundwater quality information that can be used to evaluate the regional effects of irrigated agricultural practices. In addition, the GQTM work plan should include analysis and reporting of trend monitoring results on an annual basis with more detailed analysis and reporting of monitoring data every five years. Annual monitoring will include analysis for nitrate as N and field parameters (DO, SC, pH, oxidation-reduction potential (ORP), temperature, and turbidity). The five year analysis will include TDS, major anions (bicarbonate, carbonate, chloride sulfate), and major cations (boron, calcium, magnesium, potassium, and sodium). Data obtained from GQTMP activities will be used in conjunction with data from the GQMP and MPEP to more fully understand the connections between irrigated agriculture and groundwater quality.

MANAGEMENT PRACTICES EVALUATION PROGRAM

The goal of the MPEP is to determine the effects, if any, of irrigated agricultural practices on groundwater quality. All submittal/approval dates associated with the MPEP are included in Table 79. As part of its MPEP, the Coalition is required to develop an MPEP Work Plan within two years of the approval of the GAR by the Regional Board (conditional approval June 4, 2014). The MPEP Work Plan shall include the tools and methods to be used to meet the objectives of the MPEP, specifically, identifying those irrigated agricultural management practices protective of groundwater quality. An

MPEP is required in areas designated as HVAs and must address the COCs described in the GAR (primarily nitrate).

In January 14, 2014, the SJCDWQC, along with the East San Joaquin Water Quality Coalition and Westside San Joaquin River Watershed Coalition, notified the Regional Board of their intent to form an MPEP Group Coordinating Committee (GCC) as outlined in the WDR (approved June 17, 2015). This MPEP GCC was formed to prevent a duplication of efforts and increase efficiency, while better coordinating the development, preparation, and implementation of the MPEP Work Plan and reports required by the coalitions' respective WDRs. On June 30, 2015, the MPEP GCC was expanded to include the Sacramento Valley Water Quality Coalition and the Westland Water District Coalition. The MPEP group currently is formed of five Coalitions.

The MPEP GCC is tasked with carrying out the management practice effectiveness evaluations, in addition to providing oversight of the development of the MPEP Work Plan and the management of all MPEP studies that is consistent with the objectives for the MPEP as identified in the WDR:

1. Identify whether existing site-specific and/or community-specific management practices are protective of groundwater quality within HVAs.
2. Determine if newly implemented management practices are improving or may result in improving groundwater quality.
3. Develop an estimate of the effect of Members' discharges on COCs on groundwater quality in HVAs.
4. Utilize the results of evaluated management practices to determine whether practices implemented at represented Member farms (i.e., those not specifically evaluated, but having similar site conditions), are sufficiently protective of groundwater quality or if management practices need to be improved.

Management practices identified as protective of groundwater quality through MPEP studies will be incorporated within the SJCDWQC's GQMPs. Results from MPEP and GQTM studies, along with updates in the GAR, will be used to determine if implemented management practices are resulting in improvements to groundwater quality.

On July 31, 2015, the MPEP GCC submitted the MPEP Conceptual Study Design. The MPEP Conceptual Study Design described a multiphase approach, including Phase I focused on the development of the MPEP studies (study designs, locations, crops, and management practices to be evaluated), and Phases II and III which involve the extrapolation of results from Phase I using the appropriate modeling method(s). Currently, the MPEP GCC is developing a final MPEP Work Plan for submittal to the Regional Board on June 4, 2016.

NITROGEN MANAGEMENT PLAN

In 2015, third party agricultural coalitions were required to submit a study plan outlining the state of knowledge about the amount of nitrogen removed from agricultural fields with harvested material. The Coalitions developed questions to guide the identification of these knowledge gaps and held a series of meetings with the Nitrogen Management Plan Technical Advisory Work Group (NMP TAWG). The NMP TAWG included experts from the University of California, state and federal agencies, and private industries to develop the answers to those questions developed by the Coalitions. All submittals and approval dates associated with the NMP are included in Table 79. The NMP TAWG hosted three public stakeholder Work Group meetings in Merced between April and July. The information obtained during the NMP TAWG stakeholder meetings informed the Crop Nitrogen Knowledge Gap Study Plan (Study Plan) as well as the Guidance Documents which were submitted to the Regional Board on December 18, 2015. Guidance documents were developed for growers to assist in completing their Nitrogen Management Plans.

Growers in high vulnerability groundwater areas are required to prepare and implement a Nitrogen Management Plan by June 1 annually (certified by June 15, 2016) and submit a NMP Summary Report to the Coalition by June 1 the following year starting June 1, 2016. The NMP Summary Report was developed with all of the Central Valley coalitions. On November 18, 2015 the Coalitions submitted the NMP Summary Report template to the Regional Board; approved December 23, 2015.

On the NMP Summary Report, growers report the ratio of total available nitrogen applied per acre (A) to yield per acre (Y) as the indicator of N-removed from the field at harvest for each parcel in addition to total available nitrogen applied (pounds/acre). The Coalition will convert A/Y to A/R where R is the amount of N-removed. Once the data is aggregated, the Coalition will provide N-removed estimates to growers. This is the first year that the Coalition is collecting NMP Summary Report information and the Coalition is working on the format for disseminating summary data back to the grower to help inform future nitrogen management decisions. Information sent to growers could include box and whisker plots of total applied nitrogen to nitrogen removed ratios, charts of applied nitrogen compared to nitrogen removed, information on Coalition wide means compared to member's specific information, and box and whisker plots of the ratios of total applied nitrogen to yield.

The NMP TAWG Study Plan references nitrogen removed calculators currently available from USDA-Natural Resources Conservation Service (NRCS), the International Plan Nutrition Institute (IPNI), and CDFA-Fertilizer Research and Education Program (FREP). There are 17 calculators on the CDFA FREP website for which N-removed can be calculated (not including rice, Table 88). The crops that have been reviewed for N uptake include: almonds, barley, broccoli, cauliflower, citrus, corn for grain, corn for silage, cotton, grapevines, lettuce, pistachio, rice, strawberries, tomatoes, walnuts and wheat. However, these N removed values are not adequately refined to be used as a regulatory tool. By July 1, 2016 the Coalitions will submit a Work Plan for expanding/revising the Y-to-R conversions.

In March 2016, the Coalition mailed NMP Summary Reports to 3,662 members located within four counties, representing 277,703 irrigated acres (55% of irrigated acreage in the Coalition) in high vulnerability groundwater areas. To assist growers with completing their NMP Summary Reports, the Coalition held several NMP Workshops from May through June to assist growers in completing NMPs. The Coalition will provide an analysis of the NMP Summary Reports in the 2017 AMR.

Table 88. N removed calculators from FREP for Coalition's standard Y-to-R conversion methodology.

Crop	Pounds of N removed per pound of yield	Percent of Central Valley acreage (excluding rice)
Almonds	0.068	15.9
Barley	0.0185	0.1
Broccoli	0.0055	0.1
Cauliflower	0.0034	0.0
Citrus (Valencia orange)	0.00185	4.1
Corn, Grain	0.00905	3.3
Corn, Silage	0.01345	8.5
Cotton, Acala	0.0751	2.2
Cotton, Pima	0.0569	4.2
Grapevines	0.001	11.5
Lettuce	0.0025	0.2
Pistachios	0.028	4.0
Prunes	0.006	0.9
Strawberry	0.0013	0.1
Tomatoes, Processing	0.00195	4.5
Walnuts	0.020	5.3
Wheat	0.0069	4.6
	Total Percent Acreage	**69.5%**

SEDIMENT DISCHARGE AND EROSION CONTROL PLAN

All Coalition members are required to implement 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 (SECP) are included in Table 79. The Central Valley 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. In 2015, the coalitions worked together with Regional Board staff to revise the SECP template to ensure that the template is adequate for documenting practices that are protective of water quality and submitted a revised template on October 9, 2015 (approved December 1, 2015).

The Coalition submitted the SDEAR on April 25, 2015 (conditional approval August 12, 2015). The SDEAR identifies the areas within the SJCDWQC region where growers will be required to complete SECPs utilizing the Revised Universal Soil Loss Equation (RUSLE) and responses from the returned Farm Evaluations. 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 an SECP in one of the following ways:

1. The SECP must adhere to the site-specific recommendation from the 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.

The SJCDWQC is working with the other Central Valley coalitions to come up with programs and resources to assist growers in completing and certifying their SECPs. The Coalitions have met with NRCS staff to discuss programs and funds to train RCD staff to complete and certify SECPs since there are currently limited staff available with the technical background to do this. The Coalitions are also working on developing a self-certification training program that growers could take and certify their own SECPs.

As prescribed by the conditional approval of the SDEAR, the Coalition submitted a work plan with a timeline to address proximity to surface waters on December 15, 2015 (conditional approval January 22, 2016). The Coalition will identify parcels in proximity to large tributaries by April 22, 2016, medium tributaries by July 22, 2016, and small tributaries by September 22, 2017. This analysis is focused on identifying parcels adjacent to waterbodies that have not already been identified as requiring a SECP and determining if the parcel has riparian vegetation.

In December 2015, the Coalition contacted all members with parcels requiring a SECP and mailed them the SECP template and instructions for completing the SECP. Members who were not identified with the RUSLE model and have not returned a Farm Evaluation survey were mailed an SECP; if they returned their Farm Evaluation survey and indicated that they do not have the potential to discharge sediment, the member is removed from the list of parcels required to have an SECP. The SECP 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 by February 6, 2016 (Table 79). Members identified through the proximity to surface water analysis for large tributaries have until February 2017.

MITIGATION MONITORING REPORT

As stated on Page 10 of the WDR, environmental impacts may occur as a result of member compliance activities. Members are therefore required to either avoid impacts where feasible or implement identified mitigation measures, if any, to reduce potential impacts. Where avoidance or implementation of identified mitigation is not feasible, use of the WDR is prohibited and individual WDRs are 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 implemented mitigation measures reported by Coalition members during the 2015 WY.

PROGRAMMATIC QUESTIONS

The following sections provide responses to the six key programmatic questions outlined in the WDR. Each of the six questions is answered using an assessment of water quality data obtained during the 2015 WY. In some cases, the Coalition utilized monitoring data as well as management practice information from historic years to make conclusions for each of the six questions. These data support the conclusion that, in general, water quality improvements are continuing across the Coalition region.

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

As outlined in the Basin Plan and WDR, waters of the State receiving discharge from irrigated lands must be protective of all beneficial uses (BUs) including 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). In 2008, the Regional Board developed a list of WQTLs based on numeric water quality objective and standards from the Basin Plan including interpretive narrative water quality objectives (Table 34). The Coalition uses this list of WQTLs to determine exceedances of WQTLs and impairments of BUs. In the WDR, a table of WQOs is included in Attachment B. The WDR states that additional trigger limits may be developed by the Executive Officer utilizing water quality criteria to interpret narrative WQOs.

The Basin Plan lists BUs by waterbody, but does not include all of the Coalition's monitoring waterbodies. Therefore, BUs assigned to Coalition waterbodies are applied based on those assigned to the most immediate downstream waterbody in the Basin Plan (tributary rule). However, the tributary rule does not apply to constructed agricultural drains such as those found in the Delta islands. Furthermore, exceedances of constituent specific WQTLs that cause impairments to Agriculture, Aquatic Life, and Municipal Supply BUs can have multiple sources that may or may not result from agricultural practices. Until all sources that impair BUs of waterbodies are addressed, meeting all water quality objectives and Basin Plan provisions for the Waters of the State may be difficult to achieve. Table 90 includes a summary of when Coalition water quality monitoring at specific sites was protective of beneficial uses from 2008 through September 2015.

Protection of Beneficial Uses

Waters of the State and BUs are considered protected if no exceedances of WQTLs occur during monitoring events. Table 89 lists constituents that were detected above their respective WQTLs during the 2015 WY and the BUs impaired by the exceedances. Figure 38 includes percentages of impaired BUs based on Coalition wide monitoring results from the 2015 WY. Not all constituents have a WQTL associated with a BU including pH, orthophosphate (soluble), phosphorus (total), TKN, TOC, TSS, carbofuran, demeton-s, dicofol, malathion, molinate, parathion, methyl, and thiobencarb; no exceedances occurred for any of these constituents during 2015 WY monitoring. Therefore, these constituents are not included in the assessment of BU protection below (Table 89 and Figure 38).

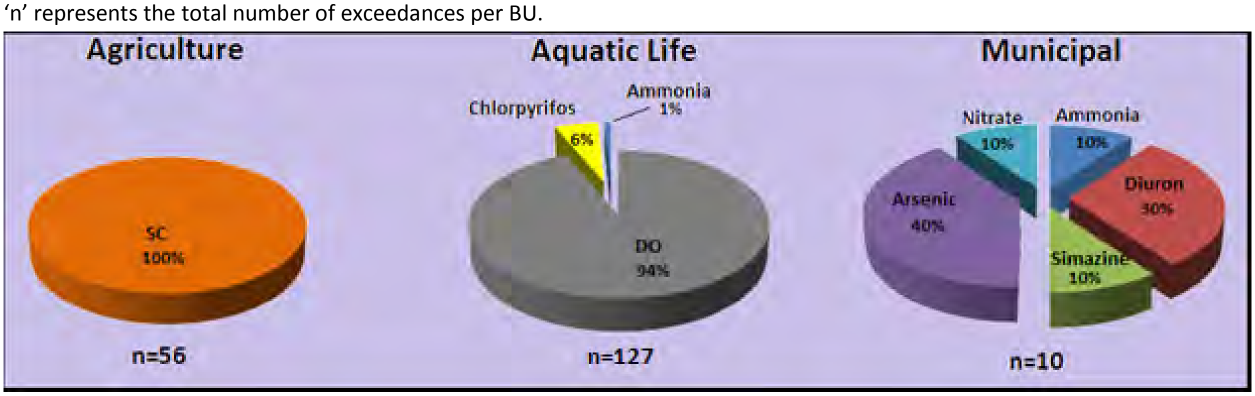
The most common exceedances of WQTLs were field parameters (DO and SC) which resulted in impaired Agricultural and Aquatic Life BUs (Table 89 and Figure 38). There were numerous exceedances of the WQTL for *E. coli* which resulted in impaired Water Contact Recreation BU. *E. coli* is the only constituent monitored by the Coalition that causes impairment to the Water Contact Recreation BU; therefore *E. coli* is not included in the figures or discussion below (Table 89). Although some improvements are evident, water quality is still not completely protective of all BUs across the Coalition region.

Table 89. Exceedances of WQOs and number of times beneficial uses were impaired during the 2015 WY.

Beneficial Use	DO	SC	*E. coli*	Ammonia	Nitrate + Nitrite as N	Chlorpyrifos	Diuron	Simazine	Total Metals (Arsenic)	Total
AQ Life	118			1		8				127
AG		56								56
MUN				1	1		3	1	4	10
REC 1			21							21

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 38. Percentages of impairments of beneficial uses due to exceedances of WQOs during the 2015 WY. Aquatic Life includes all categories (cold freshwater habitat spawning, warm freshwater habitat and freshwater habitat). 'n' represents the total number of exceedances per BU.



Agricultural BU

Monitoring results from the 2015 WY indicate elevated levels of SC as the primary contributor to impairments to the Agricultural BU (100%, Figure 38).

High salinity levels resulting in exceedances of the two seasonal WQTLs for SC 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 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.

Forty-three of the 56 exceedances of the WQTLs for SC occurred in sites located in Zones 4 and 7, which are located in the Delta. 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 CV-SALTS process.

Aquatic Life BU

During the 2015 WY, exceedances of the WQTLs for ammonia (1%), DO (94%), and chlorpyrifos (6%) resulted in impairments to Aquatic Life BU (Figure 38).

Seventy-four of the 118 DO exceedances (63%) occurred in Zones 3, 4, 6, and 7, which are all located in the Delta. Since most of the sites in the Delta are pump stations, water flow only occurs when the pumps are running which results in stagnant water and can lead to low DO levels. Growers implement management practices designed to prevent the offsite movement of constituents into the waterway by reducing irrigation tailwater and storm runoff. As growers implement management practices to reduce agricultural discharge, the amount of water flowing into tributaries is also reduced. This reduction in the amount of water entering tributaries inadvertently results in DO concentrations being lowered. Of the 44 DO exceedances that did not occur in the Delta zones, 10 occurred during the monitoring of non-contiguous waterbodies, which were located on the eastern side of the Coalition in Zones 1, 2, and 5.

The WQTL for ammonia based on the Aquatic Life BU is variable based on pH. A single sample collected from French Camp Slough @ Airport Way during NM in March 2015 contained concentrations of ammonia above the 1.5 mg/L trigger limit for the Municipal and Domestic Supply BU, and was therefore recorded as an exceedance. On the same sampling event, the Coalition sampled for toxicity and there were no toxic samples. Although concentrations of ammonia in the sample were high enough to exceed the Municipal and Domestic Supply BU trigger limit, it was not high enough to cause toxicity. Nitrate and ammonia are nutrients that are key components of fertilizers for agricultural use. Other sources of nitrate and ammonia include animal waste and waste treatment facility effluent. Ammonia is often converted, in a short time period, to nitrate by nitrifying bacteria.

Exceedances of the WQTL for chlorpyrifos also impaired Aquatic Life BU (7; Table 89). Chlorpyrifos is a widely applied pesticide and the Coalition works with growers to implement management practices to reduce chlorpyrifos impairments in waterbodies. More information concerning the sources the exceedances of the WQTL for chlorpyrifos is included in the Summary of Exceedances section of this report. In addition, the Coalition monitors four locations in the Delta to assess compliance with the Chlorpyrifos and Diazinon TMDL; no exceedances of the WQTL for chlorpyrifos occurred at the TMDL monitoring stations during 2015 WY monitoring.

Municipal and Domestic Supply BU

During the 2015 WY, exceedances of the WQTLs occurred for arsenic (40%), diuron (30%), ammonia (10%), nitrate and nitrate as N (10%), and simazine (10%) impairing Municipal and Domestic Supply BUs (Figure 38).

A single exceedance of the WQTL for nitrate occurred in samples collected from Terminous Tract Drain @ Hwy 12 in Zone 3 and a single exceedance of the WQTL for ammonia occurred in samples collected from French Camp Slough @ Airport Way in Zone 2. High levels of nitrates in drinking water carry potential health risks, especially to infants.

During the 2015 WY, four exceedances of the WQTL for arsenic occurred in samples collected from Roberts Island @ Whiskey Slough Pump and Union Island Drain @ Bonetti Rd in Zones 4 and 7, respectively. There are no longer agricultural products that contain arsenic as an active ingredient. However, 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.

A total of three exceedances of the WQTL for diuron occurred in samples collected from French Camp Slough @ Airport Way (1) and Terminous Tract Drain @ Hwy 12 (2) in Zones 2 and 3. A single exceedance of the WQTL for simazine occurred in samples collected from Union Island Drain @ Bonetti Rd in Zone 7. Diuron and simazine are both herbicides commonly applied for weed control. Details concerning the sources of the exceedances of the WQTLs for diuron and simazine are included in the Summary of Exceedances section of the report.

Overall Frequency of Exceedances

Monitoring results from 2008 through the 2015 WY indicate an improving trend in water quality throughout the Coalition region. Exceedances of the WQTLs for applied pesticides and herbicides (chlorpyrifos, copper, diazinon, and diuron) decreased from 12% exceedances (44 out of 525 of samples collected) in 2008 to 3% exceedances (11 out of 344 samples collected) in the 2015 WY (Table 93), indicating that management practices have been successful in reducing water quality impairments throughout the Coalition region.

Improvements in water quality are most noticeable in site subwatersheds where focused outreach is complete and concentrations of constituents monitored in the water column and sediment were consistently protective of assigned BUs in recent years (Table 90). However, there was one instance where a management plan was reinstated due to water quality impairments in 2015. Focused outreach in 2016 will occur in priority subwatersheds where chlorpyrifos management plans have been reinstated. A review of current membership and pesticide use compared to focused outreach contacts that occurred in 2008 through 2013 indicates that there have been changes in both enrolled parcels with direct drainage and parcels with chlorpyrifos use. The Coalition will work with these members to provide education and outreach tools to encourage implementation of additional practices.

Waste discharge from irrigated lands is but one of many possible sources of impairments to BUs. In many instances, other sources or natural conditions cause impairments in waterways monitored by the Coalition. Water quality protective of BUs within Coalition boundaries may not depend exclusively on the Coalition efforts alone; other dischargers may need to improve the quality of their discharge. Furthermore, the difference in geology and geography between Coalition zones influences monitoring results for constituents such as DO, SC, and arsenic. Monitoring sites in Zones 3, 4, and 7 are geographically located in an area where high salinity is common, resulting in exceedances of the WQTLs for SC and subsequently causing impairments to the Agriculture BU (Table 90). Zones 3, 4, and 7 are also geographically located in an area high in arsenic where exceedances are more likely to occur (Burow et al., 2004; Moran et al., 2009; Westcot et al., 1990) causing impairments to the Municipal BU (Table 90). These geological and geographical factors are outside the scope of what the Coalition is capable of improving through modified agricultural practices.

Table 90. Evaluation of beneficial uses for 2008-2015WY monitoring locations (alphabetical by Zone).

'X' indicates no sampling occurred during the specified year. Blue highlights indicate protected BUs in the 2015 WY when the same BU and monitoring site was impaired in one or more previous years.

Zone	Monitoring Site (Years of Focused Outreach)	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?	Status 2015 WY Meets BUs?
1	Bear Creek @ North Alpine Rd (2013-2015)	Sacramento San Joaquin Delta	MUN	Yes	X	X	Yes	Yes	Yes	Yes	X
			AG	Yes	X	X	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	X	No	X	X	X	X
			AQ Life	Yes	X	X	No	No	Yes	No	No
1	Coyote Creek Tributary @ Jack Tone Rd	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	Yes
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
1	Jahant Slough @ Cherokee Ln	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	Yes
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
1	Mokelumne River @ Bruella Rd (2011-2013)	Mokelumne River (Camanche Res to Delta Reach)	MUN	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
			AG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	No	Yes	No	No	No	Yes	Yes
			AQ Life	No	No	Yes	Yes	Yes	Yes	Yes	Yes
1	Mosher Creek @ North Alpine Rd	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	Yes
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
1	Pixley Slough @ Furry	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	Yes
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
2	Duck Creek @ Hwy 4 (2008-2010)	Sacramento San Joaquin Delta	MUN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	X
			AG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
			REC 1	Yes	X	X	X	No	X	X	X
			AQ Life	No	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	No
			AG	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	No	No	No	No	No	No	No	No
			AQ Life	No	No	No	No	No	No	No	No
2	Littlejohns Creek @ Jack Tone Rd	San Joaquin	MUN	Yes	X	Yes	Yes	Yes	Yes	Yes	Yes

Zone	Monitoring Site (Years of Focused Outreach)	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?	Status 2015 WY Meets BUs?
	(2010-2012)	Delta	AG	Yes	X	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	X	X	X	X	X	X	X
			AQ Life	No	X	No	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	X
			AG	No	Yes	Yes	Yes	No	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	No	No	Yes	Yes	No	No	No
2	Mormon Slough @ Jack Tone Rd (2012-2014)	Sacramento San Joaquin Delta	MUN	No	X	X	Yes	Yes	Yes	Yes	Yes
			AG	Yes	X	X	Yes	Yes	Yes	Yes	Yes
			REC 1	Yes	X	X	X	X	X	X	X
			AQ Life	No	X	X	No	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	Yes
			AG	No	Yes	Yes	No	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	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	X
			AG	No	No	No	X	X	Yes	Yes	No
			REC 1	No	Yes	No	X	X	X	X	X
			AQ Life	No	No	No	X	X	No	No	No
3	Empire Tract @ 8 Mile Rd (2015-2017)	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	No	No	X
			AG	X	X	X	X	X	No	No	No
			REC 1	X	X	X	X	X	No	No	X
			AQ Life	X	X	X	X	X	No	No	No
3	Rindge Tract Drain	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
3	Staten Island Drain @ Staten Island Rd	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
3	Terminous Tract Drain @ Hwy 12 (2011-2013)	Sacramento San Joaquin Delta	MUN	No	Yes	No	Yes	No	No	Yes	No
			AG	No	No	No	No	No	No	No	No
			REC 1	No	No	No	No	No	No	No	No
			AQ Life	No	No	No	No	No	No	No	No
4	Bacon Island Pump @ Old River	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	No	X
			AG	X	X	X	X	X	X	No	No

Zone	Monitoring Site (Years of Focused Outreach)	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?	Status 2015 WY Meets BUs?
			REC 1	X	X	X	X	X	X	No	X
			AQ Life	X	X	X	X	X	X	No	No
4	East Orwood Tract Drain	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
4	Kellogg Creek along Hoffman Ln (2012-2014)	Sacramento San Joaquin Delta	MUN	No	X	X	Yes	Yes	Yes	Yes	X
			AG	Yes	X	X	No	Yes	Yes	No	Yes
			REC 1	Yes	X	X	X	X	X	X	X
			AQ Life	No	X	X	No*	No	Yes	No	Yes
4	Roberts Island @ Whiskey Slough Pump (2013-2015)	Sacramento San Joaquin Delta	MUN	X	X	X	X	No	Yes	No	No
			AG	X	X	X	X	No	No	No	No
			REC 1	X	X	X	X	No	Yes	No	No
			AQ Life	X	X	X	X	No	No	No	No
4	South McDonald Island Pump	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	No
5	Walthall Slough @ Woodward Ave (2013-2015)	Sacramento San Joaquin Delta	MUN	X	No	No	No	No	No	Yes	Yes
			AG	X	No	No	No	No	No	No	No
			REC 1	X	No	No	No	Yes	Yes	No	No
			AQ Life	X	No	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	Yes
			AG	No	X	X	No	No	No	No	No
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	X	X	No	No	No	No	No
7	Union Island Drain @ Bonetti Rd	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	No
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	No
			AQ Life	X	X	X	X	X	X	X	No
7	Upper Roberts Island Drain	Sacramento San Joaquin Delta	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	X	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.

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 constituents, it is uncertain to what magnitude exceedances of WQTLs are related to agricultural activities. Most exceedances are the result of parameters not applied by 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 for these constituents may occur during normal, diurnal stream processes.

Field Parameters

Monitoring data from the 2015 WY indicate exceedances of the WQTL for DO were most frequent at monitoring locations in the Sacramento-San Joaquin Delta. Monitoring locations in the Delta (Zones 3, 4, and 7) are located at island drains, where the pump stations remove drainage from the entire island into the Delta. There is often no flow at these monitoring locations unless the pumps are running; low to no flow conditions often lead to exceedances of the WQTL for DO. Alternatively, DO concentrations may be low in the Delta islands because the main source of water for these drains is seepage of groundwater from a shallow water table. Concentrations of DO are often low in groundwater due to minimal atmospheric contact and biological/chemical processes. Therefore, low DO concentrations in the Delta are usually independent of agricultural practices or the processes related with surface runoff.

Exceedances of the WQTLs for SC occurred most often at monitoring locations within the Delta (Zones 3, 4, and 7). The elevated levels of SC in samples collected from the Delta sites were most likely affected by 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. Upper Roberts Island Drain) 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.

Pesticides

Agricultural applications of pesticides and herbicides may result in constituents entering surface waters due to drift or runoff in stormwater or irrigation return flows. During the 2015 WY, there were exceedances of the WQTLs for chlorpyrifos (8), diuron (3), and simazine (1). The Summary of Exceedances section of this report includes more details on sourcing of these constituents. There were no other exceedances of the WQTL for pesticides or herbicides within the Coalition boundary.

The SJCDWQC utilizes its SQMP process to work with growers to ensure that management practices implemented (including irrigation, sediment/erosion, and pesticide management practices) are effective in reducing and/or eliminating agricultural discharge that could be contributing to water quality problems. In most cases, implemented management practices results in improvement of more than one constituent. The Coalition has documented that the two most commonly implemented practices (as a result of focused outreach and education) is a reduction in the amount of water used during irrigation and a reduction in the pesticides that are contributing to water quality problems (Table 62).

QUESTION 3: ARE WATER QUALITY CONDITIONS CHANGING OVER TIME (E.G., DEGRADING OR IMPROVING AS NEW MANAGEMENT PRACTICES ARE IMPLEMENTED)?

Monitoring results from the 2015 WY resulted in exceedances of applied pesticides and metals WQTLs for arsenic (1), chlorpyrifos (8), diuron (3), and simazine (1). Water quality results from the 2015 WY indicate a significant reduction in the number of exceedances of applied pesticides and metals since 2008 which is a result of the implementation of management practices by members (Table 91). The percentage of exceedances of constituents includes only the exceedances of pesticides and metals currently applied by agriculture. From October 2014 through September 2015, there were no exceedances of the WQTL for metals (Table 91).

In 2009, the Coalition's Management Plan strategy was implemented and focused outreach efforts with targeted growers was initiated. Members implemented management practices effective at reducing the offsite movement of pesticides and other constituents which has resulted in 54 management plans being completed. The Coalition anticipates further improvements in water quality in the Coalition region in the future due to increased education, outreach, and implementation of new management practices.

Figure 39 includes 2008 through 2015 WY data in the form of 1) the percentages of exceedances by constituent category, and 2) the percent of exceedances of applied metals and applied pesticides. Toxicity resampling events and exceedances from 2008 upstream MPM conducted as part of source evaluation efforts were not included in the calculation. From 2008 through the 2015 WY, the majority (64%) of exceedances of WQTLs were the result of field parameter monitoring (DO, pH, and SC) in the Coalition region. The second highest category of exceedances was nutrients, physical parameters, and *E. coli* (bacteria), accounting for 19% of all exceedances from 2008 through the 2015 WY (Figure 39).

Applied Metals: 2008 – 2015 WY

Metals applied by agriculture are copper and zinc; however, Table 91 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 2015. 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 metal concentrations reflect the bioavailable fraction of the total metal in the water column; the amount of the dissolved fraction is dependent on many things including pH, redox potential, temperature, total organic content.

After September 2008 there were no exceedances of the WQTL for total copper and 5 exceedances of the WQTL for dissolved copper with the last exceedance occurring in 2012 (Table 91). There are currently no active management plans for copper in the Coalition region. Water quality conditions have improved in the Coalition region for copper as demonstrated by seven completed management plans for copper.

Applied Pesticides: 2008 – 2015 WY

The most significant water quality improvements for pesticides occurred directly after focused outreach and education began at the end of 2008 (Figure 39; Table 91). 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. During the 2015 WY, only 0.6% of the samples analyzed for applied pesticides contained concentrations exceeding the WQTLs (Table 91). This is a substantial improvement over previous years, where an average of 1.9% of the samples collected from 2008 through September 2014 resulted in exceedances of the WQTLs for applied pesticides (Table 91). Water quality conditions have improved for pesticides as evidenced by the completion of 21 pesticide management plans; nine (9) of these were for chlorpyrifos.

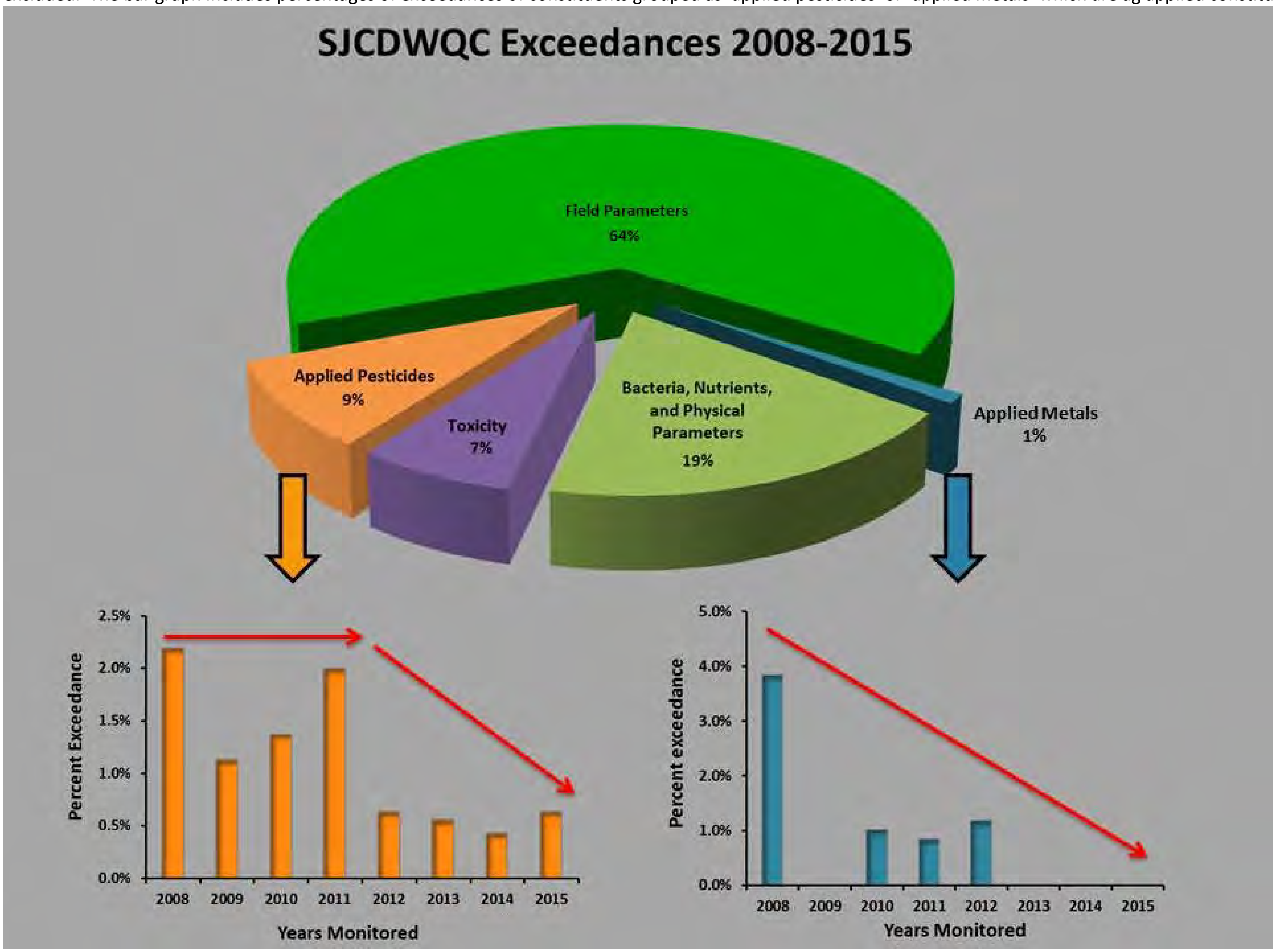
Coalition general outreach and education are ongoing. Focused outreach is now complete in the first through sixth priority site subwatersheds. Chlorpyrifos has been one of the pesticides that the Coalition has focused its outreach efforts on and for which improvements in water quality has occurred. However, during the 2015 WY there have been exceedances of the chlorpyrifos WQTL resulting in the reinstatement of chlorpyrifos management plans. The Coalition has made these subwatersheds a priority in 2016 and will work with members (including members who were not previously contacted for focused outreach) to document changes in management practices and improvements in water quality as a result of these changes.

Table 91. Percentages of exceedances of WQTLs for applied metals and applied pesticides from 2008- September 2015.

Years	Applied Metals			Applied Pesticides		
	Total Exceedances	Total Samples	Percent Exceedances	Total Exceedances	Total Sampled	Percent Exceedances
2008	9	234	3.8%	40	1,827	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%
2015 WY	0	30	0.0%	12	1,893	0.6%

*Indicates monitoring from January through September only.

Figure 39. Percentages of exceedances of WQTLs from 2008 through September 2015.
Pie chart includes percentages of all exceedances from 2008 through 2015 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.



Spatial Trends

In the 2015 Annual Report (submitted May 1, 2015), the Coalition evaluated historical monitoring data to identify potential spatial 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 that have no application records (ammonium and nitrate), and constituents not applied by agriculture (DO, SC, and *E. coli*). The Coalition analyzed monitoring data from 2009 and compared it to monitoring data from the 2015 WY to determine if water quality improvements or degradation could be correlated to the implementation of management practices. Monitoring data from 2009 represent the year focused outreach began in the Coalition region. Comparing the two years represents how the water quality has changed seven 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. 2015 WY) includes an assessment of whether water quality conditions have improved or degraded since focused outreach began for different groups of constituents.

Constituents Applied by Agriculture

Pesticide and herbicide applications may lead to detections of the chemicals in the water column and/or sediments. Potential factors leading to the detections include irrigated tailwater discharge, stormwater runoff, and/or spray drift to surface waters. Irrigation tailwater flows from fields and stormwater runoff can mobilize sediment and chemicals to surface waters. Within the SJCDWQC region, chlorpyrifos, diuron, and copper are among the top ten most heavily applied pesticides and herbicides that have resulted in water quality impairments in the past (Table 92).

Table 92. Top 10 SJCDWQC agriculturally applied constituents from 2009 through the 2015 WY. 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	0
Copper	1,708,497	5
Chlorpyrifos	331,784	47
Paraquat	319,468	1
Malathion	239,992	3
Trifluralin	154,646	0
Simazine	146,268	2
Dimethoate	144,803	0
Diuron	114,488	4
Methomyl	110,546	0

Chlorpyrifos

The Coalition conducted a spatial analysis of exceedances of the WQTL for chlorpyrifos in the 2015 Annual Report. The analysis indicated that there were no apparent spatial trends between applications of chlorpyrifos and exceedances in the waterbodies. Annual applications of chlorpyrifos have steadily declined in recent years (Table 93); the Coalition expects chlorpyrifos use to continue to decline now that chlorpyrifos is a restricted chemical. Even with the decline in use, chlorpyrifos is still one of the most widely applied pesticides in the Coalition region (Table 92). Coalition monitoring data does not show any correlation between applications of chlorpyrifos and exceedances. For example, during monitoring from January through September 2014, there were no exceedances of the WQTL for chlorpyrifos with applications of over 50,000 lbs of chlorpyrifos throughout the Coalition region. During the 2015 WY, there were eight exceedances of the WQTL for chlorpyrifos. Based on PUR data from October through June (San Joaquin County data only goes up through June), there have been 34,000 lbs of chlorpyrifos applied suggesting that the exceedances are not associated with an increase in Coalition wide use of chlorpyrifos (Table 93). The relationship between applications of chlorpyrifos and exceedances at monitoring sites is variable and discussed in more detail within the Site Subwatershed sections for sites with chlorpyrifos management plans.

Diuron

Diuron is a broad-spectrum herbicide used for weed control by agriculture, highway rights of way, and by homeowners. It inhibits photosynthesis and also affects seed germination. Diuron is applied mostly during the irrigation season from December through February.

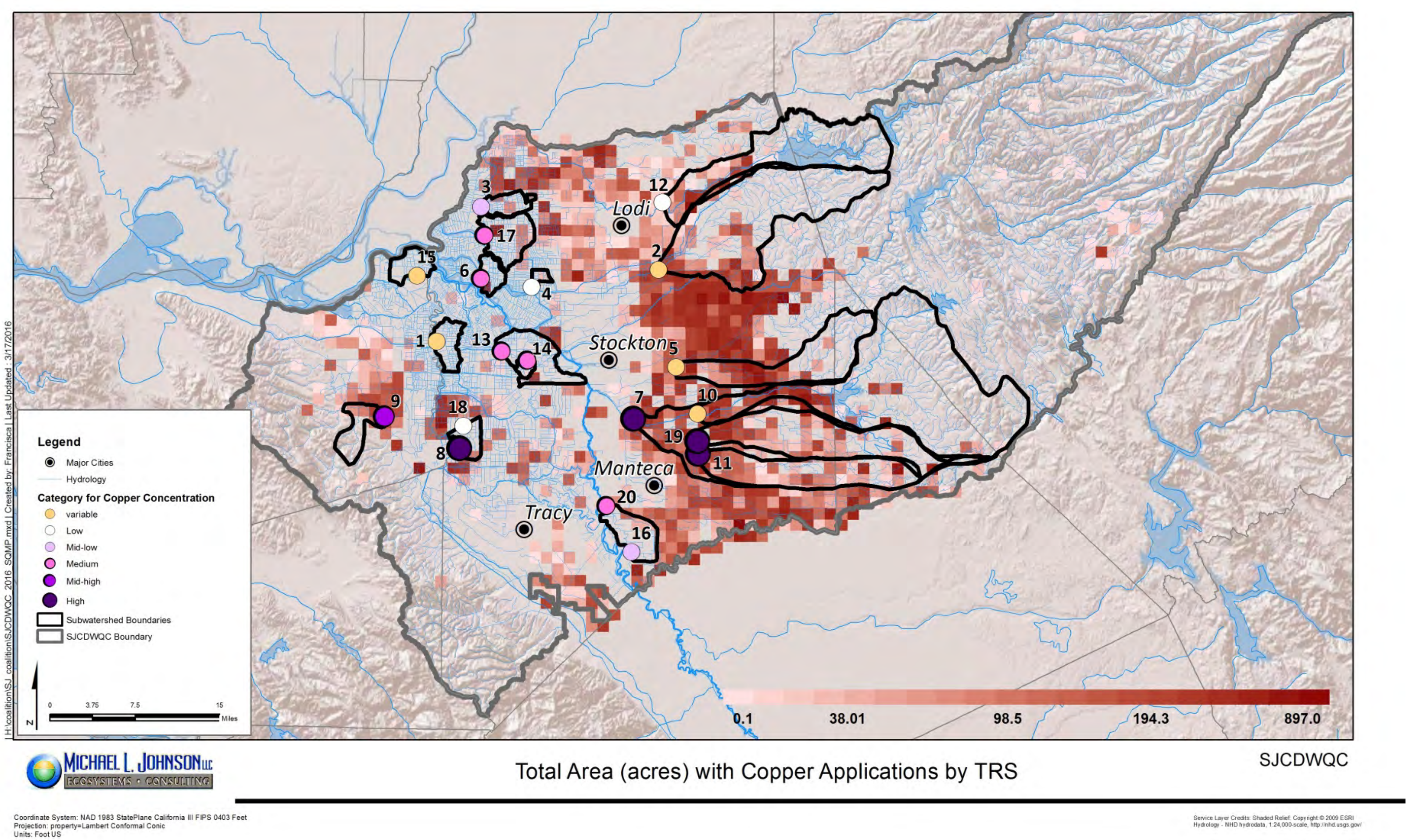
The Coalition conducted a spatial trend analysis which was presented in the 2015 Annual Report. The analysis indicated that spatial trends associated with diuron applications and detections and/or exceedances of the WQTL are not apparent. Applications of diuron have steadily declined since Coalition began in 2004 (Table 93) and exceedances of the WQTL for diuron are spatially sporadic. For example, in 2013, there were no exceedances of the WQTL for diuron with applications of 19,870 lbs of diuron throughout the Coalition region; however, during the 2015 WY, there were three exceedances of the WQTL for diuron with applications of 16,870 lbs of AI (Table 93). Similar to chlorpyrifos, the relationship between applications and exceedances at monitoring sites is variable. In addition, diuron is applied by a large variety of entities including Caltrans, county road maintenance departments, railroads, and private individuals. Because of the reporting format, the locations of these applications are unknown except at the county level. It is difficult to determine what role these applications have in generating exceedances within the Coalition region.

Copper

Pesticides containing copper are applied to a variety of agricultural crops as a fungicide, and also applied to waterways as an algaecide. Copper is one of the most heavily applied products in the Coalition region (Table 92). Sources of copper 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, 3) naturally occurring copper, or 4) runoff from abandoned mines. The Coalition is evaluating dissolved copper for the spatial trends analysis because it is applied by irrigated agriculture. The trends focus on the dissolved fraction of copper because it is bioavailable to aquatic organisms and is the only fraction analyzed as specified in the 2015 MPU (approved December 17, 2015).

The Coalition submitted an analysis of spatial trends of exceedances of the WQTL for copper in the 2015 Annual Report. The Coalition used past monitoring data to perform preliminary analyses to determine spatial trends in water quality due to agricultural applications of copper. The data analysis concluded that there is no link between watersheds receiving agricultural applications of copper and concentrations of copper in those waterbodies. Areas within the Coalition boundary with high applications of copper do not necessarily have elevated concentrations of copper; conversely, areas with few applications of copper may have elevated concentrations of copper (Figure 40).

Figure 40. Total acreage receiving applications of copper in each TRS within the Coalition region.
Darker colors represented a greater number of acres. The watershed areas that are likely to influence the concentrations of copper are outlined in black. The sampling sites are color coded by the average concentrations of copper detected at each site.



The Coalition conducted a spatial trends analysis for constituents not applied by agriculture: DO, SC, and *E. coli*. A similar analysis was performed for ammonium/nitrate which are constituents applied by agriculture but are not tracked through any reporting system. The spatial trends analysis, which was submitted with the 2015 Annual Report, 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.

On May 1, 2015 the Coalition submitted a revised SQMP (approved November 24, 2015) with a timetable for addressing difficult-to-source constituents (DO, pH, and *E. coli*). On February 22, 2016, the Coalition submitted the first preliminary data analysis evaluating sources and trends in DO and pH concentrations. The Coalition will not submit an evaluation *E. coli* sources changes in water quality conditions over time since the exceedances of the WQTL for *E. coli* will be the subject of a valley-wide source identification study performed jointly by all Coalitions.

Dissolved Oxygen

The Coalition measures DO at all monitoring sites during every monitoring event. Dissolved oxygen is essential to aquatic organisms and waterbodies 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 nutrients.

Using Coalition historical monitoring data, the Coalition evaluated spatial trends in concentrations of DO in past analyses included in the 2015 Annual Report. The Coalition also submitted a special study on February 22, 2016 that evaluated potential factors most likely to influence concentration of DO in ambient waters. Results from both analyses concluded that there is no clear spatial trend in concentrations of DO or number of exceedances in the SJCDWQC region. However, concentrations of DO indicate a temporal trend where concentrations of DO generally drop during the summer months. This pattern is most likely the result of high temperatures.

Specific Conductance

The Coalition measures SC at every monitoring site during all monitoring events. Geological and geographical factors influencing concentrations of salts in the waterways are outside the scope of what the Coalition is capable of improving through modified agricultural practices. The agricultural land in the Delta is the recipient of salt from upstream which is the responsibility of the US Bureau of Reclamation. The Lower San Joaquin River Committee of CV-SALTS is tasked with reviewing relevant studies and developing the science and policy needed to develop a Basin Plan amendment for salt and boron in the San Joaquin River upstream of Vernalis.

Past analyses from the 2015 Annual Report indicate that, geographically, the west side of the Coalition region, which is located in the Delta, has poor subsurface drainage and salty groundwater intrusion which can elevate levels of SC above the seasonal WQO (700 µS/cm April through August, and 1000 µS/cm September through March). High salinity levels resulting in exceedances of the WQOs for SC are common in the Delta islands due to 1) tidal influence in the area, 2) hydrostatic pressure moving salty 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 Coalition concluded that exceedances of SC are common in the Delta, but that there was a lack of association to any spatial trend in the Coalition region.

E. coli

E. coli are bacteria that exist naturally in ecosystems, improperly composted manure, and intestinal tracts of domesticated and wild animals. When in a waterbody, *E. coli* can exist in warm water environments with sufficient sources of TOC to allow it to proliferate and sufficient residence time. In stagnant or slow moving conditions, *E. coli* can be detected above the WQTL in water samples.

Past analyses from the 2015 Annual report concluded that exceedances of the WQTL for *E. coli* were not necessarily associated with areas with moderate to high density of dairy farm; there were no observable spatial trends in exceedances of the WQTL for *E. coli*. Exceedances of the WQTL for *E. coli* often occurred in samples collected from monitoring sites located at pump stations within the Delta. Conditions of the waterbody at the monitoring locations, such as lack of water flows, most likely support the proliferation of *E. coli* and lead to exceedances of the WQTL.

Ammonium and Nitrates

Past analyses from the 2015 Annual Report concluded that exceedances of the WQTL for ammonium and nitrates did not exhibit a spatial trend. Both ammonium and nitrate concentrations were slightly elevated in the Delta Island drains relative to the rest of the Coalition region. Fertilizers are usually applied during the spring prior to irrigation. Due to the extreme solubility nature, 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 WQO for nitrate throughout the irrigation season. Because Delta Island drains are mostly fed by drainage from the shallow water table that runs laterally through peat soils, slightly elevated concentrations of ammonium are most likely due to bacterial decomposition of the organic material in the soils. However, if elevated ammonium concentrations are indeed caused by natural oxidation of the organic soil, exceedances are likely to continue occurring occasionally in the region independent of management practices implemented by the Coalition farmers.

QUESTION 4: ARE IRRIGATED AGRICULTURE OPERATIONS OF MEMBERS IN COMPLIANCE WITH THE PROVISIONS OF THE ORDER?

The Coalition evaluated if irrigated operations of members are in compliance with provisions of the WDR by addressing 1) what management practices are being implemented to reduce the impacts of irrigated agriculture within the Coalition boundaries and 2) where the management practices are being implemented.

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)

Applications of Management Practices

Management practices are implemented throughout the Coalition region in 1) site subwatersheds where focused outreach has taken place, and 2) in site subwatersheds where focused outreach has not taken place yet. Coalition members receive information concerning management practices during general outreach and in annual grower meetings throughout the year. The Coalition's MPURs submitted every April 1, and starting in 2015, the Annual Report submitted every May 1 includes details on the number of growers implementing practices and acres associated with these specific management practices. The Member Actions Taken to Address Exceedances of the Water Quality Objectives section in this report summaries management practices implemented by growers in the first through sixth priority subwatershed. Table 63 includes all of the acreages associated with newly implemented management practices designed to reduce the impacts of irrigated agriculture in the first through sixth priority subwatersheds. Information on funding opportunities for management practices is provided to all members of the Coalition.

Starting in 2015, the Coalition sent out Farm Evaluation surveys to all members to get information on management practices from 2014. Farm Evaluations are designed to describe how each member is implementing management practices to protect water quality while trend data are collected through monitoring. Management practices discussed in the Farm Evaluations include irrigation, sediment, pesticide and nutrient, and well management practices. Management practices that are designed to protect the quality of groundwater should be implemented, where applicable, by members in high or low vulnerability areas. A summary of the 2014 Farm Evaluations and management practices implemented by Coalition members will be provided in the Farm Evaluations Summary section of this report.

QUESTION 5: ARE IMPLEMENTED MANAGEMENT PRACTICES EFFECTIVE IN MEETING APPLICABLE RECEIVING WATER LIMITATIONS?

Under the California Water Code, the Regional Water Quality Control Boards adopt Basin Plans which include designated BUs of waters of the region and establish WQOs to protect those BUs. Receiving water limitations are based on WQOs as identified in the Basin Plan. These objectives are designed to achieve and maintain water quality standards in receiving waters of the state so that BUs are met. When exceedances of WQOs occur, a TMDL for the constituent may be adopted (SC, boron, chlorpyrifos, and diazinon). These TMDLs are designed to improve water quality by controlling input of the constituents contributing to water quality impairments; when a load allocation is in compliance WQOs are met.

Information provided in Question 1 above includes details on the effects of water quality on BUs in the Coalition region during the 2015 WY. Table 90 includes blue highlights for the sites where BUs were met during the 2015 WY when in the past the same BU was impaired. Improvements in water quality are the direct result of the Coalition's focused outreach strategy.

Members across the Coalition region are implementing management practices and water quality is improving. The Coalition analyzed monitoring results (Core, Represented, and MPM) from the 2015 WY to evaluate the effectiveness of current and newly implemented management practices (a complete analysis is included in the Evaluation of Management Practice Effectiveness section of this report).

Due to improved water quality as a direct result of growers implementing management practices, there has been a steady and significant decrease of exceedances of the WQTLs for constituents of concern throughout the first through sixth site subwatersheds. To date, the Coalition has received approval for management plan completion of a total of 59 constituents in first through sixth priority site subwatersheds.

Water quality improvements in irrigated lands occur over time. Members are constantly changing membership status and many new members enter site subwatersheds annually. New members may or may not have received focused outreach and water quality impairments could potentially occur due to uninformed new members. Many of the site subwatersheds in the Coalition region have significant acreages occupied by non-members who do not receive focused outreach and could potential be impairing water quality. Until 100% of all growers within the Coalition boundary enroll in membership, water quality may not reflect the effective management practices implemented by members of the Coalition 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) is beyond the scope of what the Coalition can achieve through management practice implementation alone. A complete evaluation of management practice effectiveness based on water quality results in the first through sixth priority site subwatersheds is provided in the Evaluation of Management Practices Effectiveness section of this report.

QUESTION 6: ARE THE APPLICABLE SURFACE WATER QUALITY MANAGEMENT PLANS EFFECTIVE IN ADDRESSING IDENTIFIED WATER QUALITY PROBLEMS?

The Coalition's management plan strategy was effective in addressing identified water quality impairments. A complete evaluation of the Coalition's management plans, outreach, and management practices is included in the Management Plan section of this report. Focused outreach conducted through annual grower meetings has resulted in grower awareness of water quality concerns and the implementation of management practices designed to reduce the offsite movement of agricultural constituents and sediment. Management Plan Monitoring results indicate water quality continues to improve throughout the Coalition region. The completion of management plans of constituents in site subwatersheds where focused outreach has occurred demonstrates the effectiveness of management practices growers are implementing.

An analysis of water quality results for the entire Coalition region is provided below to demonstrate water quality improvements are a direct result of the Coalition's management plan strategy.

Coalition Wide Evaluation

During the 2015 WY, the Coalition monitored at 29 sites for Core, Represented, and MPM. The Coalition also monitored for TMDL compliance at four sites for chlorpyrifos and diazinon. Monitoring began in the Coalition region in 2006. Monitoring results since focused outreach was initiated in 2008 indicate the Coalition's management practice tracking strategy were effective in improving water quality across the Coalition region in several site subwatersheds where management plans were approved for completion. To date, the Coalition has completed 59 specific site subwatershed/constituent management plans (including five managements plan sites no longer monitored; Table 55). Exceedances from the 2015 WY resulted in the reinstatement of two management plans. Overall, water quality has improved since growers started implementing management practices as the result of focused outreach in 2009; the number and percentage of exceedances of the WQTLs for chlorpyrifos, copper, diazinon, and diuron, have decreased considerably (Table 93, Figures 41 and 42).

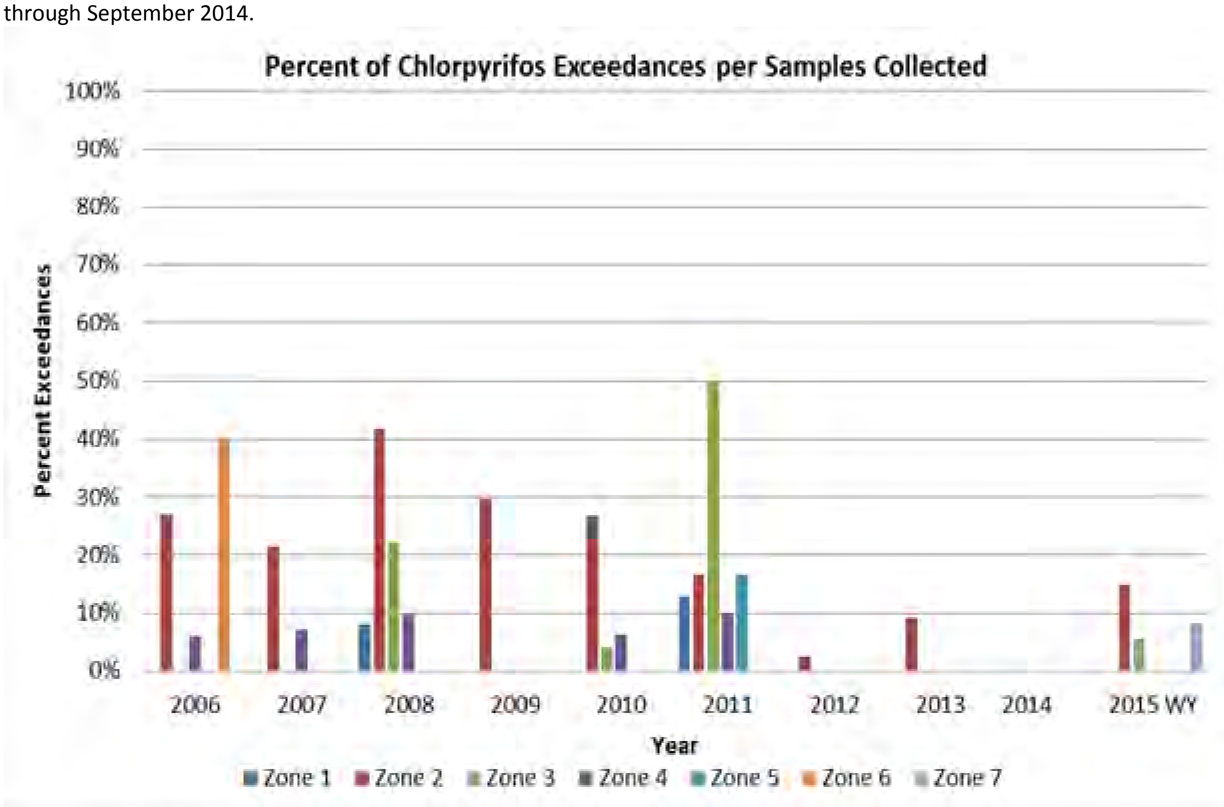
Below is an evaluation of the overall trends in water quality across the entire SJCDWQC region for chlorpyrifos, copper, diazinon, and diuron. The Coalition focused on these constituents for the Coalition Wide Evaluation because they are 1) the top agriculturally applied constituents that have resulted in exceedances, 2) part of an adopted TMDL for which irrigated agriculture is a source (chlorpyrifos and diazinon), and/or 3) they can be sourced through analyses of PUR data.

Chlorpyrifos

Growers applied less chlorpyrifos across the Coalition region since outreach began; there were 54,504 lbs AI applied in 2008 compared to 34,305 lbs AI applied during the 2015 WY (Table 93 and Figure 41). Monitoring results from the 2015 WY indicate only 6% of the samples analyzed for chlorpyrifos resulted in exceedances of the WQTL, compared to 21% in 2008 before focused outreach was initiated. During the 2015 WY, eight exceedances (four from non-contiguous waterbodies) of the WQTL for chlorpyrifos occurred within six site subwatersheds: Duck Creek @ Hwy 4 (2, Zone 2), Unnamed Drain to Lone Tree

Creek @ Jack Tone Rd (2, Zone 2), French Camp Slough @ Airport Way (1, Zone 2), Mormon Slough @ Jack Tone Rd (1, Zone 2), Terminous Tract Drain @ Hwy 12 (1, Zone 3), and Union Island Drain @ Bonetti Rd (1, Zone 7; Figure 41). Management plans for chlorpyrifos remain active for seven site subwatersheds located within Zones 2, 3, and 7.

Figure 41. SJCDWQC 2006 through 2015 WY percentage of exceedances of WQTL for chlorpyrifos in Zones 1 through 7.
No sampling for chlorpyrifos occurred in Zone 5 from 2006 through 2008; Zone 6 from 2009 through 2010; Zone 7 from 2006 through September 2014.

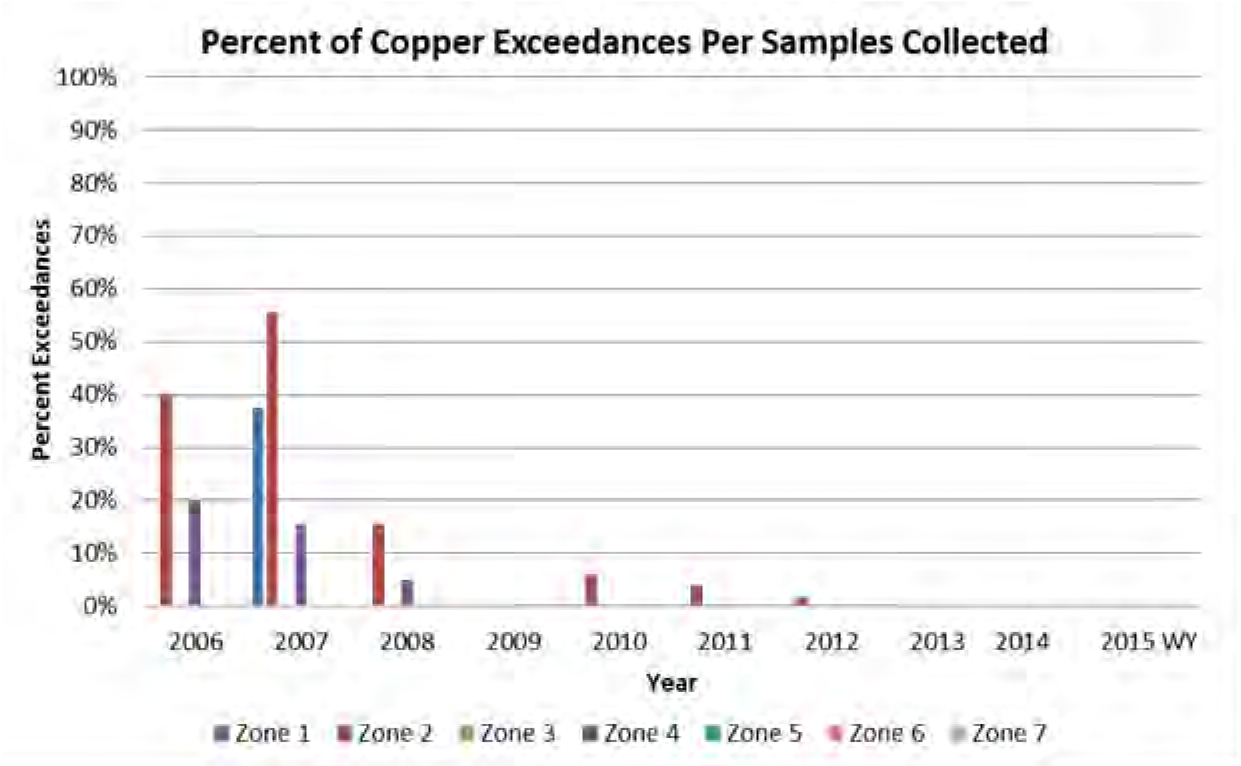


Copper

Since the Coalition initiated outreach, applications of copper across the Coalition region have remained consistent from 2008, when focused outreach was initiated, through the 2015 WY; on average, 430,072 lbs of copper are applied annually (Table 93). Historically, the water quality impairments due to copper occurred primarily in Zone 2 (Figure 42). Overall, the percent exceedances of the hardness WQTL for dissolved copper have decreased since 2008 when focused outreach was initiated, with the last exceedance occurring in samples collected from Duck Creek @ Hwy 4 in December 2012. There are currently no active management plans for copper in the Coalition region.

Figure 42. SJCDWQC 2006 through 2015 WY percentage of exceedances of the WQTL for copper in Zones 1 through 7.

No sampling occurred for copper in Zone 1 in 2012, 2013; Zone 3 from 2011 through 2012; Zone 5 from 2006 through 2008 and 2011 through 2012; Zone 6 from 2006 through 2007 and 2009 through 2013; Zone 7 from 2006 through September 2014.

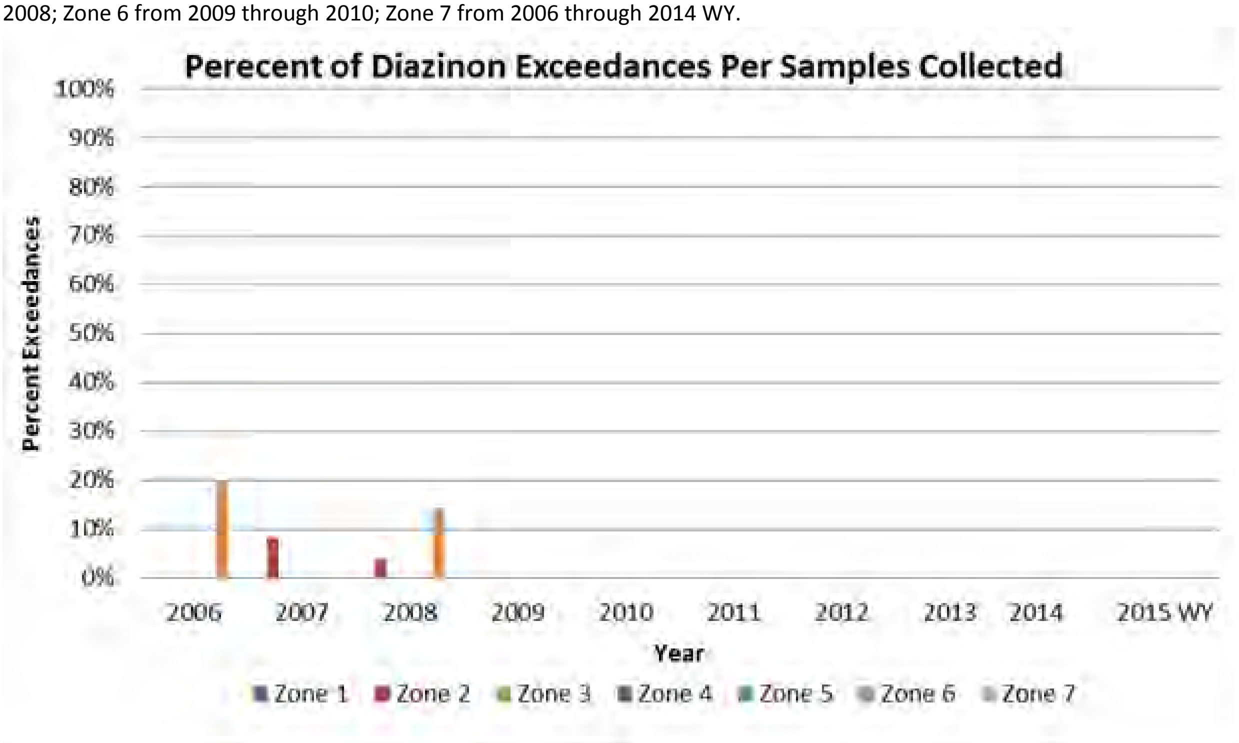


Diazinon

Growers applied less diazinon across the Coalition region since outreach began and exceedances of the WQTL for diazinon have not occurred since 2008. There were 6,523 lbs of AI applied in 2008, when focused outreach was initiated, compared to 7,465 lbs of AI applied during the 2015 WY (Table 93). Only eight exceedances of the WQTL for diazinon have occurred since SJCDWQC monitoring was initiated in 2004. Only Zones 2 and 6 have had water quality impairments due to exceedances of the WQTL for diazinon (Figure 43). The last exceedance occurred in samples collected in January 2008, when focused outreach was initiated, from Sand Creek @ Hwy 4 Bypass. Focused outreach is complete in the site subwatersheds where water quality impairments related to diazinon have occurred. The Coalition's management plan strategy has proven successful at eliminating elevated levels of diazinon from the water column. Currently, the Coalition has completed seven management plans for diazinon; there are no active management plans in place within the Coalition region.

Figure 43. SJCDWQC 2006 through 2015 WY percentage of exceedances of the WQTL for diazinon in Zones 1 through 7.

No sampling occurred for diazinon in Zone 1 in 2010, 2012 or 2013; Zone 3 in 2011 through 2012; Zone 5 from 2006 through 2008; Zone 6 from 2009 through 2010; Zone 7 from 2006 through 2014 WY.



Diuron

Growers applied less diuron across the Coalition region since outreach began; there were 23,962 lbs AI applied in 2008, when focused outreach was initiated, compared to 16,870 lbs AI applied during the 2015 WY (Table 93). Water quality impairments due to exceedances of the WQTL for diuron were decreasing until 2014; in the past two years, the monitoring data indicate an increasing trend for diuron exceedances (Figure 44). During the 2015 WY, three exceedances of the WQTL for diuron occurred; a single sample collected from French Camp Slough @ Airport Way (Zone 2) and two samples collected from Terminous Tract Drain @ Hwy 12 (Zone 3). The Coalition has completed two management plans for diuron; there are three active management plans for diuron (French Camp Slough @ Airport Way, Terminous Tract Drain @ Hwy 12, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd).

Figure 44. SJCDWQC 2006 through 2015 WY percentage of exceedances of the WQTL for diuron in Zones 1 through 7.

No sampling occurred for diuron in Zone 1 in 2010, 2012, 2013; Zone 3 from 2011 through 2012, Zone 4 in 2010; Zone 5 from 2006 through 2008, 2011 through 2012, 2014 WY; Zone 6 from 2009 through 2015 WY, Zone 7 from 2006 through 2014 WY.

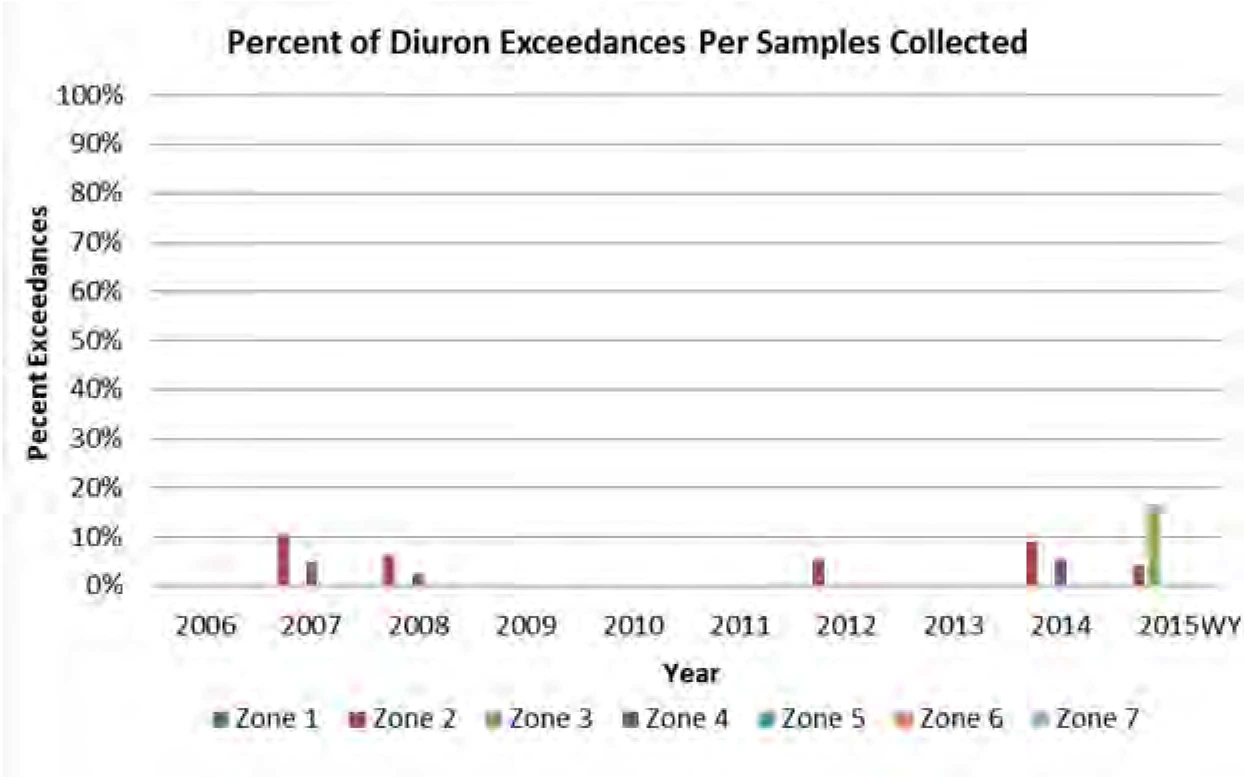


Table 93. Count of exceedances and samples collected for applied pesticides (chlorpyrifos, copper, diazinon, and diuron) across SJCDWQC region.
All PUR data for each county are complete through June 2015.

	CHLORPYRIFOS				COPPER[1]				DIAZINON				DIURON			
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
2004	0	12	0%	86,907	0	0	NA	519,242	0	12	0%	21,349	0	0	NA	74,831
2005	10	87	11%	98,486	0	0	NA	832,508	0	87	0%	12,496	0	0	NA	47,116
2006	13	105	12%	94,792	9	46	20%	733,163	1	105	1%	10,257	0	75	0%	80,916
2007	15	139	11%	82,801	22	88	25%	603,825	4	128	3%	9,564	7	128	5%	37,749
2008	28	134	21%	51,504	10	147	7%	361,291	3	121	2%	6,523	4	123	3%	23,962
2009	8	61	13%	80,114	0	82	0%	411,478	0	49	0%	5,826	0	34	0%	18,657
2010	13	93	14%	65,247	2	122	2%	521,501	0	79	0%	17,576	0	40	0%	10,561
2011	15	104	14%	45,068	2	137	1%	466,263	0	70	0%	4,490	0	52	0%	23,136
2012	1	80	1%	51,901	1	60	2%	439,322	0	43	0%	5,211	1	20	5%	18,160
2013	3	103	3%	52,350	0	88	0%	387,274	0	52	0%	5,468	0	30	0%	19,870
2014[3]	0	96	0%	50,127	0	102	0%	504,220	0	74	0%	3,960	2	53	4%	17,927
2015[4]	8	136	6%	34,305	0	30	0%	349,223	0	86	0%	7,465	3	88	3%	16,870

[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 during a single sampling event in the Coalition region.

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

[3] Monitoring occurred from January through September 2014; not a full WY.

[4] PUR data only available through June 2015 for San Joaquin County; available through September 2015 for all other counties in Coalition region.

Funding Resources

In addition to focused outreach, the Coalition informs growers about available funding for projects aimed at reducing the impact of agriculture on water quality. During the 2015 WY, Coalition growers received funding from programs managed by the Natural Resource Conservation Service (NRCS). The two programs available to growers were the Environmental Quality Incentives Program (EQIP) and the Agricultural Water Enhancement Program (AWEP). The Agricultural Act of 2014 repealed funding for AWEP. The NRCS still continues to support AWEP contracts entered prior to the Act, but no new projects are being added.

The Coalition reviewed management practice funding data provided by the NRCS to gain insight to the type of management practices growers are implementing in the region. The analysis below consists of funding provided for management practices designed to improve water quality by preventing offsite movement of agricultural constituents to adjacent waterways. Table 94 summarizes total contract acreage associated with EQIP and AWEP management practices awarded during the 2015 funding cycle in counties associated with the SJCDWQC (Contra Costa, San Joaquin, and Stanislaus Counties). Because available data is reported for the entire county, some practices included in the analysis for Stanislaus and Contra Costa Counties may have been implemented outside of the Coalition region.

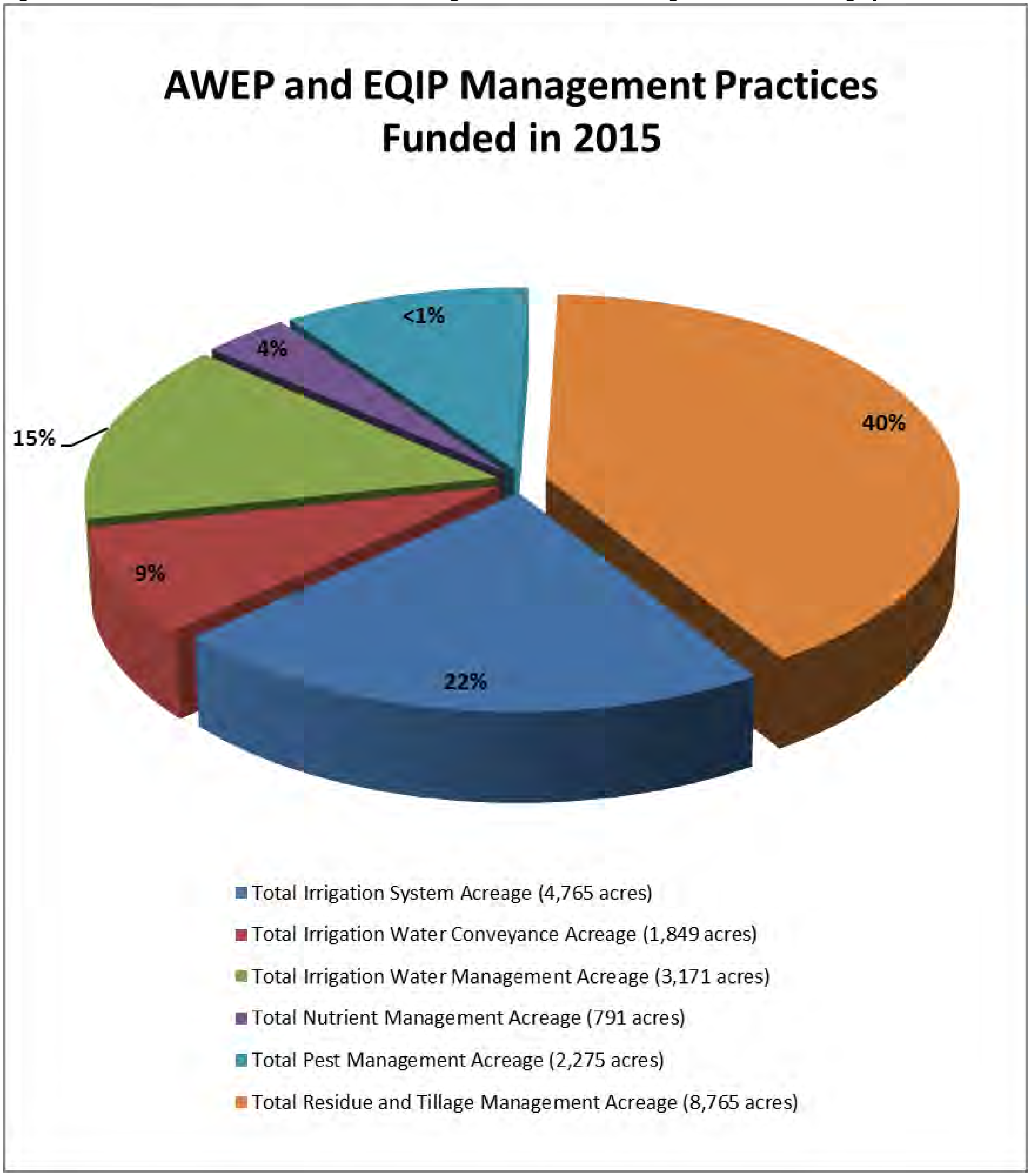
During the 2015 funding cycle, growers received funding to implement management practices in Contra Costa (35 projects), San Joaquin (337 projects), and Stanislaus (308 projects) Counties. Projects across the three counties benefited 21,616 acres of agricultural land (Table 94). Of the projects funded during the 2015 funding cycle, 33% involved the installation of micro-irrigation systems (222 projects benefiting 4,455 acres; Table 94). The most acreage was involved in Reduced Till projects, most of them from San Joaquin County (8,765 acres; Table 94 and Figure 45).

The management practices funded by AWEP and EQIP programs to date include several of the management practices recommended by the Coalition during focused outreach with targeted growers. Funding data indicate growers are utilizing financial resources to implement management practices designed to improve water quality in counties with site subwatersheds where growers have received focused outreach and in counties with site subwatersheds where focused outreach has not yet occurred.

Table 94. Practices that received EQIP and AWEP funding in SJCDWQC counties during the 2015 funding cycle.
Data are considered preliminary as counties may still be updating funding award records. Some of the practices in the Stanislaus and Contra Costa Counties may have been implemented outside of the SJCDWQC region.

Practice Group	Practice Name	Contra Costa	San Joaquin	Stanislaus	Units	Total Projects	Total Acreage Benefited
Irrigation System	Microirrigation	67.9	2,700.1	1,687.5	acres	222	4,455.5
	Sprinkler System	38.2	131.0		acres	5	169.2
	Tailwater Recovery		2		number	2	140.5
						Total Irrigation System Acreage	**4,765.2**
Irrigation Water Conveyance	Pipeline, Low-Pressure, Underground, Plastic			2000	Feet	2	57.1
	Irrigation Pipeline	9732	9033	27577	Feet	32	1,018.5
	Structure for Water Control	1	6	15	number	21	774.2
						Total Irrigation Water Conveyance Acreage	**1,849.8**
Irrigation Water Management	Irrigation Land Leveling		363.3	16.4	acres	11	379.7
	Irrigation Water Management	382.3	575.3	788.5	acres	77	1,746.1
	Land Smoothing		8.7		acres	1	8.7
	Conservation Cover	0.1			acres	1	0.1
	Hedgerow Planting	1000			Feet	2	1,036.0
						Total Water Management Acreage	**3,170.6**
Pest Management	Integrated Pest Management (IPM)		530.2		acres	20	530.2
	Precision Pest Control Application		228.2	1,516.7	acres	74	1,744.9
						Total pest Management Acreage	**2,275.1**
Nutrient Management	Nutrient Management	7.0	52.5	582.3	acres	19	641.8
	Comprehensive Nutrient Management Plan - Written		1		number	1	40.0
	Cover Crop	34.6	41.5	32.8	acres	15	108.9
						Total Nutrient Management Acreage	**790.7**
Residue and Tillage Management	Residue and Tillage Management, Reduced Till		8,088.1	676.7	acres	175	8,764.8
						Total Residue and Tillage Management Acreage	**8,764.8**
					Grand Total	**680**	**21,616.2**

Figure 45. Acres awarded AWEP and EQIP funding in SJCD counties during 2014-2015 funding cycles.



CONCLUSIONS AND RECOMMENDATIONS

Monitoring results from the 2015 WY indicate that although there are substantial improvements in water quality, all beneficial uses are not protected across the entire Coalition region. The most common exceedances of WQTLs were field parameters (DO and SC). The Agricultural BU was impaired primarily due to exceedances of the WQTL for SC. Impairment to the Aquatic Life BU occurred as a result of exceedances of the WQTLs for ammonia, chlorpyrifos, and DO. Impairment to the Municipal and Domestic Supply BU occurred as a result of elevated concentrations of ammonia, arsenic, diuron, nitrate, and simazine. Exceedances of the WQTL for *E. coli* resulted in impaired Recreational BU.

The most common exceedances involved constituents for which irrigated agriculture may not be the primary contributor, even though the land use may indicate irrigated agriculture. For many constituents, it is not clear to what extent exceedances of the WQTLs result from agricultural activities such as field parameters where source identification is difficult due to the non-conserved nature of these constituents (DO and pH). Some 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 WQTLs for pesticides or the occurrence of toxicity, the Coalition identifies sources through the analysis of preliminary PUR data, assessment of water quality data, and evaluation of management practices effectiveness.

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 Coalition 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. Some 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, *E. coli*, ammonia/nitrates, or pH.
6. Agriculture is not likely responsible for water quality impairments due to elevated concentrations of arsenic in the Coalition region.
7. The Coalition's focused outreach and tracking strategy is effective at improving water quality. The Coalition received approval on December 18, 2015 to complete 20 management plans in 10 site subwatersheds.
8. Continued improvements in water quality are expected in coming years based on results evident from past grower outreach efforts.

9. Future water quality results may be dependent on growers who are not yet members of the Coalition and do not comply with discharge requirements.

Based on the information provided in the response to the programmatic questions, the Coalition will pursue the following during the 2016 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 focused outreach and education efforts around constituents applied by agriculture.

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

1. Identify and regulate dairies in site subwatersheds that are using constituents of concern which may affect the BUs of downstream waterbodies.
2. 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.
3. Continue enforcement actions against non-members who have the potential to discharge.
4. Move forward with the processes to develop plans to study contamination of surface waters by *E. coli,* causes of elevated pH, and low dissolved oxygen.
5. 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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